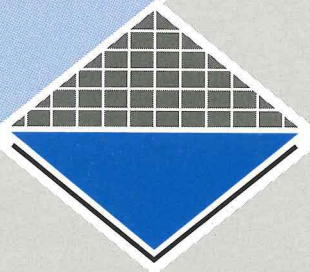
Road Injury Information Program
Report Series, Number 3

Incidence of Hospital Emergency Department Attendances for Road Injury

by
P.J. O'Connor and KPMG Peat Marwick



AUSTRALIAN INSTITUTE OF
HEALTH & WELFARE
National Injury Serveillance Unit

Federal Office of Road Safety

National Injury Surveillance Unit
Road Injury Information Program

Report documentation page

Report No.	Date	Pages	ISBN
RIIP-3	December 1993	81	0 642 20112 9

Title:
Incidence of Hospital Emergency Department Attendances for Road Injury

Author(s):
O'Connor PJ and KPMG Peat Marwick

Performing Organisation:
Road Injury & Major Trauma Program
National Injury Surveillance Unit
Mark Oliphant Building
Laffer Drive
Bedford Park S.A. 5042
Australia

Sponsors:
Road Injury & Major Trauma Program (NISU) and The Federal Office of Road Safety

Abstract:
This report contains the results of a project, jointly funded by NISU & FORS, to estimate at national level total attendances for road injury at hospital Emergency Departments in 1990/91. In order to provide a basis for subsequent estimates, the project also sought to quantify the relationship between attendances and admissions for road injury. The major impetus for the study was the lack of accurate national statistics on minor injury in road crashes, identified in several reports.

It is well known that a large proportion of low severity road crashes are never reported to police and that as a result estimates of the number of people receiving crash related injuries are likely to be significantly underestimated by police figures. This report provides some indication as to the degree of this underestimation and may provide a basis to substantially increase estimations of the economic cost of road crashes. Key results were as follows.

- It was estimated that there were 116,781 road injury attendances in Australia during 1990/91. The ratio of attendances to admissions was 3.53:1 nationally, with 95% confidence intervals of 2.82 - 4.24.

- Comparison of the point estimate of attendances derived from hospitals with an estimate of minor injury provided from Police demonstrated substantial (i.e. by 50% or more) under-reporting of minor injury in police statistics.

Information on the ratio of attendances to admissions will be used in the future to estimate annually the number of hospital attendances for road injury from national statistics on hospital admissions maintained by NISU as a part of the National Road Injury Database, developed under the Road Injury Information Program. The information will enable a better assessment of the extent of minor road injury and contribute to improved national costing of road crashes.

Further information about the Road Injury Information Program and any requests for data should be addressed to:
Assistant Director
Road Injury & Major Trauma
National Injury Surveillance Unit

Notes:

1. This report is disseminated in the interest of information exchange and to inform discussion which may be of benefit for the surveillance and prevention of road injury.
2. The views expressed are those of the author and do not necessarily represent those of the National Injury Surveillance Unit or the Australian Institute of Health & Welfare.
3. The estimates produced in the report are based on sampling of hospitals nationally. Sampling errors and 95% confidence intervals are reported to assist the reader in making use of the results. Estimates will vary from actual counts. When making State comparisons, the standard errors of the estimates must be considered.

TABLE OF CONTENTS

Section

1 EXECUTIVE SUMMARY

In late 1992, the National Injury Surveillance Unit (NISU), in conjunction with the Federal Office of Road Safety (FORS), initiated a study to estimate total attendances for road injury at hospital Emergency Departments for the financial year 1990/91. In order to provide a basis for subsequent estimates, the project also sought to quantify the relationship between attendances at hospital Emergency Departments for road injury and hospital admissions for road injury. The major impetus for the study was the lack of accurate national statistics on less severe injury in road crashes identified in several reports.[1,2] It was envisaged that through an examination of the relationship between hospital attendances and admissions for road injury and other injury, using a nationally representative sample of hospitals, a methodology could be developed for future annual estimation of Emergency Department attendances due to road injury using national statistics on hospital admissions maintained by the National Injury Surveillance Unit as part of the National Road Injury Database.

KPMG Peat Marwick Management Consultants were engaged to undertake the project which commenced in January 1993. The consulting team also incorporated the statistical expertise of the Department of Statistics, University of Adelaide.

Sampling Strategy

Fundamental to the project has been the development of an appropriate sample frame to enable the estimation of nationally based measures of hospital activity associated with road injury. A stratified random sampling methodology was developed in consultation with the Department of Statistics, University of Adelaide, based on a sampling frame developed by KPMG Peat Marwick as part of the National Costing Study. [3] The sampling frame for that study included only one NT hospital due to refusal of other hospitals to participate. The total "population" for the study comprised Australian public hospitals with 50 or more beds with an operational Emergency Department. It is to be noted that hospitals with less than 50 beds constitute only 8% of all Emergency Department occasions of service. [4] Thus, exclusion of small hospitals from the sample would have little impact on the reliability or generalisability of the study findings.

Private hospitals were specifically excluded from the population as few private hospitals had Emergency Departments operational at the time of the survey, and those that did tended to provide a more limited range of services than is typical of public hospitals. In order to achieve a representative sample, the hospital population was stratified using the following variables:

(1) State/Territory;
(2) Hospital location (metropolitan/country)*;
(3) Hospital bed size**.

* See Gillettt and Solon (1992) for definition. [5]

** The term "bed size" is used throughout the report to indicate the 'number of available beds for admitted patients' as defined in the National Health Data Dictionary.[6]

In total, 39 strata were constructed for the population of 230 hospitals in this study. A minimum of two randomly selected hospitals in each stratum was required to enable an estimate of relative standard error to be calculated for each stratum. However, this was not realised for some strata which contained only one hospital. A total of 67 hospitals were subsequently sampled in the project.

Following the data collection phase, the required estimates were derived using a weighting based upon the proportion of the beds sampled from each stratum. Table E.1, below, summarises the hospital population and sample for this project.

Table E.1
Emergency Department population and derived sample by location

State	Population			Sample		
	Metro	Country	Total	Metro	Country	Total
NSW	46	43	89	13	8	21
Vic	20	31	51	12	6	18
Qld	5	22	27	5	5	10
SA	13	14	27	4	2	6
WA	12	17	29	5	2	7
Tas	2	2	4	1	1	2
ACT	2	0	2	2	0	2
NT*	1	0	1	1	0	1
TOTAL	101	129	230	43	24	67

* Note: The sampling frame for the National Costing Study[3] included only one NT hospital due to refusal of other hospitals to participate.

It needs to be kept in mind that the principal focus of the study was the estimation of national incidence figures and ratios rather than State-level estimates. Whilst the selection of hospitals was designed to be optimal for the calculation of national estimates it may be sub-optimal at State level and this will be shown in the standard errors of the estimates.

As the power to detect significant differences is affected by the sample size, and small numbers of hospitals were drawn from some cells of the stratification matrix, some apparently large differences in the point estimates may prove to be non-significant. This does not necessarily imply that they are not practically important.

Results and Analysis

The study provided population estimates of the components of the following key relationships:

- the relationship between Emergency Department attendances for road injury and hospital admissions for road injury, and,
- the relationship between **total** attendances and **road injury** attendances at Emergency Departments.

The estimates are segmented by State/Territory, metropolitan/country, bed size, ISIS/non-ISIS and hospital type. Comparison was also made with data as reported to the Police. Unfortunately, because hospitals were unable to provide details of all injury attendances, the report was not able to examine relationships between road injury and all injury attendances.

Relationship Between Total Road Injury Attendances and Road Injury Admissions

The derived ratio estimates of Emergency Department attendances for road injury to road injury admissions, for each State, geographic location, and overall national estimate are shown in Table E.2.

Key observations are as follows:

- It was estimated that there were 116,781 road injury attendances in 1990/91 of which approximately 33,000 were admitted. The standard error of the estimate of road injury attendances was 12260 (10%), with the 95% confidence intervals being 92750 - 140811.

- The overall national ratio of road injury attendances to road injury admissions was 3.53:1. The standard error of this estimate of road injury attendances to road injury admissions was 0.36 (10%), with the 95% confidence intervals being 2.82 - 4.24.

- The national ratio of road injury attendances to road injury admissions was slightly higher for the metropolitan area (3.69:1) compared to the country (3.19:1), although this difference was not statistically significant. A total of 83,724 road injury attendances were estimated for the metropolitan region during 1990/91 of which 22,706 were admissions.

- In country Australia, an estimated 33,057 road injury attendances were calculated, with 10,372 admissions. The ratio of country road injury attendances to admissions ranged from 5.38:1 (WA) to 1.19:1 (SA).

More detailed analysis of the data is presented in the main body of the report.

Table E.2
National Estimate - Road injury attendances to admissions, 1990/91†

Location	Road injury attend	Road injury admiss	Ratio of road inj attend to admiss	Confidence Interval (95%)	
				Low	High
Metro					
NSW	34,205	9,778	3.50	2.06	4.94
VIC	17,453	4,039	4.32	2.79	5.85
QLD	5,039	1,384	3.64	3.38	3.90
SA	16,193	4,118	3.93	**	8.11
WA	6,569	2,224	2.95	2.63	3.28
TAS	1,946	495	3.93	3.86	4.00
NT[1]	657	60	10.95	*	*
ACT	1,663	608	2.74	*	*
Australia	83,724	22,706	3.69	2.69	4.69
Country					
NSW	6,999	1,984	3.53	2.02	5.03
VIC	6,538	2,602	2.51	1.48	3.54
QLD	8,440	2,105	4.01	1.92	6.09
SA	2,275	1,911	1.19	0.79	1.59
WA	6,860	1,275	5.38	5.10	5.66
TAS	1,946	495	3.93	3.86	4.00
NT					
ACT					
Australia	33,057	10,372	3.19	2.48	3.89
All regions					
NSW	41,204	11,762	3.50	2.28	4.73
VIC	23,991	6,641	3.61	2.56	4.66
QLD	13,479	3,489	3.86	2.59	5.14
SA	18,468	6,029	3.06	0.51	5.61
WA	13,429	3,499	3.84	3.04	4.64
TAS	3,892	990	3.93	3.86	4.00
NT[1]	657	60	10.95	*	*
ACT	1,663	608	2.74	*	*
Australia	116,781	33,078	3.53	2.82	4.24

† When making State comparisons, the standard errors of the estimates must be considered. See appendix 4 for details. All numbers are subject to rounding. Confidence intervals are based on stratum-specific samples of hospitals (see Table 3.1.1).

* Confidence intervals cannot be reported for NT and ACT as the figures are actual counts from only one hospital in each Territory.

** Value truncated as the lower bound in the confidence interval extended beyond a ratio of zero, which is not practically possible.

1. Caution should be exercised in using NT statistics because the sampling frame for NT consisted of only one hospital and the sample estimate for that hospital is based on a four week survey rather than complete enumeration over a twelve month period.

Relationship Between Total Emergency Department Attendances and Road Injury Attendances

The second major interest area relates to the ratio of total attendances to road injury attendances at Emergency Departments. These are summarised in Table E.3.

The key observations from these data are as follows:

- The national ratio of total attendances to road injury attendances was 38.24:1, which was derived from an estimated 4.5 million Emergency Department attendances of which nearly 117,000 are road injury related. The standard error of this ratio was 3.71 (10%). That is, for every 38.24 Emergency Department attendances, there will be one for road injury. Alternatively, it could be said that there were some 2.62 road injury attendances per 100 Emergency Department attendances.

- The national ratio of total Emergency Department attendances to road injury attendances was higher in the country (49.31:1) than in the metropolitan area (33.87:1), although this difference was not statistically significant.

- It was estimated that there were 2.8 million attendances to Emergency Departments in metropolitan areas during 1990/91 of which nearly 84,000 were road injury related.

- It was estimated that there were 1.6 million country Emergency Department attendances in 1990/91, of which approximately 33,000 were road injury related.

More detailed analysis of the data is presented in the body of this report.

Table E.3
National Estimate - Total Emergency Department attendances to road injury attendances
1990/91†

Location	Total attend	Road injury attend	Ratio of Emergency Department to road inj. attend.	Confidence Interval (95%)	
				Low	High
Metro					
NSW	973,856	34,205	28.47	13.40	43.54
VIC	732,290	17,453	41.96	38.71	45.20
QLD	387,633	5,039	76.93	66.56	87.31
SA	407,507	16,193	25.17	6.70	43.63
WA	170,938	6,569	26.02	23.38	28.67
TAS	41,781	1,946	21.47	10.45	32.49
NT[1]	6,837	657	10.41	*	*
ACT	115,209	1,663	69.28	*	*
Australia	2,836,052	83,724	33.87	25.41	42.34
Country					
NSW	451,448	6,999	64.51	51.42	77.60
VIC	329,031	6,538	50.33	23.98	76.68
QLD	407,516	8,440	48.28	14.15	82.42
SA	188,146	2,275	82.70	**	165.87
WA	212,092	6,860	30.92	30.91	30.93
TAS	41,781	1,946	21.47	10.45	32.49
NT					
ACT					
Australia	1,630,014	33,057	49.31	36.81	61.80
All regions					
NSW	1,425,304	41,204	34.59	19.98	49.20
VIC	1,061,321	23,991	44.24	36.89	51.59
QLD	795,149	13,479	58.99	32.81	85.18
SA	595,653	18,468	32.25	11.35	53.16
WA	383,030	13,429	28.52	26.36	30.68
TAS	83,562	3,892	21.47	10.45	32.49
NT[1]	6,837	657	10.41	*	*
ACT	115,209	1,663	69.28	*	*
Australia	4,466,066	116,781	38.24	30.96	45.52

† When making State comparisons, the standard errors of the estimates must be considered. See appendix 4 for details. All numbers are subject to rounding. Confidence intervals are based on stratum-specific samples of hospitals (see Table 3.1.1).

* Confidence intervals cannot be reported for NT and ACT as the figures are actual counts from only one hospital in each Territory.

** Value truncated as the lower bound in the confidence interval extended beyond a ratio of zero, which is not practically possible.

1. Caution should be exercised in using NT statistics because the sampling frame for NT consisted of only one hospital and the sample estimate for that hospital is based on a four week survey rather than complete enumeration over a twelve month period.

Comparison with Other Data Collections

An important impetus for this study related to previous studies which had shown the significant under-reporting to the Police of serious injuries. Data provided to the Federal Office of Road Safety by the various State Police departments is summarised in Table E.4, together with the estimates of road injury Emergency Department attendances and admissions as derived from this project. A number of issues are relevant when interpreting this data.

- Not all Police departments provided such data.
- Consistent definitions are not necessarily used across all jurisdictions.
- "Minor" injuries may include those reported injuries which either did not require medical treatment or those who sought treatment at locations other than hospital Emergency Departments (e.g. local general practitioner) - see Definitions, Section 2.3.
- "Serious" injuries refer to casualties admitted to hospital who do not die within 30 days of the crash from injuries sustained in the crash - see Definitions, Section 2.3.
- The 95% confidence interval on the point estimate of admissions for 1990/91, of 33078, was 28537-37619. The point estimate and the upper bound of the confidence interval was lower than expected on the basis of linear extrapolation of the known trend in hospital admissions between 1988 and 1990, which gives an expected value of 38476 admissions in 1990/91 (i.e. 11.6% reduction between 1988 and 1990, with a 1990 value of 39,626 admissions[7]). The difference probably reflects the extent of admissions to hospitals having less than 50 beds. It should therefore be considered that the estimated number of admissions could understate the true extent of admissions by as much as 16%. It should also be considered that the number of attendances was understated.

Table E.4
Comparison Between Police Reported Road Injuries, 1990/91 and Study Derived Road Injuries

State	Police Reported Minor Injury [1]*	Estimated Emergency Department attendances for Road Inj†	% Diff	Police Reported Serious Injury *	Estimated Admissions for Road Injury†	% Diff
NSW	21,353	41,204	+92.9	6,732	11,762	+74.7
WA	8,155	13,429	+64.7	2,558	3,499	+36.8
SA	6,559	18,468	+181.6	2,058	6,029	+192.9
QLD	6,499	13,479	+107.4	3,575	3,489	-2.4
TAS	1,251	3,892	+211.1	534	990	+85.4
ACT	529	1,663	+214.4	212	608	+186.8
VIC	N/A	23,991	N/A	6,162	6,641	+7.8
NT[2]	684	657	-0.04	1,114	60	-946.1

† When assessing differences, and making State comparisons, the standard errors of the estimates must be considered. See appendix 4 for details. All numbers are subject to rounding. Confidence intervals are based on stratum-specific samples of hospitals (see Table 3.1.1).

* Source : Federal Office of Road Safety, Department of Transport and Communications.

1. The minor injury data refers to 1991 calendar year. Comparison of financial year and calendar year is not thought to be a major source of bias.
2. Caution should be exercised in using NT statistics because the sampling frame for NT consisted of only one hospital and the sample estimate for that hospital is based on a four week survey rather than complete enumeration over a twelve month period.

Notwithstanding the issues raised above, a number of observations are relevant.

First, the data support the view that minor injuries are significantly understated in Police statistics. It can be calculated from Table E.4 that nationally, excluding Victoria due to a lack of comparative police data on minor injury, there were an estimated 66355 hospital attendances without admission (i.e. 92792 attendances minus 26437 admissions). This point estimate is nearly 50% higher than the corresponding police estimate of the number of people injured but not admitted to hospital as a result of road crashes. In fact it is likely that this discrepancy is even larger, both because the police figure includes people treated by medical personnel at all sites (i.e. not just Emergency Departments), and the fact that technical factors described above may have resulted in an underestimation of the true number of Emergency Department attendances.

Second, with the exception of NT and Qld, similar trends are observed across States and Territories with respect to differences between Police reported serious injury statistics and the point estimates of hospital admission for road injury. NT data should be treated with caution due to the nature of the sampling frame and method employed to estimate attendances and admissions at the sampled hospital. Also the confidence intervals on the point estimates must be considered when drawing conclusions on the basis of differences and State comparisons.

2 INTRODUCTION AND BACKGROUND

The National Injury Surveillance Unit (NISU), located in Adelaide, is an outposted unit of the Canberra-based Australian Institute of Health and Welfare. An important activity of NISU is the provision of relevant information to regulatory agencies, researchers and consumers interested in the nature, quantity and distribution of injuries in Australia.

One of the key focus areas for NISU has been studies into the impact of road injury. A report prepared by NISU under the Road Injury Information Program revealed that one third of all hospital road injury related admissions, at the national level, were not reported to Police.[1] The report also concluded that the extent of under-reporting of less severe injury is unknown as there was no reliable reporting at the national level of the extent to which road injury patients were treated at hospital Emergency Departments. The extent and cost of such minor injury is, however, thought to be substantial and worthy of accurate estimation.

The Federal Office of Road Safety (FORS), which is charged with the responsibility for the administration and co-ordination of national road user and vehicle safety programs, had earlier commissioned a study into the collection of data about road crash casualties.[2] This study advised that regular enumeration of road crash Emergency Department attendances was not feasible in the immediate future but that it would be feasible to enumerate both admissions and non-admissions of road crash casualties at a sample of hospitals to derive a ratio of non-admitted:admitted. This ratio could then be applied to admission counts at later points in time to provide estimates of the number of non-admitted road crash casualties attending hospital.

In order to pursue this issue further, NISU, in conjunction with FORS, initiated a project to estimate the incidence of hospital Emergency Department attendances for road injury. This estimate was also to be related to the number of hospital admissions for road injury in Australia through the calculation of the ratio of road injury Emergency Department attendances to road injury hospital admissions. In addition, to facilitate ongoing annual estimation of attendances (from admission data) and to understand any regional differences in these results, the project sought to gather these data across States/Territories, between metropolitan and country hospitals and across hospitals of different sizes and types.

It was envisaged that results of the project would be used for ongoing annual estimation of road injury attendances at the national level based on the admissions data provided by NISU from the national hospital morbidity file recently created, as part of the National Road Injury Database, under the Road Injury Information Program.

Fundamental to the project was the collection of a substantial set of data from a sample of Australian public hospitals operating an Emergency Department during the 1990/91 financial year. Taking account of these requirements, a number of issues required consideration during project design, including the need for sufficient hospital coverage and the availability of data required to ensure that valid statistical analyses could be undertaken.

KPMG Peat Marwick Management Consultants were engaged to undertake the project which commenced in January 1993. The consulting team also incorporated the statistical expertise of the Department of Statistics, University of Adelaide.

2.1 PROJECT METHODOLOGY

The nature of the project required an approach comprising several distinct stages, as follows:

Stage 1 - Project initiation and planning

The first stage focused on defining the framework for managing the study which included monthly project status reports to the NISU Project Manager. This stage also included agreement on the sampling strategy (further refined in Stage 2 and summarised in Chapter 3) and a protocol for communication with participating hospitals.

Stage 2 - Initiate sampling strategy

The project relied on the collection of data from a random sample of Australian public hospitals with operational Emergency Departments. This stage specifically considered the sampling strategy to be adopted for inviting hospitals to participate in the project. The study adopted a stratified random sampling methodology which, with at least two hospitals within each defined strata, enabled an estimate of relative standard error to be made. The strategy was developed in consultation with the Department of Statistics, University of Adelaide. A detailed explanation of the sampling strategy adopted, together with underlying issues, is discussed in Chapter 3.

Stage 3 - Data collection

Stage 3 involved the development and distribution of questionnaires to be used for data collection. Hospitals were invited to participate in the study via a letter addressed to the Chief Executive Officer. In addition, a letter was sent to the Chairman of the Australian College for Emergency Medicine to advise of the project.

Two sets of data were sought from hospitals as follows.

- Summary data relating to hospital admissions for road injury. Hospitals were requested to provide summary data for admissions according to the International Classification of Diseases [8], External Cause codes in the ranges E810-E819 and E826-829*.

  *This range was selected in order to facilitate comparison with Police data. Road injuries coded in these E code ranges would generally be reportable to Police under the provisions of State road safety legislation on the basis that they result from crashes that involve motor vehicles in traffic or other road vehicles which would generally be involved in crashes on roads (e.g. pedal cyclists and occupants of streetcars and animal drawn vehicles). Whilst a narrower range (E810-819 plus E826) would be more typical of the injuries in crashes reported to police the wider range provides information about under-reporting to police, which is a primary interest in the study. Admissions in the range E820-825 (i.e. non-traffic accidents), a range not covered in the scope of Police reportable crashes, were also sought but that data was not further processed due to the unavailability of comparative attendance data.

- Summary data relating to attendances for road injury (E codes 810-819 & 826-829) and total attendances at the hospital Emergency Departments was also collected.

A number of specific data items (e.g. age, gender, nature of accident, multiple visits) were requested and collected, where feasible, for a 12 month period (1990/91 financial year). Where such data were not easily obtainable, hospitals were requested to sample their attendance registers for a shorter period of three-four weeks during 1990/91. The questionnaire used for data collection is included as Appendix 1.

Stage 4 - Analysis of results

The final stage involved an analysis of the data in order to produce the required output. Analysis of patient-specific data such as age, gender, injury type, nature of accident etc, was also undertaken for those hospitals providing such data.

2.2 PROJECT TIMING AND OPERATION

The project commenced in January 1993 with overall responsibility for the project direction residing with the Project Manager, Mr Peter O'Connor, Assistant Director - Road Injury Information Program. Regular meetings were held between the consultants and the Project Manager. A written progress report was prepared for the Project Manager each month which outlined the following, as specified in the project brief:

- description of the work completed, including a listing of the people consulted, meetings held and data analysis undertaken;
- description of the work in progress and date for major project milestones with explicit comment on actual or anticipated departures from the original project schedule;
- explicit description of any actions required by the Project Manager.

2.3 DEFINITIONS

Throughout the body of this report several road accident related terms are used. In order to overcome any confusion which may arise as to their meaning in the context of this report, definitions are provided below.

Road Vehicle:	Any device (except pedestrian conveyance) upon or by which any person/property may be transported or drawn on the road.
Motor Vehicle:	Any road vehicle which is mechanically or electrically powered but not operated on rails.
Road User:	Any person who is either a pedestrian or the occupant of a road vehicle.
Serious Injury:	Whereby a person who sustains injuries is admitted to hospital as a result of a road accident and who does not die as a result of those injuries within 30 days of the accident.
Minor Injury:	Whereby a person who sustains injuries requiring medical or surgical treatment, either by a doctor or in a hospital, but is not admitted to hospital, as a result of a road accident and who does not die as a result of those injuries within 30 days of the accident.

Source: Office of Road Safety, South Australia

2.4 ACKNOWLEDGMENTS

This project relied on the participation of a significant number of hospitals throughout Australia. In addition, where data were not readily available from hospitals, State Health Authorities were able to meet our data requirements. We would therefore like to take the opportunity to acknowledge the valuable contribution made to this project by staff from the following organisations:

All hospitals participating in the study (see Appendix 2)
South Australian Health Commission (SAHC)
New South Wales Department of Health
Tasmanian Department of community and Health Services
Victorian Department of Health and Community Services

3 SAMPLING STRATEGY AND DATA COLLECTION ISSUES

Fundamental to the project has been the development of an appropriate sample frame to enable the estimation of nationally-based measures of hospital activity associated with road injury. This section of the report describes the sampling methodology adopted, the various issues considered during sampling, and the implications for analysis of the data.

As the estimates produced in the report are based on sampling, sampling errors and 95% confidence intervals are reported to assist the reader in making use of the results. Estimates of hospital admissions will vary from actual counts published by States, due to sampling error.

3.1 SAMPLE DESIGN

A stratified random sampling methodology was developed in consultation with the Department of Statistics, University of Adelaide, based on a sampling frame developed by KPMG Peat Marwick as part of the National Costing Study [3] - see Appendix 3 for details. The sampling frame for that study included only one NT hospital due to refusal of other hospitals to participate. The total "population" for the study comprised Australian public hospitals with 50 or more beds with an operational Emergency department. It is to be noted that hospitals with less than 50 beds constitute only 8% of all Emergency Department occasions of service.[4] Thus, exclusion of small hospitals from the sample would have little impact on the reliability or generalisability of the study findings. Private hospitals were specifically excluded from the population as few private hospitals had Emergency Departments operational at the time of the survey, and those that did tended to provide a more limited range of services than is typical of public hospitals.

In order to achieve a representative sample, the hospital population was stratified using the following variables:

(1) State/Territory;
(2) Hospital location (metropolitan/country)*;
(3) Hospital bed size**.

* See Gillettt and Solon (1992) for definition .[5]

** The term "bed size" is used throughout the report to indicate the 'number of available beds for admitted patients' as defined in the National Health Data Dictionary.[6]

A proportional allocation method was used to decide the sample size at the State and location level. The final level of stratification was based on hospital bed size, and from each of these strata, either two hospitals were chosen at random or the whole strata was enumerated. A minimum sample size of two in each cell enabled estimates of error to be determined.

In total, 39 strata were constructed for the population of 230 hospitals in this study. A minimum of two randomly selected hospitals in each stratum were required to enable an estimate of relative standard error to be calculated for each stratum. Some strata comprised only one hospital. A total of 67 hospitals were subsequently sampled in the project.

Following the data collection phase, the required estimates were determined by a ratio estimation procedure using a weighting based upon the proportion of the beds sampled from each stratum.

For the purpose of analysis, hospitals have also been classified using two other variables. The first according to hospital type (as defined in section 3.2.2) and the second based upon ISIS/non-ISIS (i.e. whether participating hospitals were providing data to NISU for the Injury Surveillance Information System). Table 3.1.1 summarises the hospital population and sample for this project.

Table 3.1.1
Emergency Department population and derived sample by location

State	Population			Sample		
	Metro	Country	Total	Metro	Country	Total
NSW	46	43	89	13	8	21
Vic	20	31	51	12	6	18
Qld	5	22	27	5	5	10
SA	13	14	27	4	2	6
WA	12	17	29	5	2	7
Tas	2	2	4	1	1	2
ACT	2	0	2	2	0	2
NT*	1	0	1	1	0	1
TOTAL	101	129	230	43	24	67

* Note: The sampling frame for the National Costing Study[3] included only one NT hospital due to refusal of other hospitals to participate.

It needs to be kept in mind that the principal focus of the study was the estimation of national incidence figures and ratios rather than State-level estimates. Whilst the selection of hospitals was designed to be optimal for the calculation of national estimates it may be sub-optimal at State level and this will be shown in the standard errors of the estimates.

As the power to detect significant differences is affected by the sample size, and small numbers of hospitals were surveyed in some cells of the stratification matrix, some apparently large differences in the point estimates may prove to be non-significant. This does not necessarily imply that they are not practically important.

3.2 HOSPITAL RESPONSES AND DATA COLLECTION ISSUES

As stated above, the sample for the project comprised 67 hospitals. During the course of data collection, a number of issues required action. The most significant of these related to the inability of some hospitals to participate due to the unavailability of the necessary Emergency Department data. In these circumstances, alternate hospitals (within the same stratum) were randomly selected and invited to participate. Whilst this action extended the data collection time frame, the required 67 hospitals were obtained. The second significant issue related to those hospitals which wished to be included in the study but were required to extract data manually. In these instances, data were generally collected for a representative four week period. A number of issues are worthy of note.

- Collection of data over a four-week period resulted in some loss of precision in the results, which was reflected in larger standard errors. In the NT the effects of absence of all but one hospital from the sampling frame combined with four-week data collection at the sampled hospital gave rise to estimates which must be treated with caution.

- The method used for estimation of the sample standard errors ensured that the additional imprecision was reflected in the tabulated standard error values.

- The four-week period specifically excluded holiday periods which was a conservative option designed to ensure that any bias would be in the direction of an underestimation of attendances and admissions. However, this bias was thought to be small in any event.

Admissions data were obtained from the relevant State morbidity data collection systems.

A third issue arose during data collection when some hospitals were found to fall outside the scope of the project (8 hospitals) due primarily to the cessation of Emergency Department services.

In all, a total of 111 hospitals were contacted to achieve a sample size of 67. Whilst non-response bias in the estimates was a possibility, prior knowledge of the non-responding hospitals, and the hospitals that replaced them, suggested that this was unlikely to be substantial.

A final issue related to interpretation of the data. In completing the questionnaires, hospitals reported both Emergency Department attendances and hospital admissions. If a patient was seen in the Emergency Department facility and subsequently admitted, the patient was included in both statistical counts.

The remainder of this section provides an overview of the responses received.

3.2.1 Responses by State and bed size

Table 3.2.1 summarises the sample hospitals by location and bed size. The majority of responses were from metropolitan hospitals (64% or 43 hospitals). The following observations are also of note.

- The distribution of metropolitan responses according to bed size ranged from 5% of hospitals with less than 100 beds to 23% of hospitals with more than 600 beds.
- 79% of total non-metropolitan responses, were received by hospitals with less than 200 beds.
- At a State level, the majority of responses were received from New South Wales (31%), followed by Victoria (27%), which reflected the general population distribution of beds across Australia.

Table 3.2.1
Responses by State/bed size

Location	Bed size							% of Total
	0-100	101-200	201-300	301-400	401-600	601+	Total	
Metropolitan								
NSW	1	2	2	2	2	4	13	30%
VIC	0	4	2	2	3	1	12	28%
QLD	0	2	1	0	0	2	5	12%
SA	0	1	0	0	2	1	4	9%
WA	1	0	1	1	0	2	5	12%
TAS	0	0	0	0	1	0	1	2%
NT	0	0	0	1	0	0	1	2%
ACT	0	1	0	1	0	0	2	5%
Australia	2	10	6	7	8	10	43	100%
% of total	5%	23%	14%	16%	19%	23%	100%	64%
Country								
NSW	3	3	2		0		8	33%
VIC	2	2	2		0		6	25%
QLD	2	2	0		1		5	21%
SA	0	2	0		0		2	8%
WA	0	2	0		0		2	8%
TAS	0	1	0		0		1	4%
NT	0	0	0		0		0	
ACT	0	0	0		0		0	
Australia	7	12	4		1		24	100%
% of total	29%	50%	17%		4%		100%	36%
All regions								
NSW	4	5	4	2	2	4	21	31%
VIC	2	6	4	2	3	1	18	27%
QLD	2	4	1	0	1	2	10	15%
SA	0	3	0	0	2	1	6	9%
WA	1	2	1	1	0	2	7	10%
TAS	0	1	0	0	1	0	2	3%
NT	0	0	0	1	0	0	1	1%
ACT	0	1	0	1	0	0	2	3%
Australia	9	22	10	7	9	10	67	100%
% of total	13%	33%	15%	10%	13%	15%	100%	

3.2.2 Responses by hospital type

Australian hospitals were categorised into three distinct types.*

Type 1: teaching hospitals.
Type 2: referral/base hospitals.
Type 3: community/district hospitals.
* See Gillett & Solon (1992) for definitions. [5]

Questionnaire responses by hospital type are shown in Table 3.2.2.

Table 3.2.2
Responses by hospital type

State	Type 1	Type 2	Type 3	Total
NSW	7	3	11	21
VIC	7	4	7	18
QLD	4	3	3	10
SA	3	3	0	6
WA	4	0	3	7
TAS	1	1	0	2
NT	0	1	1	2
ACT	1	0	0	1
Australia	27	15	25	67
% of total	40%	22%	37%	100%

Here we see that all hospital type categories have been well represented, with the majority of participating hospitals (40%) being Type 1.

3.2.3 Hospitals participating in the injury surveillance information system (ISIS) data collection

A number of hospitals across Australia contribute to the Injury Surveillance Information System (ISIS). Of the 67 hospitals which participated in the project, 18 (27%) are currently providing ISIS data to the National Injury Surveillance Unit (NISU). The distribution of responses by State and bed size from hospitals which are currently providing ISIS data to NISU is shown in Table 3.2.3 below.

Table 3.2.3
Responses by ISIS data

State	Bed size							% of
	0-100	101-200	201-300	301-400	401-600	601+	Total	total
NSW	1	0	0	0	1	1	3	17%
VIC	0	0	1	1	0	1	3	17%
QLD	1	2	0	0	1	0	4	22%
SA	0	0	0	0	1	0	1	6%
WA	1	0	1	0	0	1	3	17%
TAS	0	1	0	0	1	0	2	11%
NT								
ACT	0	1	0	1	0	0	2	11%
Australia	3	4	2	2	4	3	18	100%
% of total	17%	22%	11%	11%	21%	17%	100%	27%

Whilst the sample was not selected on the basis of providing ISIS data, a high proportion of ISIS hospitals were represented in the sample (i.e. 18 of the 40 ISIS hospitals or 45%) and the results were not retrospectively stratified on the basis of this variable This raised the possibility of bias in the estimates derived from the study. However, analysis of the ratios of road injury attendances to admissions, and also total Emergency Department attendances to road injury attendances, for ISIS and non-ISIS hospitals revealed no large or statistically significant national differences (see Tables 4.1.4 and 4.2.4), and only one statistically significant State difference i.e. in metropolitan Victoria there was a difference in the ratio of total Emergency Department attendances to road injury attendances (see Table 4.2.4). These results demonstrate that there was not any major bias from the high representation of ISIS hospitals in the sample.

3.2.4 Responses by survey question

The survey estimation procedure took into account the fact that many hospitals were not able to comply fully with the requested data (see Appendix 1). A high proportion of hospitals were only able to answer the mandatory questions (Q1 and Q3 of section A and Q1 of section B). Hospitals were unable to provide data on the total number of off-road vehicle accidents and so this variable is not considered further in the report. In section A, the questions refer to the total number of Emergency Department attendances during 1990/91 and the total number of Emergency Department attendances for road injury during this time. Question 1 of section B refers to the total number of admissions. A summary of responses is shown in Table 3.2.4 below.

Detailed descriptions of each of these questions can be found in the questionnaire itself (Appendix 1). Particularly relevant was the inability of hospitals (with the exception of one) to complete question 2 of section A, being the number of multiple visits by Emergency Department cases.

The underlying reason behind the difficulties hospitals experienced in extracting this information related to the lack of automated Emergency Department registers which meant, in many cases, that staff were required to extract the data manually from hard-copy registers. In some hospitals, attendance registers are not maintained in the level of detail necessary to provide the information sought in the questionnaire.

The inability of many hospitals to provide the complete range of data necessarily limited the extent to which national estimates could be derived by age group, sex, road user type and other variables.

Table 3.2.4
Responses by survey question

Location	Emergency Department attend		Road injury attendances				Road injury admissions			
	total No. (A1)	Multi Visits (A2)	total No. (A3)	Multi Visits (A4)	Age/ sex (A5)	User type (A6)	road Inj adms (B1)	Multi Visits (B2)	Age/ sex (B3)	User type (B4)
Metropolitan										
NSW	13		13	3	7	7	13	9	3	9
VIC	12		12	5	6	4	12	9	5	8
QLD	5		5	4	4	4	5	4	4	4
SA	4		4	0	1	1	4	2	2	2
WA	5		5	2	2	2	5	3	3	3
TAS	1		1	0	1	0	1	1	1	1
NT	1		1	0	0	0	1	0	0	0
ACT	2		2	1	2	0	2	2	1	0
Australia	43		43	15	23	18	43	30	19	27
% responses	64%		64%	22%	34%	27%	64%	45%	28%	40%
Country										
NSW	8	1	8	4	5	5	8	5	5	4
VIC	6	0	6	1	2	4	6	3	2	4
QLD	5	0	5	2	2	2	5	1	1	1
SA	2	0	2	1	1	1	2	2	2	2
WA	2	0	2	0	2	1	2	2	2	2
TAS	1	0	1	0	0	0	1	0	0	0
NT										
ACT										
Australia	24	1	24	8	12	13	24	13	12	13
% responses	36%	1%	36%	12%	18%	19%	36%	19%	18%	19%
All regions										
NSW	21	1	21	7	12	12	21	14	8	13
VIC	18	0	18	6	8	8	18	12	7	12
QLD	10	0	10	6	6	6	10	5	5	5
SA	6	0	6	1	2	2	6	4	4	4
WA	7	0	7	2	4	3	7	5	5	5
TAS	2	0	2	0	1	0	2	1	1	1
NT	1	0	1	0	0	0	1	0	0	0
ACT	2	0	2	1	2	0	2	2	1	0
Australia	67	1	67	23	35	31	67	43	31	40
% responses	100%	1%	100%	34%	52%	46%	100%	64%	46%	60%

4 RESULTS AND ANALYSIS OF THE DATA RECEIVED

The results from the project are presented here in two distinct parts. The study provides for population estimates of the components of the following key relationships:

- the relationship between Emergency Department attendances for road injury and hospital admissions for road injury; and,
- the relationship between **total** attendances and **road injury** attendances at Emergency Departments.

The estimates are segmented by State/Territory, metropolitan/country, bed size, ISIS/non-ISIS and hospital type. Comparison is also made with data as reported to the Police. A third area of analysis, relating to the demographic data, is also presented within the limitations of the available data. Finally, comparison is made between the results from this project and data available from other data sources. State differences in the point estimates of road injury attendances and admissions must be considered in relation to the standard errors on the estimates, details of which are provided in Appendix 4, and other factors including variations in patterns of health care utilisation related to demographic factors and ethnicity [9] as well as health status, disease rates and hospital policies. [10]

4.1 TOTAL ROAD INJURY ATTENDANCES TO ROAD INJURY ADMISSIONS

The most important objective of the study was to examine the relationship between attendances at hospital Emergency Departments for road injury and actual road injury admissions. This analysis aimed to derive a national ratio of these two measures. In presenting the results, we have separately analysed the ratio according to a number of variables, including State, geographic location, hospital type, hospital bed size and ISIS/non-ISIS. Standard errors for these ratios are also provided together with the corresponding 95% confidence interval.

We emphasise that the data represent national population estimates and not merely arithmetic averages of the sampled data.

4.1.1 Road injury attendances to road injury admissions: national estimate

The derived ratio estimate of Emergency Department attendances for road injury to road injury admissions, for each State, geographic location, and overall national estimate are shown in Table 4.1.1. It is to be noted that all estimates relate to the financial year 1990/91.

The overall national ratio of road injury attendances to road injury admissions was 3.53:1. The standard error of this estimate of road injury attendances to road injury admissions was 0.36 (10%). It was estimated that there were 116,781 road injury attendances in 1990/91 of which approximately 33,000 were admitted. None of the State ratios was significantly different from the overall national ratio.

The national ratio of road injury attendances to road injury admissions was slightly higher for the metropolitan area (3.69:1) compared to the country (3.19:1), although this difference was not statistically significant. The standard error of the ratio estimates for the metropolitan and country areas was 0.51 (14%) and 0.36 (11%) respectively.

A total of 83,724 road injury attendances was estimated for the metropolitan region during 1990/91, of which 22,706 were admitted.

In country Australia, an estimated 33,057 road injury attendances were calculated, with 10,372 admissions. The ratio of country road injury attendances to admissions ranged from 5.38:1 (Western Australia) to 1.19:1 (South Australia).

Comparison of the ratios by State and location revealed few significant differences.

Table 4.1.1
National Estimate - Road injury attendances to admissions, 1990/91†

Location	Road injury attend	Road injury admiss	Ratio of road inj attend to admiss	Std error of ratio	Ratio of std error to road injury ratio	Confidence Interval (95%)	
						Low	High
Metro							
NSW	34,205	9,778	3.50	0.74	0.21	2.06	4.94
VIC	17,453	4,039	4.32	0.78	0.18	2.79	5.85
QLD	5,039	1,384	3.64	0.13	0.04	3.38	3.90
SA	16,193	4,118	3.93	2.13	0.54	**	8.11
WA	6,569	2,224	2.95	0.17	0.06	2.63	3.28
TAS	1,946	495	3.93	0.04	0.01	3.86	4.00
NT[1]	657	60	10.95	*	*	*	*
ACT	1,663	608	2.74	*	*	*	*
Australia	83,724	22,706	3.69	0.51	0.14	2.69	4.69
Country							
NSW	6,999	1,984	3.53	0.77	0.22	2.02	5.03
VIC	6,538	2,602	2.51	0.53	0.21	1.48	3.54
QLD	8,440	2,105	4.01	1.06	0.27	1.92	6.09
SA	2,275	1,911	1.19	0.20	0.17	0.79	1.59
WA	6,860	1,275	5.38	0.14	0.03	5.10	5.66
TAS	1,946	495	3.93	0.04	0.01	3.86	4.00
NT							
ACT							
Australia	33,057	10,372	3.19	0.36	0.11	2.48	3.89
All regions							
NSW	41,204	11,762	3.50	0.62	0.18	2.28	4.73
VIC	23,991	6,641	3.61	0.54	0.15	2.56	4.66
QLD	13,479	3,489	3.86	0.65	0.17	2.59	5.14
SA	18,468	6,029	3.06	1.30	0.42	0.51	5.61
WA	13,429	3,499	3.84	0.41	0.11	3.04	4.64
TAS	3,892	990	3.93	0.04	0.01	3.86	4.00
NT[1]	657	60	10.95	*	*	*	*
ACT	1,663	608	2.74	*	*	*	*
Australia	116,781	33,078	3.53	0.36	0.10	2.82	4.24

† When making State comparisons, the standard errors of the estimates must be considered. See appendix 4 for details. All numbers are subject to rounding. Confidence intervals are based on stratum-specific samples of hospitals (see Table 3.1.1).

* Standard errors and confidence intervals cannot be reported for NT and ACT as the figures are actual counts from only one hospital in each Territory.

** Value truncated as the lower bound in the confidence interval extended beyond a ratio of zero, which is not practically possible.

1. Caution should be exercised in using NT statistics because the sampling frame for NT consisted of only one hospital and the sample estimate for that hospital is based on a four week survey rather than complete enumeration over a twelve month period.

4.1.2 Road injury attendances to road injury admissions: hospital type and State

Table 4.1.2 summarises the ratio of road injury attendances to road injury admissions by hospital type and State.

The ratio of road injury attendances to road injury admissions for Type 1 (teaching) hospitals was 2.83:1 compared to 3.57:1 for Type 2 (referral/base) hospitals and 4.31:1 for Type 3 (community/district) hospitals. These ratios were not significantly different. We emphasise that limitations on data availability did not allow separate analysis to be undertaken on the extent to which transfers from Type 3 to 2 or Type 3/2 to 1 would impact on these observations. A comparison of the ratios by State and hospital type revealed that few of the differences were statistically significant.

Table 4.1.2
Road injury attendances to road injury admissions by Type and State, 1990/91†

State/ Type	Road inj attend	Road inj admiss	Ratio of road inj attend to admiss	Std error of ratio	Ratio of std error to road inj ratio	Confidence Interval (95%)	
						Low	High
Type 1							
NSW	8,335	3,852	2.16	0.09	0.04	1.99	2.34
VIC	6,989	1,693	4.13	0.31	0.08	3.53	4.73
QLD	3,677	1,281	2.87	0.10	0.04	2.67	3.07
SA	7,885	2,537	3.11	1.04	0.33	1.07	5.14
WA	4,354	1,864	2.34	0.09	0.04	2.16	2.51
TAS	1,946	495	3.93	0.04	0.01	3.86	4.00
NT							
ACT	832	304	2.74	*	*	*	*
Australia	34,016	12,025	2.83	0.22	0.08	2.39	3.27
Type 2							
NSW	11,915	3,458	3.45	0.51	0.15	2.46	4.44
VIC	9,297	3,184	2.92	0.66	0.23	1.64	4.21
QLD	6,778	1,498	4.52	0.55	0.12	3.46	5.59
SA	6,881	1,733	3.97	2.54	0.64	**	8.96
WA							
TAS	1,946	495	3.93	0.04	0.01	3.86	4.00
NT[1]	657	60	10.95	*	*	*	*
ACT	832	304	2.74	0.00	0.00	2.74	2.74
Australia	38,305	10,731	3.57	0.49	0.14	2.62	4.52
Type 3							
NSW	20,954	4,452	4.71	1.24	0.26	2.28	7.13
VIC	7,705	1,765	4.37	1.15	0.26	2.12	6.61
QLD	3,024	709	4.26	2.82	0.66	**	9.78
SA	3,702	1,761	2.10	0.65	0.31	0.82	3.38
WA	9,075	1,636	5.55	0.29	0.05	4.98	6.12
TAS							
NT							
ACT							
Australia	44,459	10,322	4.31	0.63	0.15	3.07	5.54

† When making State comparisons, the standard errors of the estimates must be considered. See appendix 4 for details. All numbers are subject to rounding. Confidence intervals are based on stratum-specific samples of hospitals (see Table 3.1.1).

* Standard errors and confidence intervals cannot be reported for NT and ACT as the figures are actual counts from only one hospital in each Territory.

** Value truncated as the lower bound in the confidence interval extended beyond a ratio of zero, which is not practically possible.

1. Caution should be exercised in using NT statistics because the sampling frame for NT consisted of only one hospital and the sample estimate for that hospital is based on a four week survey rather than complete enumeration over a twelve month period.

The estimated national number of road injury attendances followed a similar pattern to the derived ratios for the three hospital types, and ranged from 34,016 in Type 1 (teaching) hospitals to 44,459 in Type 3 (community/district) hospitals.

4.1.3 Road injury attendances to admissions: hospital bed size and location

A further important sub-analysis related to the differences observed according to bed size. In order to undertake the analysis, hospitals were allocated to one of six bed size categories. We observed that, for 1990/91, the ratio was higher for metropolitan hospitals in all bed ranges with the exception of the 401-600 bed range, although the differences were not significantly different (see Table 4.1.3 below).

It was also observed that the ratio was negatively correlated with bed size in metropolitan hospitals. However, comparison of the ratios revealed few significant differences on the basis of bed size within the metropolitan or country locations. This raises the possibility that the ratios of road injury attendances to admissions for hospitals with less than 50 beds may not be significantly different from larger hospitals and arguably provides some justification for generalising the results of this study to the future estimation of attendances nationally on the basis of admissions to all Australian hospitals.

Table 4.1.3
Total Emergency Department attendances to road injury admissions by region and bed size, 1990/91†

Location/ No. of beds	Road inj. attend	Road inj. admiss.	Ratio of road inj attend to admiss	Std error of ratio	Ratio of std error to road inj ratio	Confidence Interval (95%)	
						Low	High
Metro							
50-100	7,687	1,422	5.41	2.44	0.45	0.63	10.19
101-200	16,404	2,764	5.93	1.28	0.22	3.43	8.44
201-300	16,302	3,995	4.08	1.14	0.28	1.85	6.31
301-400	15,273	4,267	3.58	0.54	0.15	2.53	4.63
401-600	16,208	4,813	3.37	0.35	0.10	2.69	4.05
601+	11,852	5,445	2.18	0.01	0.00	2.16	2.19
Total metro	83,724	22,706	3.69	0.51	0.14	2.69	4.69
Country							
50-100	13,372	4,063	3.29	0.60	0.18	2.12	4.46
101-200	9,667	2,891	3.34	0.43	0.13	2.51	4.18
201-300	6,206	2,292	2.71	0.33	0.12	2.06	3.36
301-400	1,105	429	2.58	0.65	0.25	1.31	3.84
401-600	2,708	698	3.88	0.84	0.22	2.24	5.52
601+							
Total country	33,057	10,372	3.19	0.36	0.11	2.48	3.89

† All numbers are subject to rounding. Confidence intervals are based on stratum-specific samples of hospitals (see Table 3.1.1).

4.1.4 Road injury attendances to road injury admissions: ISIS/non-ISIS categorisation

ISIS refers to those hospitals providing information to the National Injury Surveillance Unit's "Injury Surveillance Information System". ISIS is based on the collection of data from people who attend the Emergency Department because of injury.

Currently 40 hospitals provide ISIS data to NISU, of which 18 participated in this study. Table 4.1.4 shows the estimate of total road injury attendances and road injury admissions, together with the ratio of road injury attendances to road injury admissions derived from them for these two categories. For comparative purposes, we have also included this ratio separately by region to understand any variation between metropolitan and country hospitals.

Within metropolitan, and also country hospitals, the ratio for ISIS hospitals was not significantly different from the ratio for non-ISIS hospitals, overall or for any State.

There were however some significant differences for both ISIS and non-ISIS hospitals on the basis of location. For example, in WA the ratio for metropolitan ISIS hospitals (2.78:1) was significantly lower than the ratio for country ISIS (5.38:1), and also non-ISIS (5.38:1), hospitals. Further comparisons can be made on the basis of the data provided in table 4.1.4.

Table 4.1.4
Road injury attendances to road injury admissions by ISIS region and State, 1990/91†

State by ISIS	Road inj attend	Road inj admiss	Ratio of road inj attend. to admiss	Std error of ratio	Ratio of std error to road inj ratio	Confidence Interval (95%)	
						Low	High
ISIS - Metro							
NSW	11,379	3,171	3.59	0.88	0.24	1.87	5.31
VIC	3,612	913	3.96	1.11	0.28	1.78	6.13
QLD	2,025	526	3.85	0.07	0.02	3.71	3.99
SA	4,195	1,422	2.95	0.91	0.31	1.17	4.73
WA	1,139	410	2.78	0.37	0.13	2.06	3.50
TAS	973	248	3.93	0.04	0.01	3.86	4.00
NT							
ACT	1,663	608	2.74	*	*	*	*
Australia	24,985	7,297	3.42	0.45	0.13	2.54	4.31
NON-ISIS - Metro							
NSW	22,827	6,607	3.46	0.67	0.19	2.14	4.77
VIC	13,841	3,126	4.43	0.69	0.16	3.08	5.78
QLD	3,014	858	3.51	0.19	0.05	3.14	3.88
SA	11,998	2,697	4.45	2.88	0.65	**	10.09
WA	5,431	1,815	2.99	0.14	0.05	2.71	3.28
TAS	973	248	3.93	0.04	0.01	3.86	4.00
NT[1]	657	60	10.95	*	*	*	*
ACT							
Australia	58,741	15,411	3.81	0.57	0.15	2.70	4.92
ISIS - Country							
NSW	527	151	3.49	1.52	0.44	0.51	6.46
VIC	428	254	1.69	0.55	0.33	0.60	2.77
QLD	893	225	3.97	0.88	0.22	2.25	5.68
SA	163	137	1.19	0.20	0.17	0.79	1.59
WA	404	75	5.38	0.14	0.03	5.10	5.66
TAS	973	248	3.93	0.04	0.01	3.86	4.00
NT							
ACT							
Australia	3,388	1,090	3.11	0.34	0.11	2.44	3.77
NON-ISIS - Country							
NSW	6,472	1,833	3.53	0.71	0.20	2.14	4.92
VIC	6,110	2,348	2.60	0.56	0.22	1.50	3.71
QLD	7,547	1,880	4.01	1.09	0.27	1.88	6.15
SA	2,113	1,775	1.19	0.20	0.17	0.79	1.59
WA	6,456	1,200	5.38	0.14	0.03	5.10	5.66
TAS	973	248	3.93	0.04	0.01	3.86	4.00
NT							
ACT							
Australia	29,671	9,284	3.20	0.37	0.12	2.47	3.92

† When making State comparisons, the standard errors of the estimates must be considered. See appendix 4 for details. All numbers are subject to rounding. Confidence intervals are based on stratum-specific samples of hospitals (see Table 3.1.1).

* Standard errors and confidence intervals cannot be reported for NT and ACT as the figures are actual counts from only one hospital in each Territory.

** Value truncated as the lower bound in the confidence interval extended beyond a ratio of zero, which is not practically possible.

1. Caution should be exercised in using NT statistics because the sampling frame for NT consisted of only one hospital and the sample estimate for that hospital is based on a four week survey rather than complete enumeration over a twelve month period.

4.2 TOTAL EMERGENCY DEPARTMENT ATTENDANCES TO ROAD INJURY ATTENDANCES

The second major area of interest relates to the ratio of total attendances to road injury attendances at Emergency Departments. In this section we examine this ratio as derived at a national level by geographic location and hospital type. The results include the standard error for each of these estimates and the corresponding 95% confidence interval.

4.2.1 Total Emergency Department attendances to road injury attendances: national estimate

The estimated ratios of total Emergency Department attendances to road injury attendances, for each State, by geographic location together with the national estimate for 1990/91, are shown in Table 4.2.1.

The national ratio of total Emergency Department attendances to road injury Emergency Department attendances was 38.24:1 which was derived from an estimated 4.5 million Emergency Department attendances of which nearly 117,000 are road injury related. The relative standard error of this ratio was 3.71 (10%). That is, for every 38.24 Emergency Department attendances there was one for road injury. Alternatively, it can be said that there were some 2.62 road injury attendances per 100 Emergency Department attendances.

The national ratio of total Emergency Department attendances to road injury attendances was higher in the country (49.31:1) than in the metropolitan area (33.87:1), although this difference was not statistically significant. The standard errors of these ratio estimates were 6.37 and 4.32 respectively, giving a ratio of standard error to road injury ratio of 0.13 for both geographic locations.

It was estimated that there were 2.8 million Emergency Department attendances in metropolitan areas during 1990/91 of which nearly 84,000 are road injury related. Of note is the very high ratio of total metropolitan Emergency Department attendances to road injury attendances in Queensland (76.93:1), which is significantly higher than that for other States.

It was estimated that there were 1.6 million country Emergency Department attendances in 1990/91 of which approximately 33,000 were road injury related. The highest ratio of total country Emergency Department attendances to road injury attendances was 82.7:1 in South Australia. The standard error of this ratio was also high i.e. 42.43, which represents 51% of estimate. Significant differences in the ratios of both WA and Tas from the NSW and Australian country hospital ratios were detected.

Table 4.2.1
National Estimate - Total Emergency Department attendances to road injury attendances, 1990/91†

Location	Total Emergency Department attend	Road injury attend	Ratio of Emergency Department to road inj attend.	Std error of ratio	Ratio of std error to road injury ratio	Confidence Interval (95%)	
						Low	High
Metro							
NSW	973,856	34,205	28.47	7.69	0.27	13.40	43.54
VIC	732,290	17,453	41.96	1.66	0.04	38.71	45.20
QLD	387,633	5,039	76.93	5.29	0.07	66.56	87.31
SA	407,507	16,193	25.17	9.42	0.37	6.70	43.63
WA	170,938	6,569	26.02	1.35	0.05	23.38	28.67
TAS	41,781	1,946	21.47	5.62	0.26	10.45	32.49
NT[1]	6,837	657	10.41	*	*	*	*
ACT	115,209	1,663	69.28	*	*	*	*
Australia	2,836,052	83,724	33.87	4.32	0.13	25.41	42.34
Country							
NSW	451,448	6,999	64.51	6.68	0.10	51.42	77.60
VIC	329,031	6,538	50.33	13.44	0.27	23.98	76.68
QLD	407,516	8,440	48.28	17.42	0.36	14.15	82.42
SA	188,146	2,275	82.70	42.43	0.51	**	165.87
WA	212,092	6,860	30.92	0.01	0.00	30.91	30.93
TAS	41,781	1,946	21.47	5.62	0.26	10.45	32.49
NT							
ACT							
Australia	1,630,014	33,057	49.31	6.37	0.13	36.81	61.80
All regions							
NSW	1,425,304	41,204	34.59	7.46	0.22	19.98	49.20
VIC	1,061,321	23,991	44.24	3.75	0.08	36.89	51.59
QLD	795,149	13,479	58.99	13.36	0.23	32.81	85.18
SA	595,653	18,468	32.25	10.67	0.33	11.35	53.16
WA	383,030	13,429	28.52	1.10	0.04	26.36	30.68
TAS	83,562	3,892	21.47	5.62	0.26	10.45	32.49
NT[1]	6,837	657	10.41	*	*	*	*
ACT	115,209	1,663	69.28	*	*	*	*
Australia	4,466,066	116,781	38.24	3.71	0.10	30.96	45.52

† When making State comparisons, the standard errors of the estimates must be considered. See appendix 4 for details. All numbers are subject to rounding. Confidence intervals are based on stratum-specific samples of hospitals (see Table 3.1.1).

* Standard errors and confidence intervals cannot be reported for NT and ACT as the figures are actual counts from only one hospital in each Territory.

** Value truncated as the lower bound in the confidence interval extended beyond a ratio of zero, which is not practically possible.

1. Caution should be exercised in using NT statistics because the sampling frame for NT consisted of only one hospital and the sample estimate for that hospital is based on a four week survey rather than complete enumeration over a twelve month period.

4.2.2 Total Emergency Department attendances to road injury attendances: hospital type and State

As discussed in section 3.2.2, Australian hospitals have been categorised into three distinct groups. Type 1 hospitals refers to all teaching hospitals, Type 2 to referral/base hospitals and Type 3 hospitals to community/district hospitals.

Our analysis indicates the ratio of total Emergency Department attendances to road injury attendances for Type 1, Type 2 and Type 3 hospitals to be very

similar, being 39.32:1, 38.2:1 and 37.46:1 respectively. The estimated standard error of this ratio for each of these categories was also low, ranging from 2.57 (7%) for Type 1 hospitals to 6.42 (17%) for Type 3 hospitals.

Table 4.2.2 shows the ratio of total Emergency Department attendances to road injury attendances by hospital type and State.

Table 4.2.2
Total Emergency Department attendances to road injury attendances by type and State, 1990/91†

State/ Type	Total Emergency Department attend	Road injury attend	Ratio of Emergency Department to road inj attend	Std error of ratio	Ratio of std error to road injury ratio	Confidence Interval (95%)	
						Low	High
Type 1							
NSW	317,448	8,335	38.09	3.00	0.08	32.20	43.97
VIC	317,941	6,989	45.49	0.61	0.01	44.30	46.68
QLD	268,122	3,677	72.93	3.71	0.05	65.65	80.21
SA	215,643	7,885	27.35	6.95	0.25	13.73	40.97
WA	119,040	4,354	27.34	2.00	0.07	23.42	31.27
TAS	41,781	1,946	21.47	5.62	0.26	10.45	32.49
NT							
ACT	57,604	832	69.28	*	*	*	*
Australia	1,337,580	34,016	39.32	2.57	0.07	34.28	44.37
Type 2							
NSW	326,524	11,915	27.40	4.96	0.18	17.68	37.13
VIC	464,914	9,297	50.01	4.24	0.08	41.71	58.31
QLD	367,903	6,778	54.28	23.47	0.43	8.28	100.28
SA	197,654	6,881	28.72	12.55	0.44	4.13	53.32
WA							
TAS	41,781	1,946	21.47	5.62	0.26	10.45	32.49
NT[1]	6,837	657	10.41	*	*	*	*
ACT	57,604	832	69.28	*	*	*	*
Australia	1,463,216	38,305	38.20	4.48	0.12	29.41	46.99
Type 3							
NSW	781,333	20,954	37.29	12.27	0.33	13.24	61.33
VIC	278,466	7,705	36.14	10.07	0.28	16.41	55.87
QLD	159,124	3,024	52.62	14.64	0.28	23.92	81.32
SA	182,356	3,702	49.26	19.08	0.39	11.87	86.65
WA	263,990	9,075	29.09	1.05	0.04	27.04	31.14
TAS							
NT							
ACT							
Australia	1,665,269	44,459	37.46	6.42	0.17	24.86	50.05

† When making State comparisons, the standard errors of the estimates must be considered. See appendix 4 for details. All numbers are subject to rounding. Confidence intervals are based on stratum-specific samples of hospitals (see Table 3.1.1).

* Standard errors and confidence intervals cannot be reported for NT and ACT as the figures are actual counts from only one hospital in each Territory.

1. Caution should be exercised in using NT statistics because the sampling frame for NT consisted of only one hospital and the sample estimate for that hospital is based on a four week survey rather than complete enumeration over a twelve month period.

Consistent with the ratios discussed above, the estimated number of Emergency Department attendances was relatively even across each of the three types of hospitals, and ranged from 1.3 million in Type 1 (teaching) hospitals to 1.7 million in Type 3 (community/district) hospitals.

At a State level, the ratio of total Emergency Department attendances to road injury attendances was particularly high in Queensland Type 1 hospitals (72.93:1), and was significantly different from other States. For Type 1 and 2 hospitals there were significant variations between States. The range for Type 1 hospitals was 21.47:1 (Tas) to 72.93:1 (Qld). For Type 2 hospitals, excluding NT and ACT, the range was 21.47:1 (Tas) to 54.28:1 (Qld)

4.2.3 Total Emergency Department attendances to road injury attendances: hospital bed size and location

Bed size had little consistent association with the size of the ratio of total Emergency Department attendances to road injury attendances in the metropolitan or country areas. The only significant difference within metropolitan or country hospitals on the basis of bed-size was between 401-600 bed and 600+ bed metropolitan hospitals. There was no significant difference in the ratios between metropolitan and country hospitals as a whole.

Table 4.2.3
Total Emergency Department attendances to road injury attendances by region and bed size, 1990/91†

Location/ No. of beds	Total Emergency Department attend	Road inj attend	Ratio of Emergency Department to road inj attend	Std error of ratio	Ratio of std error to road inj ratio	Confidence Interval (95%)	
						Low	High
Metro							
50-100	245,889	7,687	31.99	9.65	0.30	13.08	50.90
101-200	580,550	16,404	35.39	9.54	0.27	16.70	54.08
201-300	481,358	16,302	29.53	8.82	0.30	12.24	46.82
301-400	576,605	15,273	37.75	2.29	0.06	33.27	42.24
401-600	481,607	16,208	29.71	2.48	0.08	24.86	34.57
601+	470,043	11,852	39.66	0.40	0.01	38.88	40.44
Total metro	2,836,052	83,724	33.87	4.32	0.13	25.41	42.34
Country							
50-100	576,803	13,372	43.14	7.38	0.17	28.68	57.59
101-200	557,597	9,667	57.68	8.05	0.14	41.90	73.46
201-300	302,995	6,206	48.83	7.68	0.16	33.77	63.88
301-400	68,424	1,105	61.92	22.32	0.36	18.17	105.67
401-600	124,196	2,708	45.86	24.09	0.53	21.77	69.95
601+							
Tot. country	1,630,014	33,057	49.31	6.37	0.13	36.81	61.80

† All numbers are subject to rounding. Confidence intervals are based on stratum-specific samples of hospitals (see Table 3.1.1).

4.2.4 Total Emergency Department attendances to road injury attendances: ISIS/non-ISIS categorisation

As discussed above in Section 4.1.4, ISIS refers to those hospitals providing information to the National Injury Surveillance Unit's "Injury Surveillance Information System". In this section, the ratio of total attendances to road injury attendances derived for ISIS and non-ISIS hospitals and geographic location, is analysed.

For both metropolitan and country hospitals, it was observed that the overall ratios of total attendances to road injury attendances for ISIS and non-ISIS hospitals were not significantly different. This result also holds true at State level except in Victoria where a significant difference in the ratios of ISIS (53.60:1) and non-ISIS (38.92:1) hospitals was found in the metropolitan area.

Whilst the overall standard error of total attendances to road injury attendances, for metropolitan and country hospitals, was relatively similar between non-ISIS hospitals (6.47) and ISIS hospitals (6.38), there were some large State differences.

Table 4.2.4
Total Emergency Department attendances to road injury attendances by ISIS region and State, 1990/91†

State by ISIS	Total Emergency Department attend	Road inj attend	Ratio Emergency Department to road inj attend	Std error of ratio	Ratio of std error to road inj ratio	Confidence Interval (95%)	
						Low	High
ISIS - Metropolitan							
NSW	314,187	11,379	27.61	8.64	0.31	10.68	44.55
VIC	193,583	3,612	53.60	2.31	0.04	49.07	58.13
QLD	168,520	2,025	83.22	4.71	0.06	74.00	92.44
SA	118,415	4,195	28.23	6.92	0.25	14.66	41.79
WA	36,014	1,139	31.63	7.88	0.25	16.19	47.08
TAS	20,891	973	21.47	5.62	0.26	10.45	32.49
NT							
ACT	115,209	1,663	69.28	*	*	*	*
Australia	966,818	24,985	38.70	5.58	0.14	27.76	49.63
NON-ISIS- Metro.							
NSW	659,669	22,827	28.90	7.22	0.25	14.74	43.06
VIC	538,707	13,841	38.92	1.75	0.04	35.49	42.35
QLD	219,113	3,014	72.71	5.96	0.08	61.03	84.40
SA	289,093	11,998	24.10	10.24	0.42	4.03	44.16
WA	134,924	5,431	24.85	0.01	0.00	24.82	24.87
NT[1]	6,837	657	10.41	*	*	*	*
TAS							
ACT							
Australia	1,869,233	58,739	31.82	4.01	0.13	23.96	39.69
ISIS - Country							
NSW	40,931	527	77.74	12.28	0.16	53.67	101.82
VIC	37,375	428	87.32	29.02	0.33	30.44	144.21
QLD	42,415	893	47.50	19.44	0.41	9.40	85.60
SA	13,439	163	82.70	42.43	0.51	**	165.87
WA	12,476	404	30.92	0.00	0.00	30.92	30.92
TAS							
NT							
ACT							
Australia	167,527	3,387	49.47	6.38	0.13	36.97	61.97
NON-ISIS -Country							
NSW	410,517	6,472	63.43	6.32	0.10	51.05	75.81
VIC	291,656	6,110	47.73	13.72	0.29	20.85	74.62
QLD	365,101	7,547	48.38	17.19	0.36	14.68	80.08
SA	174,707	2,113	82.70	42.43	0.51	**	165.87
WA	199,616	6,456	30.92	0.00	0.00	30.92	30.92
TAS							
NT							
ACT							
Australia	1,462,488	29,671	49.29	6.47	0.13	36.60	61.98

† When making State comparisons, the standard errors of the estimates must be considered. See appendix 4 for details. All numbers are subject to rounding. Confidence intervals are based on stratum-specific samples of hospitals (see Table 3.1.1).

* Standard errors and confidence intervals cannot be reported for NT and ACT as the figures are actual counts from only one hospital in each Territory.

** Value truncated as the lower bound in the confidence interval extended beyond a ratio of zero, which is not practically possible.

1. Caution should be exercised in using NT statistics because the sampling frame for NT consisted of only one hospital and the sample estimate for that hospital is based on a four week survey rather than complete enumeration over a twelve month period.

4.3 COMPARISON WITH OTHER DATA COLLECTIONS

An important impetus for this study related to previous studies which had shown a significant under-reporting to the Police of serious injuries. This section of analysis compares the observations from this study with the reported activity from Police records.

Data provided to the Federal Office of Road Safety by the various State Police departments is summarised in Table 4.3.1 together with the estimates of road injury Emergency Department attendances and admissions as derived from this project. A number of issues are relevant when interpreting this data.

- Not all Police departments provided such data.
- Consistent definitions are not necessarily used across all jurisdictions.
- "Minor" injuries may include those reported injuries which either did not require medical treatment or those who sought treatment at locations other than hospital Emergency Departments (e.g. local general practitioner) - see Definitions, Section 2.3.
- "Serious" injuries refer to casualties admitted to hospital who do not die within 30 days of the crash from injuries sustained in the crash - see Definitions, Section 2.3.
- The 95% confidence interval on the point estimate of admissions for 1990/91, of 33078, was 28537-37619. The point estimate and the upper bound of the confidence interval was lower than expected on the basis of linear extrapolation of the known trend in hospital admissions between 1988 and 1990, which gives an expected value of 38476 admissions in 1990/91 (i.e. 11.6% reduction between 1988 and 1990, with a 1990 value of 39,626 admissions[7]). The difference probably reflects the extent of admissions to hospitals having less than 50 beds. It should therefore be considered that the estimated number of admissions could understate the true extent of admissions by as much as 16%. It should also be considered that the number of attendances is understated.

Table 4.3.1
Comparison Between Police Reported Road Injuries, 1990/91 and Study Derived Road Injuries†

State	Police Reported Minor Injury [1]*	Estimated Emergency Department attendances for Road Inj	% Diff	Police Reported Serious Injury *	Estimated Admissions for Road Injury	% Diff
NSW	21,353	41,204	+92.9	6,732	11,762	+74.7
WA	8,155	13,429	+64.7	2,558	3,499	+36.8
SA	6,559	18,468	+181.6	2,058	6,029	+192.9
QLD	6,499	13,479	+107.4	3,575	3,489	-2.4
TAS	1,251	3,892	+211.1	534	990	+85.4
ACT	529	1,663	+214.4	212	608	+186.8
VIC	N/A	23,991	N/A	6,162	6,641	+7.8
NT	684	657**	-0.04	1,114	60**	-946.1

† When making State comparisons, the standard errors of the estimates must be considered. See appendix 4 for details. All numbers are subject to rounding. Confidence intervals are based on stratum-specific samples of hospitals (see Table 3.1.1).

* Source : Federal Office of Road Safety, Department of Transport and Communications.

** Caution should be exercised in using NT statistics because the sampling frame for NT consisted of only one hospital and the sample estimate for that hospital is based on a four week survey rather than complete enumeration over a twelve month period.

1. The minor injury data refers to 1991 calendar year. Comparison of financial year and calendar year is not thought to be a major source of bias.

Notwithstanding the issues raised above with respect to the definitional issues, a number of observations are relevant.

First, the data support the view that minor injuries are significantly understated in Police statistics. It can be calculated from Table 4.3.1 that nationally, excluding Victoria due to a lack of comparative police data on minor injury, there were an estimated 66355 hospital attendances without admission (i.e. 92792 attendances minus 26437 admissions). This point estimate is nearly 50% higher than the corresponding police estimate of the number of people injured but not admitted to hospital as a result of road crashes. In fact it is likely that this discrepancy is even larger, both because the police figure includes people treated by medical personnel at all sites (i.e. not just Emergency Departments), and the fact that technical factors described above may have resulted in an underestimation of the true number of Emergency Department attendances.

Second, with the exception of NT and Qld, similar trends are observed across States and Territories with respect to differences between Police reported serious injury statistics and hospital admission statistics for road injury. NT data should be treated with caution due to the nature of the sampling frame and method employed to estimate attendances and admissions at the sampled hospital. Also the confidence intervals on the point estimates must be considered when drawing conclusions on the basis of differences and State comparisons.

4.4 ADDITIONAL DATA RECEIVED

In addition to gathering the mandatory data required for the study to calculate the ratio estimates discussed above, the study also sought to gather additional data variables. Data variables requested in our questionnaire included road user type, age, gender, and the number of multiple visits.

Due to the limited installation of automated Emergency Department data collection tools, the data were unavailable in most hospitals. Nevertheless, these data are presented for the interest of the reader. Two additional pieces of information are provided, namely, an analysis of the age and gender of road accident victims and road injury type. It is emphasised that, unlike the data shown in the tables above, these refer to the data retrieved from the questionnaire survey using arithmetic averages. The following data are not estimates for the population but, rather, sample arithmetic summary data. Consequently, the data contained in the following two tables must be used with extreme care. These should not be construed as reflecting the national population, and should only be used as a guide to the breakdown of total admissions recorded by respondent hospitals.

4.4.1 Analysis of Age and Gender

The questionnaire requested hospitals to provide a breakdown of their admissions data for road injury by patients' age and gender. Table 4.4.1 provides a percentage breakdown of admissions by these variables and a male to female ratio by age. Table 4.4.2 provides the corresponding data for Emergency Department attendances.

Table 4.4.1
Age by Gender Breakdown of Road Injury Admissions, 1990/91

Age	Male	% breakdown	Female	% breakdown	Total	% breakdown	Male:Female ratio
0-9	646	9%	358	10%	1,004	9%	1.80 : 1
10-14	602	9%	335	9%	937	9%	1.80 : 1
15-19	1,250	18%	553	15%	1,803	17%	2.26 : 1
20-24	1,134	16%	459	12%	1,593	15%	2.47 : 1
25-29	938	13%	384	10%	1,322	12%	2.44 : 1
30-49	1,590	22%	768	21%	2,358	22%	2.07 : 1
50-64	506	7%	348	9%	854	8%	1.45 : 1
65+	423	6%	490	13%	913	8%	0.86 : 1
Unknown	5	0%	3	0%	8	0%	1.67 : 1
Australia	7,094	100%	3,698	100%	10,792	100%	1.92 : 1

Overall, it can be seen that the ratio of male to female admissions for road injury in 1990/91 was 1.92:1. In the survey 7,094 males compared with 3,698 females were recorded as having been admitted for road injury related causes. Consistent for both males and females the highest proportion of admissions was in the 30-49 age group, being 22% and 21% respectively. The overall ratio of males to females in this age group was 2.07:1.

For male admissions, it was observed that there was a very high number of admissions for road injury in the 15-29 age groups, accounting for 47% of all male road injury related admissions. For females, the proportion of road injury related admissions was more evenly spread across the various age groups, averaging at around 12%.

Table 4.4.2
Age and Gender Breakdown of Emergency Department Road Injury Attendances, 1990/91

Age	Male	% breakdown	Female	% breakdown	Total	% breakdown	Male:Female Ratio
0-9	1,138	9%	721	8%	1,859	9%	1.58:1
10-14	841	7%	505	5%	1,346	6%	1.67:1
15-19	2,087	17%	1,429	15%	3,516	16%	1.46:1
20-24	2,127	17%	1,529	16%	3,656	17%	1.39:1
25-29	1,331	11%	955	10%	2,286	11%	1.39:1
30-49	2,349	19%	1,951	21%	4,300	20%	1.20:1
50-64	706	6%	677	7%	1,383	6%	1.04:1
65+	526	4%	551	6%	1,077	5%	0.95:1
unknown	1,304	11%	977	11%	2,281	11%	1.33:1
Total	12,409	100%	9,295	100%	21,704	100%	1.34:1

A slightly lower male to female ratio (1.34:1) for Emergency Department attendances compared to road injury admissions was observed. A relatively high proportion of cases with unknown age was found. The 30-49 years age group had the highest percentage of Emergency Department attendances for both males and females. High percentages for the 15-24 years age group were also observed.

Overall, the 15-29 age groups accounted for 45% of total male Emergency Department attendances and 41% of total female attendances.

4.4.2 Road user type

For the purposes of data collection, road injury Emergency Department attendances and admissions relate to those with an external cause coded in the range E810-E819 & E826-E829 of the ICD-9-CM classification system. Specifically, E810-E819 relates to motor vehicle traffic accidents whilst E826-E829 relates to "other" road vehicle accidents.*

*Data on accidents falling within the E820-E825 range (i.e. off-road motor vehicle accidents) was sought in the questionnaire but was rarely provided by respondents. It was therefore excluded from the analysis.

In question 4 of Section B of the questionnaire, respondents were requested to provide us with a breakdown of road injury related admissions which correspond to E810-E819 & E826-E829 of the ICD-9-CM classification system. Table 4.4.3 provides a breakdown of admissions for road injury by road user type, as per the questionnaire.

The highest proportion of admissions coded in the range E810-E819 of the ICD-9-CM classification system were drivers of motor vehicles other than motor cycles (28.1%) followed by passengers of motor vehicles other than motor cycles (22.8%) and pedestrians (17.8%). Combined, these three road user types accounted for 68.7% of road injury admissions, within this "E" code range, recorded in the survey.

The highest proportion of admissions coded in the range E820-E825 (off-road motor vehicles) are the motor cyclist road user group (31.7%), followed by passengers within a motor vehicle other than a motor bike (20.4%). Combined, these road user types accounted for more than 52% of all admissions within this "E" code range.

Table 4.4.3
Breakdown of admissions by road user type, 1990/91

Injury type/road user type	Road injury						Other injuries	Other admiss.	Total
	E810-E819		E820-E825		E826-E829				
Driver of MV other than motor cycle	2,368	28.1%	82	11.6%	95	6.8%			
Passenger in MV other than motor cycle	1,923	22.8%	144	20.4%	558	40.1%			
Motor cyclist	1,091	12.9%	224	31.7%	178	12.8%			
Passenger on motor cycle	122	1.4%	13	1.8%	5	0.4%			
Occupant on streetcar	10	0.1%	3	0.4%	8	0.6%			
Rider of animal/occupant of animal-drawn vehicle	42	0.5%	11	1.6%	183	13.1%			
Pedal cyclist	586	6.9%	47	6.6%	303	21.8%			
Pedestrian	1,502	17.8%	85	12.0%	18	1.3%			
Other specified person	60	0.7%	40	5.7%	21	1.5%			
Unspecified person	732	8.7%	58	8.2%	23	1.7%			
Australia	8,436	100.0%	707	100.0%	1,392	100.0%			

Finally, from the E826-E829 code range ("other" road vehicle accidents) it can be observed that the highest proportion of admissions related to passengers in motor vehicles other than motor bikes (40.1%) followed by pedal cyclists (21.8%). Together these two road user types accounted for 61.9% of admissions within this "E" code range.

In summary, we see that across the three "E" code ranges, passengers of motor vehicles other than motor bikes accounted for the highest number of admissions relating to road injury in our survey (2,625). This was followed by drivers of motor vehicles other than motor cycles (2,545) and pedestrians (1,605).

REFERENCES

(1) O'Connor, PJ (1993) Road Injury in Australia. National Injury Surveillance Unit, Adelaide.

(2) Ozanne-Smith, J and Haworth, N (1993) Development of data collection methodology: crashes resulting in hospitalisation and casualty crashes not resulting in hospitalisation. Federal Office of Road Safety, Canberra. (Consultant's report number 120).

(3) KPMG Peat Marwick (1993) National costing study. Production of cost weights for AN-DRG's, Version 1: Summary report to Dept. HHLG&CS. Adelaide.

(4) KPMG Peat Marwick (1992) Estimating the incidence of hospital Accident and Emergency attendances for road injury - a study proposal, Adelaide.

(5) Gillett, S & Solon, R (1992) Hospital utilisation and costs study, 1989-90. Vol 1 - A Survey of public hospitals and related data. Health Services Series, Number 3. Australian Institute of Health & Welfare, Canberra.

(6) National Health Data Dictionary (1993) Australian Institute of Health & Welfare, Canberra.

(7) Road crashes resulting in hospitalisation, Australia 1990 (1993) Federal Office of Road Safety, Canberra.

(8) International Classification of Diseases, Ninth Revision (1977) World Health Organisation, Geneva.

(9) Harvey, R & Mathers, C (1989) Hospital utilisation and costs study, Volume 1: Commentary. Australian Institute of Health, Canberra.

(10) Cockington, RA, O'Connor, PJ & Vimpani, GV (1987) Adelaide Children's Hospital accident monitoring system, Report 2: Vehicle accidents. Child Accident Prevention Foundation of Australia, Melbourne.

Appendix 1
Hospital Questionnaire

NATIONAL INJURY SURVEILLANCE UNIT
and
FEDERAL OFFICE OF ROAD SAFETY

Estimation of the Incidence of Hospital Accident and Emergency Attendances for Road Injury

HOSPITAL QUESTIONNAIRE

Return by date: 5 March 1993

Refer any queries to:
Chris Collins (Tel. 08-237 5339)

Hospital name: _____

Geographic location (*tick box*)

Metropolitan ☐
Rural ☐

Number of approved beds (*enter number in box*) ☐☐☐☐

KPMG Peat Marwick
Management Consultants
115 Grenfell Street, Adelaide SA 5000
Telephone: (08) 236 3111; Facsimile (08) 236 3395

January 1993

For the purposes of data collection, road injury accident and emergency attendances and admissions relate to those with an external cause coded in the range E810-E819 or E826-E829 using the ICD 9 CM classification system. Specifically, E810-E819 relates to motor vehicle traffic accidents whilst E826-E829 relates to "other" road vehicle accidents. Accidents falling within the E820-E825 range are off-road motor vehicle accidents, and data relating to these should not be included in this questionnaire except where specified in the tables below.

We do, however, realise that accident and emergency attendances are not routinely coded under the "E code" classification system. Where data are not available using this code range, hospitals are requested to match their data as closely as possible to the defined table.

SECTION A ACCIDENT AND EMERGENCY ATTENDANCES IN 1990/91

This section focuses on the number of accident and emergency attendances which occurred within your hospital in 1990/91. In questions 3-5 we have requested that your hospital provide us with the number of road injury attendances which correspond to E810-E819 & E826-E829 of the ICD 9 CM classification system. We realise accident and emergency attendances may not be coded in this manner, and therefore many hospitals will not be able to provide information at this level. If you are unable to break down your data at this level, please specify below and provide the total number of road injury attendances in 1990/91. (i.e. including off-road motor vehicle accidents (E820-E825). Alternatively, data at the aggregate level may be available from the hospital's billing system as road injury victims would normally be eligible for compensation payments.

Data provided includes off-road vehicle accidents (E820-E825) Yes ☐ No ☐

Q1 **Total number of accident and emergency attendances for 1990/91 (i.e. road injury and all other causes)** *(enter number in box)* ☐☐☐☐☐☐

Q2 **Multiple visits by individuals (i.e. road injury and all other causes)**
For the period of data collection (1990/91), please record the total number of individuals who returned to your accident and emergency facility for follow-up treatment *(enter numbers in boxes)*

1 visit (initial only)	☐☐☐☐☐	**3 visits**	☐☐☐☐☐
2 visits	☐☐☐☐☐	**4+ visits**	☐☐☐☐☐

Q3 **Total number of accident and emergency attendances for road injury in 1990/91 (E810-E819 & E826-E829 only)** *(enter number in box)* ☐☐☐☐☐

Q4 **Multiple visits by road injury individuals (E810-E819 & E826-E829 only)**
For the period of data collection (1990/91), please record the number of road injury individuals who returned to your accident and emergency facility for follow-up treatment *(enter numbers in boxes)*

1 visit (initial only)	☐☐☐☐☐	**3 visits**	☐☐☐☐☐
2 visits	☐☐☐☐☐	**4+ visits**	☐☐☐☐☐

Q5 **Total number of accident and emergency attendances for road injury by gender and age categories (E810-E819 & E826-E829 only)** *(enter number in box)*

MALES		FEMALES	
0-9 yrs		0-9 yrs	
10-14 yrs		10-14 yrs	
15-19 yrs		15-19 yrs	
20-24 yrs		20-24 yrs	
25-29 yrs		25-29 yrs	
30-49 yrs		30-49 yrs	
65+ yrs		65+ yrs	
TOTAL		TOTAL	

Q6 **Road user type** *(please complete table)*

Injury Type/Road User Type (based on 4th digit "E" code)	A&E attendances					
	Road Injury			Other injuries	Other attendances	Total
	MV traffic accidents	Off-road MV accidents	Other road vehicle accidents			
Driver of motor vehicle other than motorcycle						
Passenger in motor vehicle other than motorcycle						
Motorcyclist						
Passenger on motorcycle						
Occupant on streetcar						
Rider of animal/occupant of animal-drawn vehicle						
Pedal Cyclist						
Pedestrian						
Other specified person						
Unspecified person						
Total						

Notes

(1) Shaded area not required

(2) If information relating to the fourth digit "E" code is not available for all "injury type" categories, hospitals are requested to match their data as closely as possible.

SECTION B HOSPITAL ADMISSIONS IN 1990/91

This section focuses on the number of individuals admitted to your hospital. Patients transferred from other hospitals who do not necessarily pass through your accident and emergency department but are admitted for road injury should also be included.

Q1 **Number of admissions for road injuries (E810-E819 & E826-E829 only)** *(enter numbers in boxes)*

To your Hospital (through A&E) ☐☐☐☐☐

To another hospital (transfers) ☐☐☐☐☐

To your Hospital (Transfers in - not through A&E) ☐☐☐☐☐

Q2 **Analysis of admissions for road injuries by gender and age categories (E810-E819 & E826-E829 only):**

MALES		FEMALES	
0-9 yrs		0-9 yrs	
10-14 yrs		10-14 yrs	
15-19 yrs		15-19 yrs	
20-24 yrs		20-24 yrs	
25-29 yrs		25-29 yrs	
30-49 yrs		30-49 yrs	
65+ yrs		65+ yrs	
TOTAL		TOTAL	

Q3 **Multiple admissions by road injury individuals (E810-E819 & E826-E829 only)**
For the period of data collection (1990/91), please record the number of road injury individuals who were re-admitted to your hospital within 3 months for the same "E" code. (NB: this may not necessarily be a follow-on admission.) *(enter numbers in boxes)*

1 admission (initial only)		3 admissions	
2 admissions		4+ admissions	

Q4 **Road injury type** *(please complete table)*

Injury Type/Road user type (based on 4th digit "E" code)	Admissions					
	Road Injury(2)			Other injuries	Other admissions	Total
	E810-E819	E820-E825	E826-E829			
Driver of motor vehicle other than motorcycle						
Passenger in motor vehicle other than motorcycle						
Motorcyclist						
Passenger on motorcycle						
Occupant on streetcar						
Rider of animal/occupant of animal-drawn vehicle						
Pedal Cyclist						
Pedestrian						
Other specified person						
Unspecified person						
Total						

Notes
(1) **Shaded area not required.**

(2) **E810-E819 - motor vehicle traffic accidents**
E820-E825 - off-road motor vehicle accidents
E829-E829 - other motor vehicle accidents

Appendix 2
List of participating hospitals

Appendix 2

List of Sample hospitals by Location

Location	Hospital Name	No. Beds
ACT		
Metropolitan	Calvary Hospital	121
	Woden Valley Hospital	360
NSW		
Metropolitan	Gloucester Sols.Mem.Hospital	61
	Balmain Hospital	128
	Ryde Hospital	186
	Fairfield District Hospital	224
	Royal Alexandra Hospital	300
	Nepean District Hospital	334
	Sutherland Hospital	362
	Prince Of Wales Hospital	460
	St.Vincent's Hospital	503
	Repatriation General Hospital	736
	Royal North Shore Hospital	841
	Royal Prince Alfred Hospital	882
	Westmead Centre Parramatta	1064
Country	Macksville And District Hospital	56
	Cowra District Hospital	71
	Casino And District Memorial. Hospital	98
	Shoalhaven District Memorial Hospital	118
	Armidale And New Eng. Hospital	130
	Lithgow District Hospital	140
	Orange Base Hospital	211
	Wagga Wagga Base Hospital	234
NT		
Metropolitan	Royal Darwin Hospital	342
Queensland		
Metropolitan	Mater Misericordiae - Childrens	139
	Q E II Jubilee Hospital	178
	Mater Misericordiae - Adult	262
	Princess Alexandra Hospital	1032
	Royal Brisbane Hospital	1147
Country	Roma Hospital	71
	Logan Hospital	93
	Ayr Hospital	108
	Mount Isa Hospital	155
	Toowoomba Hospital	483

Appendix 2

List of Sample hospitals by Location (cont.)

Location	Hospital Name	No. Beds
SA		
Metropolitan	Lyell McEwin Health Services	184
	Flinders Medical Centre	516
	Queen Elizabeth Hospital	588
	Royal Adelaide Hospital	928
Country	Port Augusta Hospital	106
	Mount Gambier Hospital	146
Tasmania		
Metropolitan	Royal Hobart Hospital	573
Country	Mersey General Hospital	187
Victoria		
Metropolitan	Sandringham And District Mem. Hosp.	110
	Monash Medical Centre Cam. Moorabbin	110
	Williamstown Hospital	161
	Monash Medical Centre Cam. Clayton	256
	Frankston Community Hospital	308
	Royal Childrens Hospital	354
	Geelong Hospital	448
	Austin Hospital - Heidelberg Campus	466
	St. Vincent's Hospital	488
	The Alfred Group - Alfred Hospital	605
	Royal Melbourne Hospital	861
	Preston/Northcote Community Hospital	286
Country	Kyneton District Hospital	59
	Gippsland Base Hospital	96
	Kyabram And District Mem. Com. Hosp.	129
	Hamilton Base Hospital	196
	Ballarat Base Hospital	254
	Bendigo And Northern District Hospital	280
WA		
Metropolitan	Wanneroo Hospital	84
	Princess Margaret Hospital	254
	Fremantle Hospital	363
	Sir Charles Gairdner Hospital	680
	Royal Perth Hospital	690
Country	Narrogin Regional Hospital	122
	Kalgoorlie Regional Hospital	174

Appendix 3
Detailed Sampling Strategy

APPENDIX 3

REPORT FOR ACCIDENT AND INJURY SURVEILLANCE UNIT

P Leppard
Department of Statistics
University of Adelaide
July 1993

The 230 hospitals comprising the population for this study have been analysed using a modified form of the sampling scheme adopted for the National Costing study, which was designed as a stratified random sample. A total of 67 hospitals were sampled.

The strata were constructed on the basis of state, location and hospital bed size. A proportional allocation method was used to decide the sample size at the State and location levels: hospital bed size was then used to sub-divide into the final level from which either at least two hospitals were chosen at random or the whole strata were enumerated. In total, 39 strata were thus constructed.

The population stratification and notation for an explanation of the estimation process is illustrated in Table 1.

The purpose of the exercise is to estimate the ratio of two quantities P and Q over the population of 230 hospitals. P and Q are variously defined as total "A&E attendances", total "road injury attendances" and total "through A&E adm-Not through A&E adm". Using the notation established in Table 1, estimated value of P/estimated value of Q:

$$= \quad (17\hat{p}_1 + 10\hat{p}_2 + \cdots + \hat{p}_{39}) / (17\hat{q}_1 + 10\hat{q}_2 + \cdots \hat{q}_{39})$$

$$= \quad (\hat{p}_1 + \hat{p}_1 + \cdots + \hat{p}_1 + \hat{p}_2 + \cdots + \hat{p}_2 + \cdots + \hat{p}_{39}) / (\hat{q}_1 + \hat{q}_1 + \cdots + \hat{q}_1 + \hat{q}_2 + \cdots + \hat{q}_2 + \cdots + \hat{q}_{39})$$

$$= \quad \frac{1 \times \hat{p}_1 + \cdots + 1 \times \hat{p}_1 + 0 \times \hat{q}_1 + \cdots + 0 \times \hat{q}_1 + 1 \times \hat{p}_2 + \cdots + 1 \times \hat{p}_2 + 0 \times \hat{q}_2 + \cdots + 0 \times \hat{q}_2 + \cdots + 1 \times \hat{p}_{40} + 0 \times \hat{q}_{39}}{0 \times \hat{p}_1 + \cdots + 0 \times \hat{p}_1 + 1 \times \hat{q}_1 + \cdots + 1 \times \hat{q}_1 + 0 \times \hat{p}_2 + \cdots + 0 \times \hat{p}_2 + 1 \times \hat{q}_2 + \cdots + 1 \times \hat{q}_2 + \cdots + 0 \times \hat{p}_{40} + 1 \times \hat{q}_{39}} \qquad (1)$$

$$= \quad \ell'_1 x$$

$$= \quad \hat{P}/\hat{Q} \qquad (2)$$

The vectors ℓ_1 , ℓ_2 and x are implicitly defined in (1) above, and x are implicitly defined in (1) above, and $\hat{p}_i$ and are $\hat{q}_i$ $i=1,\ldots,$ 39 are defined in Table 1.

This method of estimation is based on standard stratified sampling theory (see, for example, *Sampling Techniques* by W G Cochran, Chapters 2 and 5, 2nd edition, 1963). Simulation studies carried out for the present study indicate that the estimate (2) is an unbiased estimate of the ratio.

An estimate of error of the prediction can be obtained in the following way. The estimated variances and co-variances of $\hat{p}_i$ and $\hat{q}_i$ for strata i of size n_i are, again, from standard theory.

$$v_{i11} = (1-f_i) \sum_{\ell=1}^{n_i} \frac{(p_{i\ell} - \hat{p}_i)^2}{n_i(n_i-1)}$$

$$v_{i22} = (1-f_i) \sum_{\ell=1}^{n_i} \frac{(q_{i\ell} - \hat{q}_i)^2}{n_i(n_i-1)}$$

$$v_{i12} = v_{i21} = (1-f_i) \sum_{\ell=1}^{n_i} \frac{(p_{i\ell} - \hat{p}_i)(q_{i\ell} - \hat{q}_i)}{n_i(n_i-1)}$$

Note that for those strata which are completely enumerated, $f_i=1$ and hence there is no sampling error associated with the estimates $\hat{p}_i$ and $\hat{q}_i$.

Let M_i be the unit matrix of size $N_i \times N_i$, and define the $2N_i \times 2N_i$ matrix V_i by

$$V_i = \begin{bmatrix} v_{i11}M_i & v_{i12}M_i \\ v_{i21}M_i & v_{i22}M_i \end{bmatrix}$$

Then $V(x)$, the co-variance matrix of x, is

$$V(x) = \begin{bmatrix} V_1 & & & \\ & V_2 & & 0 \\ & & V_3 & \\ & 0 & & \bullet \\ & & & & V_{40} \end{bmatrix}$$

since between-strata estimates are independent.

Hence, estimates of the variance of $\hat{P}$ and the variance $\hat{Q}$ follow from the standard theory of a linear combination of random variables as

$$Var(\hat{P}) = \ell'_1 V(x) \ell_1$$

and

$$Var(\hat{Q}) = \ell'_2 V(x) \ell_2$$

Using the theory of non-linear functions of random variables (see, for example, *The Advanced Theory of Statistics* by M Kendall, A Stuart and J Ord, Volume 1, Chapter 10, 5th edition, 1987), an estimate of the variance of the estimated ratio can be obtained as

$$Var(\hat{P}/\hat{Q}) = d' V(x) d$$

where

$$d = (\hat{Q}\ell_1 - \hat{P}\ell_2)/\hat{Q}^2$$

(3)

The above arguments have been developed for estimation of cost per service over the whole population of 230 hospitals, but the concept is applicable to any subgroup of interest. For example, suppose an estimate is required for hospitals in metropolitan NSW, referring to equation (1) the appropriate elements of vectors ℓ_1 and ℓ_2 are set to 1 and 0, the balance of elements corresponding to hospitals outside the group of interest are set to zero, and calculations proceed in the manner already described.

It should be pointed out that, while the matrix $V(x)$ is nominally of size 460x460, use can be made of the sparse nature of $V(x)$ and matrices of much smaller size are actually used in computations.

The estimates and their standard errors are provided in Appendix 4.

Table 1
THE POPULATION, STRATIFICATION AND NOTATION FOR ESTIMATION

State	Location	Bed size	Strata	Hospital	Strata size	Sample size	P	Q	Estimates
NSW	City	b_1	1	h_1	17	2	?	?	
		b_2		h_2			?	?	$\hat{p}_1 = (p_{16}+p_{17})/2$
		•		•			•	•	
		•		•			•	•	
		•		•			•	•	$\hat{q}_1 = (q_{16}+q_{17})/2$
		b_{15}		h_{15}			?	?	
		b_{16}		h_{16}			p_{16}	p_{16}	
		b_{17}		h_{17}			p_{17}	p_{17}	
		b_{18}	2	h_{18}	10	2	?	?	
							?	?	$\hat{p}_2 = (p_{26}+p_{27})/2$
		•		•			•	•	
		•		•			•	•	
		•		•			•	•	$\hat{q}_2 = (q_{26}+q_{27})/2$
		b_{25}		h_{25}			?	?	$f_2 = 2/10$
		b_{26}		h_{26}			p_{26}	q_{26}	
		b_{27}		h_{27}			p_{27}	q_{27}	
		b_{28}	3	h_{28}	12	3	?	?	
		•		•			•	•	
		•		•			•	•	
		•		•			•	•	$\hat{p}_3 = (p_{37}+p_{38})+p_{39}/3$
		b_{37}		h_{37}			p_{37}	q_{37}	$\hat{q}_3 = (q_{37}+q_{38})+q_{39}/3$
		b_{38}		h_{38}			p_{38}	q_{38}	$f_3 = 3/10$
		b_{39}		h_{39}			p_{39}	q_{39}	

Appendix 4
Standard Errors for Estimates

	Estimate	Standard Error	RSE	95% confidence interval	
				Low	High
CITY... 50-100 BEDS					
total A&E atten	245889.34	88361.76	0.36	72700.30	419078.38
road injury att	7686.67	2159.04	0.28	3454.96	11918.38
Ratio	31.99	9.65	0.30	13.08	50.90
CITY... 101-200 BEDS					
total A&E atten	580550.00	78977.63	0.14	425753.84	735346.12
road injury att	16403.50	4425.83	0.27	7728.87	25078.14
Ratio	35.39	9.54	0.27	16.70	54.08
CITY... 201-300 BEDS					
total A&E atten	481358.00	50098.77	0.10	383164.41	579551.62
road injury att	16301.50	4390.55	0.27	7696.02	24906.98
Ratio	29.53	8.82	0.30	12.24	46.82
CITY... 301-400 BEDS					
total A&E atten	576604.50	102849.68	0.18	375019.12	778189.88
road injury att	15272.50	2285.79	0.15	10792.36	19752.64
Ratio	37.75	2.29	0.06	33.27	42.24
CITY... 401-600 BEDS					
total A&E atten	481606.81	59620.31	0.12	364751.00	598462.62
road injury att	16207.67	1575.21	0.10	13120.25	19295.08
Ratio	29.71	2.48	0.08	24.86	34.57
CITY... 601+ BEDS					
total A&E atten	470042.66	10027.42	0.02	450388.91	489696.41
road injury att	11851.83	236.99	0.02	11387.33	12316.34
Ratio	39.66	0.40	0.01	38.88	40.44
COUNTRY 50-100 BEDS					
total A&E atten	576803.00	139639.56	0.24	303109.44	850496.56
road injury att	13371.50	2767.14	0.21	7947.90	18795.10
Ratio	43.14	7.38	0.17	28.68	57.59
COUNTRY 101-200 BEDS					
total A&E atten	557596.50	91703.77	0.16	377857.12	737335.88
road injury att	9667.00	2425.36	0.25	4913.29	14420.71
Ratio	57.68	8.05	0.14	41.90	73.46
COUNTRY 201-300 BEDS					
total A&E atten	302994.50	21662.55	0.07	260535.89	345453.09
road injury att	6205.50	1009.71	0.16	4226.46	8184.54
Ratio	48.83	7.68	0.16	33.77	63.88
COUNTRY 301-400 BEDS					
total A&E atten	68424.00	2811.36	0.04	62913.74	73934.26
road injury att	1105.00	428.88	0.39	264.40	1945.60
Ratio	61.92	22.32	0.36	18.17	105.67
COUNTRY 401-600 BEDS					
total A&E atten	124196.00	9910.81	0.08	104770.81	143621.19
road injury att	2708.00	1638.52	0.61	0.00	5919.50
Ratio	45.86	24.09	0.53	0.00	93.08
COUNTRY 601+ BEDS					
total A&E atten	0.00	0.00	0.00	0.00	0.00
road injury att	0.00	0.00	0.00	0.00	0.00
Ratio	0.00	0.00	0.00	0.00	0.00
NSW CITY ISIS					
total A&E atten	314187.00	57160.25	0.18	202152.91	426221.09
road injury att	11378.50	3437.33	0.30	4641.32	18115.68
Ratio	27.61	8.64	0.31	10.68	44.55

VIC CITY ISIS					
total A&E atten	193583.34	40751.75	0.21	113709.91	273456.78
road injury att	3611.67	889.46	0.25	1868.33	5355.00
Ratio	53.60	2.31	0.04	49.07	58.13
QLD CITY ISIS					
total A&E atten	168520.00	16621.29	0.10	135942.28	201097.72
road injury att	2025.00	85.21	0.04	1858.00	2192.00
Ratio	83.22	4.71	0.06	74.00	92.44
SA CITY ISIS					
total A&E atten	118414.50	10623.50	0.09	97592.44	139236.56
road injury att	4195.00	760.17	0.18	2705.07	5684.93
Ratio	28.23	6.92	0.25	14.66	41.79
WA CITY ISIS					
total A&E atten	36014.00	11695.85	0.32	13090.14	58937.86
road injury att	1138.50	320.15	0.28	511.00	1766.00
Ratio	31.63	7.88	0.25	16.19	47.08
TAS CITY ISIS					
total A&E atten	20890.50	11391.14	0.55	0.00	43217.12
road injury att	973.00	275.77	0.28	432.49	1513.51
Ratio	21.47	5.62	0.26	10.45	32.49
NT CITY ISIS					
total A&E atten	0.00	0.00	0.00	0.00	0.00
road injury att	0.00	0.00	0.00	0.00	0.00
Ratio	0.00	0.00	0.00	0.00	0.00
ACT CITY ISIS					
total A&E atten	115209.00	0.00	0.00	115209.00	115209.00
road injury att	1663.00	0.00	0.00	1663.00	1663.00
Ratio	69.28	0.00	0.00	69.28	69.28
NSW CITY NON_ISIS					
total A&E atten	659668.88	146209.36	0.22	373098.53	946239.25
road injury att	22826.50	5663.81	0.25	11725.43	33927.57
Ratio	28.90	7.22	0.25	14.74	43.06
VIC CITY NON_ISIS					
total A&E atten	538707.00	82663.27	0.15	376687.00	700727.00
road injury att	13841.00	1932.79	0.14	10052.73	17629.27
Ratio	38.92	1.75	0.04	35.49	42.35
QLD CITY NON-ISIS					
total A&E atten	219113.00	26370.32	0.12	167427.17	270798.81
road injury att	3013.50	127.86	0.04	2762.90	3264.10
Ratio	72.71	5.96	0.08	61.03	84.40
SA CITY NON-ISIS					
total A&E atten	289092.50	31251.37	0.11	227839.81	350345.19
road injury att	11997.50	3800.79	0.32	4547.95	19447.05
Ratio	24.10	10.24	0.42	4.03	44.16
WA CITY NON-ISIS					
total A&E atten	134924.00	27780.39	0.21	80474.44	189373.56
road injury att	5430.50	1120.48	0.21	3234.37	7626.63
Ratio	24.85	0.01	0.00	24.82	24.87
TAS CITY NON-ISIS					
total A&E atten	20890.50	11391.14	0.55	0.00	43217.12
road injury att	973.00	275.77	0.28	432.49	1513.51
Ratio	21.47	5.62	0.26	10.45	32.49
NT CITY NON-ISIS					

total A&E atten	6837.00	0.00	0.00	6837.00	6837.00
road injury att	657.00	0.00	0.00	657.00	657.00
Ratio	10.41	0.00	0.00	10.41	10.41
ACT CITY NON-ISIS					
total A&E atten	0.00	0.00	0.00	0.00	0.00
road injury att	0.00	0.00	0.00	0.00	0.00
Ratio	0.00	0.00	0.00	0.00	0.00
NSW COUNTRY ISIS					
total A&E atten	40931.00	6922.73	0.17	27362.45	54499.55
road injury att	526.50	129.58	0.25	272.52	780.48
Ratio	77.74	12.28	0.16	53.67	101.82
VIC COUNTRY ISIS					
total A&E atten	37375.00	1328.42	0.04	34771.29	39978.71
road injury att	428.00	127.03	0.30	179.01	676.99
Ratio	87.32	29.02	0.33	30.44	144.21
QLD COUNTRY ISIS					
total A&E atten	42415.00	8918.04	0.21	24935.64	59894.36
road injury att	893.00	425.13	0.48	59.75	1726.25
Ratio	47.50	19.44	0.41	9.40	85.60
SA COUNTRY ISIS					
total A&E atten	13439.00	3564.41	0.27	6452.76	20425.24
road injury att	162.50	40.27	0.25	83.56	241.44
Ratio	82.70	42.43	0.51	0.00	165.87
WA COUNTRY ISIS					
total A&E atten	12476.00	8145.92	0.65	0.00	28442.01
road injury att	403.50	263.48	0.65	0.00	919.93
Ratio	30.92	0.00	0.00	30.92	30.92
TAS COUNTRY ISIS					
total A&E atten	20890.50	11391.14	0.55	0.00	43217.12
road injury att	973.00	275.77	0.28	432.49	1513.51
Ratio	21.47	5.62	0.26	10.45	32.49
NT COUNTRY ISIS					
total A&E atten	0.00	0.00	0.00	0.00	0.00
road injury att	0.00	0.00	0.00	0.00	0.00
Ratio	0.00	0.00	0.00	0.00	0.00
ACT COUNTRY ISIS					
total A&E atten	0.00	0.00	0.00	0.00	0.00
road injury att	0.00	0.00	0.00	0.00	0.00
Ratio	0.00	0.00	0.00	0.00	0.00
NSW COUNTRY NON_ISIS					
total A&E atten	410517.00	73423.53	0.18	266606.88	554427.12
road injury att	6472.00	1371.01	0.21	3784.82	9159.18
Ratio	63.43	6.32	0.10	51.05	75.81
VIC COUNTRY NON_ISIS					
total A&E atten	291656.00	69779.81	0.24	154887.56	428424.44
road injury att	6110.00	608.00	0.10	4918.31	7301.69
Ratio	47.73	13.72	0.29	20.85	74.62
QLD COUNTRY NON-ISIS					
total A&E atten	365101.00	112712.57	0.31	144184.36	586017.62
road injury att	7547.00	3226.18	0.43	1223.69	13870.31
Ratio	48.38	17.19	0.36	14.68	82.08
SA COUNTRY NON-ISIS					
total A&E atten	174707.00	46337.34	0.27	83885.82	265528.19

road injury att	2112.50	523.55	0.25	1086.34	3138.66
Ratio	82.70	42.43	0.51	0.00	165.87
WA COUNTRY NON-ISIS					
total A&E atten	199616.00	130334.88	0.65	0.00	455072.38
road injury att	6456.00	4215.75	0.65	0.00	14718.87
Ratio	30.92	0.00	0.00	30.92	30.92
TAS COUNTRY NON-ISIS					
total A&E atten	20890.50	11391.14	0.55	0.00	43217.12
road injury att	973.00	275.77	0.28	432.49	1513.51
Ratio	21.47	5.62	0.26	10.45	32.49
NT COUNTRY NON-ISIS					
total A&E atten	0.00	0.00	0.00	0.00	0.00
road injury att	0.00	0.00	0.00	0.00	0.00
Ratio	0.00	0.00	0.00	0.00	0.00
ACT COUNTRY NON-ISIS					
total A&E atten	0.00	0.00	0.00	0.00	0.00
road injury att	0.00	0.00	0.00	0.00	0.00
Ratio	0.00	0.00	0.00	0.00	0.00
CITY ISIS					
total A&E atten	966818.38	77630.12	0.08	814663.38	1118973.38
road injury att	24984.67	3656.52	0.15	17817.89	32151.45
Ratio	38.70	5.58	0.14	27.76	49.63
CITY NON_ISIS					
total A&E atten	1869232.75	175873.38	0.09	1524521.00	2213944.50
road injury att	58739.00	7183.89	0.12	44658.58	72819.41
Ratio	31.82	4.01	0.13	23.96	39.69
COUNTRY ISIS					
total A&E atten	167526.50	18385.85	0.11	131490.23	203562.77
road injury att	3386.50	600.63	0.18	2209.26	4563.74
Ratio	49.47	6.38	0.13	36.97	61.97
COUNTRY NON_ISIS					
total A&E atten	1462487.50	205495.38	0.14	1059716.50	1865258.50
road injury att	29670.50	5548.00	0.19	18796.42	40544.58
Ratio	49.29	6.47	0.13	36.60	61.98
CITY... 50-100 BEDS					
road injury att	7686.67	2159.04	0.28	3454.96	11918.38
through A&E_adm	1421.50	494.29	0.35	452.70	2390.30
Ratio	5.41	2.44	0.45	0.63	10.19
CITY... 101-200 BEDS					
road injury att	16403.50	4425.83	0.27	7728.87	25078.14
through A&E_adm	2764.00	385.48	0.14	2008.46	3519.54
Ratio	5.93	1.28	0.22	3.43	8.44
CITY... 201-300 BEDS					
road injury att	16301.50	4390.55	0.27	7696.02	24906.98
through A&E_adm	3995.00	458.33	0.11	3096.68	4893.32
Ratio	4.08	1.14	0.28	1.85	6.31
CITY... 301-400 BEDS					
road injury att	15272.50	2285.79	0.15	10792.36	19752.64
through A&E_adm	4267.00	706.11	0.17	2883.02	5650.98
Ratio	3.58	0.54	0.15	2.53	4.63
CITY... 401-600 BEDS					
road injury att	16207.67	1575.21	0.10	13120.25	19295.08
through A&E_adm	4813.33	625.93	0.13	3586.52	6040.15

Ratio	3.37	0.35	0.10	2.69	4.05
CITY... 601+ BEDS					
road injury att	11851.83	236.99	0.02	11387.33	12316.34
through A&E_adm	5444.67	116.39	0.02	5216.55	5672.79
Ratio	2.18	0.01	0.00	2.16	2.19
COUNTRY 50-100 BEDS					
road injury att	13371.50	2767.14	0.21	7947.90	18795.10
through A&E_adm	4063.33	737.55	0.18	2617.73	5508.93
Ratio	3.29	0.60	0.18	2.12	4.46
COUNTRY 101-200 BEDS					
road injury att	9667.00	2425.36	0.25	4913.29	14420.71
through A&E_adm	2890.50	482.45	0.17	1944.90	3836.10
Ratio	3.34	0.43	0.13	2.51	4.18
COUNTRY 201-300 BEDS					
road injury att	6205.50	1009.71	0.16	4226.46	8184.54
through A&E_adm	2292.00	182.86	0.08	1933.59	2650.41
Ratio	2.71	0.33	0.12	2.06	3.36
COUNTRY 301-400 BEDS					
road injury att	1105.00	428.88	0.39	264.40	1945.60
through A&E_adm	428.50	68.42	0.16	294.39	562.61
Ratio	2.58	0.65	0.25	1.31	3.84
COUNTRY 401-600 BEDS					
road injury att	2708.00	1638.52	0.61	0.00	5919.50
through A&E_adm	698.00	271.93	0.39	165.01	1230.99
Ratio	3.88	0.84	0.22	2.24	5.52
COUNTRY 601+ BEDS					
road injury att	0.00	0.00	0.00	0.00	0.00
through A&E_adm	0.00	0.00	0.00	0.00	0.00
Ratio	0.00	0.00	0.00	0.00	0.00
NSW CITY ISIS					
road injury att	11378.50	3437.33	0.30	4641.32	18115.68
through A&E_adm	3171.00	419.11	0.13	2349.55	3992.45
Ratio	3.59	0.88	0.24	1.87	5.31
VIC CITY ISIS					
road injury att	3611.67	889.46	0.25	1868.33	5355.00
through A&E_adm	913.00	32.27	0.04	849.75	976.25
Ratio	3.96	1.11	0.28	1.78	6.13
QLD CITY ISIS					
road injury att	2025.00	85.21	0.04	1858.00	2192.00
through A&E_adm	526.00	12.39	0.02	501.71	550.29
Ratio	3.85	0.07	0.02	3.71	3.99
SA CITY ISIS					
road injury att	4195.00	760.17	0.18	2705.07	5684.93
through A&E_adm	1421.50	183.15	0.13	1062.52	1780.48
Ratio	2.95	0.91	0.31	1.17	4.73
WA CITY ISIS					
road injury att	1138.50	320.15	0.28	511.00	1766.00
through A&E_adm	409.50	91.89	0.22	229.39	589.61
Ratio	2.78	0.37	0.13	2.06	3.50
TAS CITY ISIS					
road injury att	973.00	275.77	0.28	432.49	1513.51
through A&E_adm	247.50	72.48	0.29	105.44	389.56
Ratio	3.93	0.04	0.01	3.86	4.00

NT CITY ISIS					
road injury att	0.00	0.00	0.00	0.00	0.00
through A&E_adm	0.00	0.00	0.00	0.00	0.00
Ratio	0.00	0.00	0.00	0.00	0.00
ACT CITY ISIS					
road injury att	1663.00	0.00	0.00	1663.00	1663.00
through A&E_adm	608.00	0.00	0.00	608.00	608.00
Ratio	2.74	0.00	0.00	2.74	2.74
NSW CITY NON_ISIS					
road injury att	22826.50	5663.81	0.25	11725.43	33927.57
through A&E_adm	6606.50	1146.11	0.17	4360.12	8852.88
Ratio	3.46	0.67	0.19	2.14	4.77
VIC CITY NON_ISIS					
road injury att	13841.00	1932.79	0.14	10052.73	17629.27
through A&E_adm	3126.00	71.02	0.02	2986.81	3265.19
Ratio	4.43	0.69	0.16	3.08	5.78
QLD CITY NON-ISIS					
road injury att	3013.50	127.86	0.04	2762.90	3264.10
through A&E_adm	857.50	45.42	0.05	768.48	946.52
Ratio	3.51	0.19	0.05	3.14	3.88
SA CITY NON-ISIS					
road injury att	11997.50	3800.79	0.32	4547.95	19447.05
through A&E_adm	2697.00	892.02	0.33	948.64	4445.36
Ratio	4.45	2.88	0.65	0.00	10.09
WA CITY NON-ISIS					
road injury att	5430.50	1120.48	0.21	3234.37	7626.63
through A&E_adm	1814.50	287.06	0.16	1251.85	2377.15
Ratio	2.99	0.14	0.05	2.71	3.28
TAS CITY NON-ISIS					
road injury att	973.00	275.77	0.28	432.49	1513.51
through A&E_adm	247.50	72.48	0.29	105.44	389.56
Ratio	3.93	0.04	0.01	3.86	4.00
NT CITY NON-ISIS					
road injury att	657.00	0.00	0.00	657.00	657.00
through A&E_adm	60.00	0.00	0.00	60.00	60.00
Ratio	10.95	0.00	0.00	10.95	10.95
ACT CITY NON-ISIS					
road injury att	0.00	0.00	0.00	0.00	0.00
through A&E_adm	0.00	0.00	0.00	0.00	0.00
Ratio	0.00	0.00	0.00	0.00	0.00
NSW COUNTRY ISIS					
road injury att	526.50	129.58	0.25	272.52	780.48
through A&E_adm	151.00	77.66	0.51	0.00	303.22
Ratio	3.49	1.52	0.44	0.51	6.46
VIC COUNTRY ISIS					
road injury att	428.00	127.03	0.30	179.01	676.99
through A&E_adm	254.00	7.75	0.03	238.82	269.18
Ratio	1.69	0.55	0.33	0.60	2.77
QLD COUNTRY ISIS					
road injury att	893.00	425.13	0.48	59.75	1726.25
through A&E_adm	225.17	71.36	0.32	85.30	365.03
Ratio	3.97	0.88	0.22	2.25	5.68

SA COUNTRY ISIS					
road injury att	162.50	40.27	0.25	83.56	241.44
through A&E_adm	136.50	10.65	0.08	115.63	157.37
Ratio	1.19	0.20	0.17	0.79	1.59
WA COUNTRY ISIS					
road injury att	403.50	263.48	0.65	0.00	919.93
through A&E_adm	75.00	46.97	0.63	0.00	167.05
Ratio	5.38	0.14	0.03	5.10	5.66
TAS COUNTRY ISIS					
road injury att	973.00	275.77	0.28	432.49	1513.51
through A&E_adm	247.50	72.48	0.29	105.44	389.56
Ratio	3.93	0.04	0.01	3.86	4.00
NT COUNTRY ISIS					
road injury att	0.00	0.00	0.00	0.00	0.00
through A&E_adm	0.00	0.00	0.00	0.00	0.00
Ratio	0.00	0.00	0.00	0.00	0.00
ACT COUNTRY ISIS					
road injury att	0.00	0.00	0.00	0.00	0.00
through A&E_adm	0.00	0.00	0.00	0.00	0.00
Ratio	0.00	0.00	0.00	0.00	0.00
NSW COUNTRY NON_ISIS					
road injury att	6472.00	1371.01	0.21	3784.82	9159.18
through A&E_adm	1833.00	489.39	0.27	873.79	2792.21
Ratio	3.53	0.71	0.20	2.14	4.92
VIC COUNTRY NON_ISIS					
road injury att	6110.00	608.00	0.10	4918.31	7301.69
through A&E_adm	2348.00	399.57	0.17	1564.83	3131.17
Ratio	2.60	0.56	0.22	1.50	3.71
QLD COUNTRY NON-ISIS					
road injury att	7547.00	3226.18	0.43	1223.69	13870.31
through A&E_adm	1880.17	553.19	0.29	795.92	2964.41
Ratio	4.01	1.09	0.27	1.88	6.15
SA COUNTRY NON-ISIS					
road injury att	2112.50	523.55	0.25	1086.34	3138.66
through A&E_adm	1774.50	138.41	0.08	1503.22	2045.78
Ratio	1.19	0.20	0.17	0.79	1.59
WA COUNTRY NON-ISIS					
road injury att	6456.00	4215.75	0.65	0.00	14718.87
through A&E_adm	1200.00	751.47	0.63	0.00	2672.88
Ratio	5.38	0.14	0.03	5.10	5.66
TAS COUNTRY NON-ISIS					
road injury att	973.00	275.77	0.28	432.49	1513.51
through A&E_adm	247.50	72.48	0.29	105.44	389.56
Ratio	3.93	0.04	0.01	3.86	4.00
NT COUNTRY NON-ISIS					
road injury att	0.00	0.00	0.00	0.00	0.00
through A&E_adm	0.00	0.00	0.00	0.00	0.00
Ratio	0.00	0.00	0.00	0.00	0.00
ACT COUNTRY NON-ISIS					
road injury att	0.00	0.00	0.00	0.00	0.00
through A&E_adm	0.00	0.00	0.00	0.00	0.00
Ratio	0.00	0.00	0.00	0.00	0.00
CITY ISIS					

road injury att	24984.67	3656.52	0.15	17817.89	32151.45
through A&E_adm	7296.50	484.14	0.07	6347.58	8245.42
Ratio	3.42	0.45	0.13	2.54	4.31
CITY NON_ISIS					
road injury att	58739.00	7183.89	0.12	44658.58	72819.41
through A&E_adm	15409.00	1485.76	0.10	12496.92	18321.08
Ratio	3.81	0.57	0.15	2.70	4.92
COUNTRY ISIS					
road injury att	3386.50	600.63	0.18	2209.26	4563.74
through A&E_adm	1089.17	136.95	0.13	820.74	1357.60
Ratio	3.11	0.34	0.11	2.44	3.77
COUNTRY NON_ISIS					
road injury att	29670.50	5548.00	0.19	18796.42	40544.58
through A&E_adm	9283.16	1137.67	0.12	7053.33	11513.00
Ratio	3.20	0.37	0.12	2.47	3.92

CITY... 50-100 BEDS	Number in group = 16	
total A&E atten	15368.08	5522.61
road injury att	480.42	134.94
CITY... 101-200 BEDS	Number in group = 26	
total A&E atten	22328.85	3037.60
road injury att	630.90	170.22
CITY... 201-300 BEDS	Number in group = 16	
total A&E atten	30084.88	3131.17
road injury att	1018.84	274.41
CITY... 301-400 BEDS	Number in group = 17	
total A&E atten	33917.91	6049.98
road injury att	898.38	134.46
CITY... 401-600 BEDS	Number in group = 15	
total A&E atten	32107.12	3974.69
road injury att	1080.51	105.01
CITY... 601+ BEDS	Number in group = 11	
total A&E atten	42731.15	911.58
road injury att	1077.44	21.54
COUNTRY 50-100 BEDS	Number in group = 67	
total A&E atten	8609.00	2084.17
road injury att	199.57	41.30
COUNTRY 101-200 BEDS	Number in group = 44	
total A&E atten	12672.65	2084.18
road injury att	219.70	55.12
COUNTRY 201-300 BEDS	Number in group = 12	
total A&E atten	25249.54	1805.21
road injury att	517.12	84.14
COUNTRY 301-400 BEDS	Number in group = 2	
total A&E atten	34212.00	1405.68
road injury att	552.50	214.44
COUNTRY 401-600 BEDS	Number in group = 4	
total A&E atten	31049.00	2477.70
road injury att	677.00	409.63
COUNTRY 601+ BEDS	Number in group = 0	
total A&E atten	0.00	0.00
road injury att	0.00	0.00
NSW CITY ISIS	Number in group = 14	
total A&E atten	22441.93	4082.87
road injury att	812.75	245.52
VIC CITY ISIS	Number in group = 4	
total A&E atten	48395.84	10187.94
road injury att	902.92	222.36
QLD CITY ISIS	Number in group = 4	
total A&E atten	42130.00	4155.32
road injury att	506.25	21.30
SA CITY ISIS	Number in group = 3	
total A&E atten	39471.50	3541.17
road injury att	1398.33	253.39
WA CITY ISIS	Number in group = 3	

total A&E atten	12004.67	3898.62
road injury att	379.50	106.72
TAS CITY ISIS	Number in group =	1
total A&E atten	20890.50	11391.14
road injury att	973.00	275.77
NT CITY ISIS	Number in group =	0
total A&E atten	0.00	0.00
road injury att	0.00	0.00
ACT CITY ISIS	Number in group =	2
total A&E atten	57604.50	0.00
road injury att	831.50	0.00
NSW CITY NON_ISIS	Number in group =	32
total A&E atten	20614.65	4569.04
road injury att	713.33	176.99
VIC CITY NON_ISIS	Number in group =	16
total A&E atten	33669.19	5166.45
road injury att	865.06	120.80
QLD CITY NON-ISIS	Number in group =	5
total A&E atten	43822.60	5274.06
road injury att	602.70	25.57
SA CITY NON-ISIS	Number in group =	6
total A&E atten	48182.08	5208.56
road injury att	1999.58	633.47
WA CITY NON-ISIS	Number in group =	9
total A&E atten	14991.56	3086.71
road injury att	603.39	124.50
TAS CITY NON-ISIS	Number in group =	1
total A&E atten	20890.50	11391.14
road injury att	973.00	275.77
NT CITY NON-ISIS	Number in group =	1
total A&E atten	6837.00	0.00
road injury att	657.00	0.00
ACT CITY NON-ISIS	Number in group =	0
total A&E atten	0.00	0.00
road injury att	0.00	0.00
NSW COUNTRY ISIS	Number in group =	5
total A&E atten	8186.20	1384.55
road injury att	105.30	25.92
VIC COUNTRY ISIS	Number in group =	1
total A&E atten	37375.00	1328.42
road injury att	428.00	127.03
QLD COUNTRY ISIS	Number in group =	2
total A&E atten	21207.50	4459.02
road injury att	446.50	212.56
SA COUNTRY ISIS	Number in group =	1
total A&E atten	13439.00	3564.41
road injury att	162.50	40.27
WA COUNTRY ISIS	Number in group =	1
total A&E atten	12476.00	8145.92
road injury att	403.50	263.48

TAS COUNTRY ISIS	Number in group =	1
total A&E atten	20890.50	11391.14
road injury att	973.00	275.77
NT COUNTRY ISIS	Number in group =	0
total A&E atten	0.00	0.00
road injury att	0.00	0.00
ACT COUNTRY ISIS	Number in group =	0
total A&E atten	0.00	0.00
road injury att	0.00	0.00
NSW COUNTRY NON_ISIS	Number in group =	38
total A&E atten	10803.08	1932.20
road injury att	170.32	36.08
VIC COUNTRY NON_ISIS	Number in group =	30
total A&E atten	9721.87	2325.99
road injury att	203.67	20.27
QLD COUNTRY NON-ISIS	Number in group =	20
total A&E atten	18255.05	5635.63
road injury att	377.35	161.31
SA COUNTRY NON-ISIS	Number in group =	13
total A&E atten	13439.00	3564.41
road injury att	162.50	40.27
WA COUNTRY NON-ISIS	Number in group =	16
total A&E atten	12476.00	8145.93
road injury att	403.50	263.48
TAS COUNTRY NON-ISIS	Number in group =	1
total A&E atten	20890.50	11391.14
road injury att	973.00	275.77
NT COUNTRY NON-ISIS	Number in group =	0
total A&E atten	0.00	0.00
road injury att	0.00	0.00
ACT COUNTRY NON-ISIS	Number in group =	0
total A&E atten	0.00	0.00
road injury att	0.00	0.00
CITY ISIS	Number in group =	31
total A&E atten	31187.69	2504.20
road injury att	805.96	117.95
CITY NON_ISIS	Number in group =	70
total A&E atten	26703.32	2512.48
road injury att	839.13	102.63
COUNTRY ISIS	Number in group =	11
total A&E atten	15229.68	1671.44
road injury att	307.86	54.60
COUNTRY NON_ISIS	Number in group =	118
total A&E atten	12393.96	1741.49
road injury att	251.44	47.02
CITY... 50-100 BEDS	Number in group =	16
road injury att	480.42	134.94
through A&E_adm	88.84	30.89
CITY... 101-200 BEDS	Number in group =	26

road injury att	630.90	170.22
through A&E_adm	106.31	14.83
CITY... 201-300 BEDS	Number in group =	16
road injury att	1018.84	274.41
through A&E_adm	249.69	28.65
CITY... 301-400 BEDS	Number in group =	17
road injury att	898.38	134.46
through A&E_adm	251.00	41.54
CITY... 401-600 BEDS	Number in group =	15
road injury att	1080.51	105.01
through A&E_adm	320.89	41.73
CITY... 601+ BEDS	Number in group =	11
road injury att	1077.44	21.54
through A&E_adm	494.97	10.58
COUNTRY 50-100 BEDS	Number in group =	67
road injury att	199.57	41.30
through A&E_adm	60.65	11.01
COUNTRY 101-200 BEDS	Number in group =	44
road injury att	219.70	55.12
through A&E_adm	65.69	10.96
COUNTRY 201-300 BEDS	Number in group =	12
road injury att	517.12	84.14
through A&E_adm	191.00	15.24
COUNTRY 301-400 BEDS	Number in group =	2
road injury att	552.50	214.44
through A&E_adm	214.25	34.21
COUNTRY 401-600 BEDS	Number in group =	4
road injury att	677.00	409.63
through A&E_adm	174.50	67.98
COUNTRY 601+ BEDS	Number in group =	0
road injury att	0.00	0.00
through A&E_adm	0.00	0.00
NSW CITY ISIS	Number in group =	14
road injury att	812.75	245.52
through A&E_adm	226.50	29.94
VIC CITY ISIS	Number in group =	4
road injury att	902.92	222.36
through A&E_adm	228.25	8.07
QLD CITY ISIS	Number in group =	4
road injury att	506.25	21.30
through A&E_adm	131.50	3.10
SA CITY ISIS	Number in group =	3
road injury att	1398.33	253.39
through A&E_adm	473.83	61.05
WA CITY ISIS	Number in group =	3
road injury att	379.50	106.72
through A&E_adm	136.50	30.63
TAS CITY ISIS	Number in group =	1
road injury att	973.00	275.77
through A&E_adm	247.50	72.48

NT CITY ISIS	Number in group =	0
road injury att	0.00	0.00
through A&E_adm	0.00	0.00
ACT CITY ISIS	Number in group =	2
road injury att	831.50	0.00
through A&E_adm	304.00	0.00
NSW CITY NON_ISIS	Number in group =	32
road injury att	713.33	176.99
through A&E_adm	206.45	35.82
VIC CITY NON_ISIS	Number in group =	16
road injury att	865.06	120.80
through A&E_adm	195.38	4.44
QLD CITY NON-ISIS	Number in group =	5
road injury att	602.70	25.57
through A&E_adm	171.50	9.08
SA CITY NON-ISIS	Number in group =	6
road injury att	1999.58	633.47
through A&E_adm	449.50	148.67
WA CITY NON-ISIS	Number in group =	9
road injury att	603.39	124.50
through A&E_adm	201.61	31.90
TAS CITY NON-ISIS	Number in group =	1
road injury att	973.00	275.77
through A&E_adm	247.50	72.48
NT CITY NON-ISIS	Number in group =	1
road injury att	657.00	0.00
through A&E_adm	60.00	0.00
ACT CITY NON-ISIS	Number in group =	0
road injury att	0.00	0.00
through A&E_adm	0.00	0.00
NSW COUNTRY ISIS	Number in group =	5
road injury att	105.30	25.92
through A&E_adm	30.20	15.53
VIC COUNTRY ISIS	Number in group =	1
road injury att	428.00	127.03
through A&E_adm	254.00	7.75
QLD COUNTRY ISIS	Number in group =	2
road injury att	446.50	212.56
through A&E_adm	112.58	35.68
SA COUNTRY ISIS	Number in group =	1
road injury att	162.50	40.27
through A&E_adm	136.50	10.65
WA COUNTRY ISIS	Number in group =	1
road injury att	403.50	263.48
through A&E_adm	75.00	46.97
TAS COUNTRY ISIS	Number in group =	1
road injury att	973.00	275.77
through A&E_adm	247.50	72.48
NT COUNTRY ISIS	Number in group =	0

road injury att	0.00	0.00
through A&E_adm	0.00	0.00
ACT COUNTRY ISIS	Number in group =	0
road injury att	0.00	0.00
through A&E_adm	0.00	0.00
NSW COUNTRY NON_ISIS	Number in group =	38
road injury att	170.32	36.08
through A&E_adm	48.24	12.88
VIC COUNTRY NON_ISIS	Number in group =	30
road injury att	203.67	20.27
through A&E_adm	78.27	13.32
QLD COUNTRY NON-ISIS	Number in group =	20
road injury att	377.35	161.31
through A&E_adm	94.01	27.66
SA COUNTRY NON-ISIS	Number in group =	13
road injury att	162.50	40.27
through A&E_adm	136.50	10.65
WA COUNTRY NON-ISIS	Number in group =	16
road injury att	403.50	263.48
through A&E_adm	75.00	46.97
TAS COUNTRY NON-ISIS	Number in group =	1
road injury att	973.00	275.77
through A&E_adm	247.50	72.48
NT COUNTRY NON-ISIS	Number in group =	0
road injury att	0.00	0.00
through A&E_adm	0.00	0.00
ACT COUNTRY NON-ISIS	Number in group =	0
road injury att	0.00	0.00
through A&E_adm	0.00	0.00
CITY ISIS	Number in group =	31
road injury att	805.96	117.95
through A&E_adm	235.37	15.62
CITY NON_ISIS	Number in group =	70
road injury att	839.13	102.63
through A&E_adm	220.13	21.23
COUNTRY ISIS	Number in group =	11
road injury att	307.86	54.60
through A&E_adm	99.02	12.45
COUNTRY NON_ISIS	Number in group =	118
road injury att	251.44	47.02
through A&E_adm	78.67	9.64

NSW..City					
total A&E atten	973856.19	202965.33	0.21	576044.12	1371668.25
road injury att	34205.01	9051.23	0.26	16464.60	51945.41
Ratio	28.47	7.69	0.27	13.40	43.54
NSW..Country					
total A&E atten	451448.00	79980.75	0.18	294685.75	608210.25
road injury att	6998.50	1498.32	0.21	4061.80	9935.20
Ratio	64.51	6.68	0.10	51.42	77.60
NSW					
total A&E atten	1425304.25	218155.41	0.15	997719.62	1852888.88
road injury att	41203.51	9174.42	0.22	23221.65	59185.37
Ratio	34.59	7.46	0.22	19.98	49.20
Vic..City					
total A&E atten	732290.38	123224.76	0.17	490769.84	973810.88
road injury att	17452.67	2798.95	0.16	11966.72	22938.62
Ratio	41.96	1.66	0.04	38.71	45.20
Vic..Country					
total A&E atten	329031.00	69893.53	0.21	192039.67	466022.31
road injury att	6538.00	717.57	0.11	5131.56	7944.44
Ratio	50.33	13.44	0.27	23.98	76.68
Vic					
total A&E atten	1061321.38	141666.53	0.13	783655.00	1338987.75
road injury att	23990.67	2889.48	0.12	18327.29	29654.04
Ratio	44.24	3.75	0.08	36.89	51.59
Qld..City					
total A&E atten	387633.00	42431.85	0.11	304466.56	470799.44
road injury att	5038.50	213.04	0.04	4620.94	5456.06
Ratio	76.93	5.29	0.07	66.56	87.31
Qld..Country					
total A&E atten	407516.00	121563.95	0.30	169250.66	645781.38
road injury att	8440.00	3643.41	0.43	1298.91	15581.09
Ratio	48.28	17.42	0.36	14.15	82.42
Qld					
total A&E atten	795149.00	128756.54	0.16	542786.19	1047511.81
road injury att	13478.50	3649.64	0.27	6325.21	20631.79
Ratio	58.99	13.36	0.23	32.81	85.18
SA ..City					
total A&E atten	407507.00	38472.94	0.09	332100.03	482913.97
road injury att	16192.50	4560.95	0.28	7253.04	25131.96
Ratio	25.17	9.42	0.37	6.70	43.63
SA ..Country					
total A&E atten	188146.00	49901.75	0.27	90338.58	285953.44
road injury att	2275.00	563.82	0.25	1169.90	3380.10
Ratio	82.70	42.43	0.51	0.00	165.87
SA					
total A&E atten	595653.00	63010.72	0.11	472152.00	719154.00
road injury att	18467.50	4595.67	0.25	9459.99	27475.02
Ratio	32.25	10.67	0.33	11.35	53.16
WA ..City					
total A&E atten	170938.00	36736.13	0.21	98935.19	242940.81
road injury att	6569.00	1440.62	0.22	3745.39	9392.61
Ratio	26.02	1.35	0.05	23.38	28.67

WA ..Country					
total A&E atten	212092.00	138480.70	0.65	0.00	483514.19
road injury att	6859.50	4479.23	0.65	0.00	15638.79
Ratio	30.92	0.01	0.00	30.91	30.93
WA					
total A&E atten	383030.00	143270.48	0.37	102219.84	663840.12
road injury att	13428.50	4705.20	0.35	4206.31	22650.69
Ratio	28.52	1.10	0.04	26.36	30.68
Tas..City					
total A&E atten	41781.00	22782.27	0.55	0.00	86434.25
road injury att	1946.00	551.54	0.28	864.98	3027.02
Ratio	21.47	5.62	0.26	10.45	32.49
Tas..Country					
total A&E atten	41781.00	22782.27	0.55	0.00	86434.25
road injury att	1946.00	551.54	0.28	864.98	3027.02
Ratio	21.47	5.62	0.26	10.45	32.49
Tas					
total A&E atten	83562.00	45564.54	0.55	0.00	172868.50
road injury att	3892.00	1103.09	0.28	1729.95	6054.05
Ratio	21.47	5.62	0.26	10.45	32.49
NT					
total A&E atten	6837.00	0.00	0.00	6837.00	6837.00
road injury att	657.00	0.00	0.00	657.00	657.00
Ratio	10.41	0.00	0.00	10.41	10.41
ACT					
total A&E atten	115209.00	0.00	0.00	115209.00	115209.00
road injury att	1663.00	0.00	0.00	1663.00	1663.00
Ratio	69.28	0.00	0.00	69.28	69.28
National...City					
total A&E atten	2836051.50	250712.56	0.09	2344655.00	3327448.00
road injury att	83723.68	10629.51	0.13	62889.84	104557.52
Ratio	33.87	4.32	0.13	25.41	42.34
National...Country					
total A&E atten	1630014.00	219649.52	0.13	1199501.00	2060527.00
road injury att	33057.00	6059.70	0.18	21179.98	44934.02
Ratio	49.31	6.37	0.13	36.81	61.80
National					
total A&E atten	4466066.00	334874.97	0.07	3809711.00	5122421.00
road injury att	116780.69	12260.31	0.10	92750.48	140810.89
Ratio	38.24	3.71	0.10	30.96	45.52
NSW..Type1					
total A&E atten	317448.00	44962.46	0.14	229321.59	405574.41
road injury att	8335.00	848.01	0.10	6672.91	9997.09
Ratio	38.09	3.00	0.08	32.20	43.97
NSW..Type2					
total A&E atten	326523.50	64405.09	0.20	200289.52	452757.50
road injury att	11915.00	2176.75	0.18	7648.57	16181.43
Ratio	27.40	4.96	0.18	17.68	37.13
NSW..Type3					
total A&E atten	781332.50	153745.47	0.20	479991.38	1082673.62
road injury att	20953.50	7063.31	0.34	7109.41	34797.59
Ratio	37.29	12.27	0.33	13.24	61.33
Vic..Type1					

total A&E atten	317941.34	20485.08	0.06	277790.56	358092.12
road injury att	6989.17	459.53	0.07	6088.48	7889.85
Ratio	45.49	0.61	0.01	44.30	46.68
Vic..Type2					
total A&E atten	464913.84	81667.11	0.18	304846.31	624981.38
road injury att	9296.67	1876.06	0.20	5619.59	12973.74
Ratio	50.01	4.24	0.08	41.71	58.31
Vic..Type3					
total A&E atten	278466.19	73487.73	0.26	134430.23	422502.12
road injury att	7704.83	845.48	0.11	6047.70	9361.96
Ratio	36.14	10.07	0.28	16.41	55.87
Qld..Type1					
total A&E atten	268122.00	18709.89	0.07	231450.62	304793.38
road injury att	3676.50	85.28	0.02	3509.36	3843.64
Ratio	72.93	3.71	0.05	65.65	80.21
Qld..Type2					
total A&E atten	367903.00	31851.18	0.09	305474.69	430331.31
road injury att	6778.00	3279.53	0.48	350.12	13205.88
Ratio	54.28	23.47	0.43	8.28	100.28
Qld..Type3					
total A&E atten	159124.00	119937.09	0.75	0.00	394200.69
road injury att	3024.00	1592.31	0.53	0.00	6144.93
Ratio	52.62	14.64	0.28	23.92	81.32
SA ..Type1					
total A&E atten	215643.00	15167.62	0.07	185914.47	245371.53
road injury att	7884.50	1520.32	0.19	4904.67	10864.33
Ratio	27.35	6.95	0.25	13.73	40.97
SA ..Type2					
total A&E atten	197654.00	23555.76	0.12	151484.72	243823.28
road injury att	6881.00	2286.16	0.33	2400.13	11361.87
Ratio	28.72	12.55	0.44	4.13	53.32
SA ..Type3					
total A&E atten	182356.00	36187.95	0.20	111427.61	253284.39
road injury att	3702.00	860.25	0.23	2015.90	5388.10
Ratio	49.26	19.08	0.39	11.87	86.65
WA ..Type1					
total A&E atten	119040.00	11695.85	0.10	96116.14	141963.86
road injury att	4353.50	320.15	0.07	3726.00	4981.00
Ratio	27.34	2.00	0.07	23.42	31.27
WA ..Type2					
total A&E atten	0.00	0.00	0.00	0.00	0.00
road injury att	0.00	0.00	0.00	0.00	0.00
Ratio	0.00	0.00	0.00	0.00	0.00
WA ..Type3					
total A&E atten	263990.00	141239.67	0.54	0.00	540819.75
road injury att	9075.00	4617.25	0.51	25.19	18124.81
Ratio	29.09	1.05	0.04	27.04	31.14
Tas..Type1					
total A&E atten	41781.00	22782.27	0.55	0.00	86434.25
road injury att	1946.00	551.54	0.28	864.98	3027.02
Ratio	21.47	5.62	0.26	10.45	32.49
Tas..Type2					
total A&E atten	41781.00	22782.27	0.55	0.00	86434.25

road injury att	1946.00	551.54	0.28	864.98	3027.02
Ratio	21.47	5.62	0.26	10.45	32.49
Tas Type3					
total A&E atten	0.00	0.00	0.00	0.00	0.00
road injury att	0.00	0.00	0.00	0.00	0.00
Ratio	0.00	0.00	0.00	0.00	0.00
NT Type1					
total A&E atten	0.00	0.00	0.00	0.00	0.00
road injury att	0.00	0.00	0.00	0.00	0.00
Ratio	0.00	0.00	0.00	0.00	0.00
NT Type2					
total A&E atten	6837.00	0.00	0.00	6837.00	6837.00
road injury att	657.00	0.00	0.00	657.00	657.00
Ratio	10.41	0.00	0.00	10.41	10.41
NT Type3					
total A&E atten	0.00	0.00	0.00	0.00	0.00
road injury att	0.00	0.00	0.00	0.00	0.00
Ratio	0.00	0.00	0.00	0.00	0.00
ACT Type1					
total A&E atten	57604.50	0.00	0.00	57604.50	57604.50
road injury att	831.50	0.00	0.00	831.50	831.50
Ratio	69.28	0.00	0.00	69.28	69.28
ACT Type2					
total A&E atten	57604.50	0.00	0.00	57604.50	57604.50
road injury att	831.50	0.00	0.00	831.50	831.50
Ratio	69.28	0.00	0.00	69.28	69.28
ACT Type3					
total A&E atten	0.00	0.00	0.00	0.00	0.00
road injury att	0.00	0.00	0.00	0.00	0.00
Ratio	0.00	0.00	0.00	0.00	0.00
National...Type1					
total A&E atten	1337579.75	70749.37	0.05	1198911.00	1476248.50
road injury att	34016.16	1912.03	0.06	30268.59	37763.74
Ratio	39.32	2.57	0.07	34.28	44.37
National...Type2					
total A&E atten	1463216.88	113604.18	0.08	1240552.62	1685881.12
road injury att	38305.17	4954.18	0.13	28594.98	48015.36
Ratio	38.20	4.48	0.12	29.41	46.99
National...Type3					
total A&E atten	1665268.50	254324.14	0.15	1166793.25	2163743.75
road injury att	44459.33	8671.74	0.20	27462.71	61455.94
Ratio	37.46	6.42	0.17	24.86	50.05
NSW..City					
road injury att	34205.01	9051.23	0.26	16464.60	51945.41
through A&E_adm	9777.50	1558.93	0.16	6722.00	12832.99
Ratio	3.50	0.74	0.21	2.06	4.94
NSW..Country					
road injury att	6998.50	1498.32	0.21	4061.80	9935.20
through A&E_adm	1984.00	561.77	0.28	882.93	3085.07
Ratio	3.53	0.77	0.22	2.02	5.03
NSW					
road injury att	41203.51	9174.42	0.22	23221.65	59185.37
through A&E_adm	11761.50	1657.05	0.14	8513.68	15009.31

Ratio	3.50	0.62	0.18	2.28	4.73
Vic..City					
road injury att	17452.67	2798.95	0.16	11966.72	22938.62
through A&E_adm	4039.00	102.32	0.03	3838.45	4239.55
Ratio	4.32	0.78	0.18	2.79	5.85
Vic..Country					
road injury att	6538.00	717.57	0.11	5131.56	7944.44
through A&E_adm	2602.00	400.25	0.15	1817.51	3386.49
Ratio	2.51	0.53	0.21	1.48	3.54
Vic					
road injury att	23990.67	2889.48	0.12	18327.29	29654.04
through A&E_adm	6641.00	413.12	0.06	5831.28	7450.72
Ratio	3.61	0.54	0.15	2.56	4.66
Qld..City					
road injury att	5038.50	213.04	0.04	4620.94	5456.06
through A&E_adm	1383.50	51.74	0.04	1282.08	1484.92
Ratio	3.64	0.13	0.04	3.38	3.90
Qld..Country					
road injury att	8440.00	3643.41	0.43	1298.91	15581.09
through A&E_adm	2105.33	622.94	0.30	884.38	3326.29
Ratio	4.01	1.06	0.27	1.92	6.09
Qld					
road injury att	13478.50	3649.64	0.27	6325.21	20631.79
through A&E_adm	3488.83	625.08	0.18	2263.67	4714.00
Ratio	3.86	0.65	0.17	2.59	5.14
SA ..City					
road injury att	16192.50	4560.95	0.28	7253.04	25131.96
through A&E_adm	4118.50	1071.23	0.26	2018.89	6218.11
Ratio	3.93	2.13	0.54	0.00	8.11
SA ..Country					
road injury att	2275.00	563.82	0.25	1169.90	3380.10
through A&E_adm	1911.00	149.06	0.08	1618.85	2203.15
Ratio	1.19	0.20	0.17	0.79	1.59
SA					
road injury att	18467.50	4595.67	0.25	9459.99	27475.02
through A&E_adm	6029.50	1081.55	0.18	3909.66	8149.34
Ratio	3.06	1.30	0.42	0.51	5.61
WA ..City					
road injury att	6569.00	1440.62	0.22	3745.39	9392.61
through A&E_adm	2224.00	371.40	0.17	1496.05	2951.95
Ratio	2.95	0.17	0.06	2.63	3.28
WA ..Country					
road injury att	6859.50	4479.23	0.65	0.00	15638.79
through A&E_adm	1275.00	798.43	0.63	0.00	2839.93
Ratio	5.38	0.14	0.03	5.10	5.66
WA					
road injury att	13428.50	4705.20	0.35	4206.31	22650.69
through A&E_adm	3499.00	880.59	0.25	1773.05	5224.95
Ratio	3.84	0.41	0.11	3.04	4.64
Tas..City					
road injury att	1946.00	551.54	0.28	864.98	3027.02
through A&E_adm	495.00	144.96	0.29	210.88	779.12
Ratio	3.93	0.04	0.01	3.86	4.00

Tas..Country					
road injury att	1946.00	551.54	0.28	864.98	3027.02
through A&E_adm	495.00	144.96	0.29	210.88	779.12
Ratio	3.93	0.04	0.01	3.86	4.00
Tas					
road injury att	3892.00	1103.09	0.28	1729.95	6054.05
through A&E_adm	990.00	289.91	0.29	421.77	1558.23
Ratio	3.93	0.04	0.01	3.86	4.00
NT					
road injury att	657.00	0.00	0.00	657.00	657.00
through A&E_adm	60.00	0.00	0.00	60.00	60.00
Ratio	10.95	0.00	0.00	10.95	10.95
ACT					
road injury att	1663.00	0.00	0.00	1663.00	1663.00
through A&E_adm	608.00	0.00	0.00	608.00	608.00
Ratio	2.74	0.00	0.00	2.74	2.74
National...City					
road injury att	83723.68	10629.51	0.13	62889.84	104557.52
through A&E_adm	22705.50	1944.43	0.09	18894.42	26516.58
Ratio	3.69	0.51	0.14	2.69	4.69
National...Country					
road injury att	33057.00	6059.70	0.18	21179.98	44934.02
through A&E_adm	10372.33	1242.81	0.12	7936.43	12808.23
Ratio	3.19	0.36	0.11	2.48	3.89
National					
road injury att	116780.69	12260.31	0.10	92750.48	140810.89
through A&E_adm	33077.82	2316.78	0.07	28536.93	37618.71
Ratio	3.53	0.36	0.10	2.82	4.24
NSW..Type1					
road injury att	8335.00	848.01	0.10	6672.91	9997.09
through A&E_adm	3851.50	372.55	0.10	3121.31	4581.69
Ratio	2.16	0.09	0.04	1.99	2.34
NSW..Type2					
road injury att	11915.00	2176.75	0.18	7648.57	16181.43
through A&E_adm	3458.00	713.61	0.21	2059.33	4856.67
Ratio	3.45	0.51	0.15	2.46	4.44
NSW..Type3					
road injury att	20953.50	7063.31	0.34	7109.41	34797.59
through A&E_adm	4452.00	844.66	0.19	2796.46	6107.54
Ratio	4.71	1.24	0.26	2.28	7.13
Vic..Type1					
road injury att	6989.17	459.53	0.07	6088.48	7889.85
through A&E_adm	1693.00	16.76	0.01	1660.15	1725.85
Ratio	4.13	0.31	0.07	3.53	4.73
Vic..Type2					
road injury att	9296.67	1876.06	0.20	5619.59	12973.74
through A&E_adm	3183.50	77.33	0.02	3031.93	3335.07
Ratio	2.92	0.66	0.22	1.64	4.21
Vic..Type3					
road injury att	7704.83	845.48	0.11	6047.70	9361.96
through A&E_adm	1764.50	396.06	0.22	988.23	2540.77
Ratio	4.37	1.15	0.26	2.12	6.61

Qld..Type1					
road injury att	3676.50	85.28	0.02	3509.36	3843.64
through A&E_adm	1281.50	43.25	0.03	1196.72	1366.28
Ratio	2.87	0.10	0.04	2.67	3.07
Qld..Type2					
road injury att	6778.00	3279.53	0.48	350.12	13205.88
through A&E_adm	1498.00	544.18	0.36	431.40	2564.60
Ratio	4.52	0.55	0.12	3.46	5.59
Qld..Type3					
road injury att	3024.00	1592.31	0.53	0.00	6144.93
through A&E_adm	709.33	303.75	0.43	113.99	1304.68
Ratio	4.26	2.82	0.66	0.00	9.78
SA ..Type1					
road injury att	7884.50	1520.32	0.19	4904.67	10864.33
through A&E_adm	2536.50	359.21	0.14	1832.45	3240.55
Ratio	3.11	1.04	0.33	1.07	5.14
SA ..Type2					
road injury att	6881.00	2286.16	0.33	2400.13	11361.87
through A&E_adm	1732.50	536.91	0.31	680.17	2784.83
Ratio	3.97	2.54	0.64	0.00	8.96
SA ..Type3					
road injury att	3702.00	860.25	0.23	2015.90	5388.10
through A&E_adm	1760.50	207.76	0.12	1353.29	2167.71
Ratio	2.10	0.65	0.31	0.82	3.38
WA ..Type1					
road injury att	4353.50	320.15	0.07	3726.00	4981.00
through A&E_adm	1863.50	91.89	0.05	1683.39	2043.61
Ratio	2.34	0.09	0.04	2.16	2.51
WA ..Type2					
road injury att	0.00	0.00	0.00	0.00	0.00
through A&E_adm	0.00	0.00	0.00	0.00	0.00
Ratio	0.00	0.00	0.00	0.00	0.00
WA ..Type3					
road injury att	9075.00	4617.25	0.51	25.19	18124.81
through A&E_adm	1635.50	848.47	0.52	0.00	3298.50
Ratio	5.55	0.29	0.05	4.98	6.12
Tas..Type1					
road injury att	1946.00	551.54	0.28	864.98	3027.02
through A&E_adm	495.00	144.96	0.29	210.88	779.12
Ratio	3.93	0.04	0.01	3.86	4.00
Tas..Type2					
road injury att	1946.00	551.54	0.28	864.98	3027.02
through A&E_adm	495.00	144.96	0.29	210.88	779.12
Ratio	3.93	0.04	0.01	3.86	4.00
Tas Type3					
road injury att	0.00	0.00	0.00	0.00	0.00
through A&E_adm	0.00	0.00	0.00	0.00	0.00
Ratio	0.00	0.00	0.00	0.00	0.00
NT Type1					
road injury att	0.00	0.00	0.00	0.00	0.00
through A&E_adm	0.00	0.00	0.00	0.00	0.00
Ratio	0.00	0.00	0.00	0.00	0.00
NT Type2					

road injury att	657.00	0.00	0.00	657.00	657.00
through A&E_adm	60.00	0.00	0.00	60.00	60.00
Ratio	10.95	0.00	0.00	10.95	10.95
NT Type3					
road injury att	0.00	0.00	0.00	0.00	0.00
through A&E_adm	0.00	0.00	0.00	0.00	0.00
Ratio	0.00	0.00	0.00	0.00	0.00
ACT Type1					
road injury att	831.50	0.00	0.00	831.50	831.50
through A&E_adm	304.00	0.00	0.00	304.00	304.00
Ratio	2.74	0.00	0.00	2.74	2.74
ACT Type2					
road injury att	831.50	0.00	0.00	831.50	831.50
through A&E_adm	304.00	0.00	0.00	304.00	304.00
Ratio	2.74	0.00	0.00	2.74	2.74
ACT Type3					
road injury att	0.00	0.00	0.00	0.00	0.00
through A&E_adm	0.00	0.00	0.00	0.00	0.00
Ratio	0.00	0.00	0.00	0.00	0.00
National...Type1					
road injury att	34016.16	1912.03	0.06	30268.59	37763.74
through A&E_adm	12025.00	574.75	0.05	10898.48	13151.52
Ratio	2.83	0.22	0.08	2.39	3.27
National...Type2					
road injury att	38305.17	4954.18	0.13	28594.98	48015.36
through A&E_adm	10731.00	1058.60	0.10	8656.15	12805.85
Ratio	3.57	0.49	0.14	2.62	4.52
National...Type3					
road injury att	44459.33	8671.74	0.20	27462.71	61455.94
through A&E_adm	10321.83	1313.64	0.13	7747.09	12896.57
Ratio	4.31	0.63	0.15	3.07	5.54

NSW..City	Number in group =	46
total A&E atten	21170.79	4412.29
road injury att	743.59	196.77
NSW..Country	Number in group =	43
total A&E atten	10498.79	1860.02
road injury att	162.76	34.84
NSW	Number in group =	89
total A&E atten	16014.65	2451.18
road injury att	462.96	103.08
Vic..City	Number in group =	20
total A&E atten	36614.52	6161.24
road injury att	872.63	139.95
Vic..Country	Number in group =	31
total A&E atten	10613.90	2254.63
road injury att	210.90	23.15
Vic	Number in group =	51
total A&E atten	20810.22	2777.78
road injury att	470.41	56.66
Qld..City	Number in group =	9
total A&E atten	43070.33	4714.65
road injury att	559.83	23.67
Qld..Country	Number in group =	22
total A&E atten	18523.46	5525.63
road injury att	383.64	165.61
Qld	Number in group =	31
total A&E atten	25649.97	4153.44
road injury att	434.79	117.73
SA ..City	Number in group =	9
total A&E atten	45278.55	4274.77
road injury att	1799.17	506.77
SA ..Country	Number in group =	14
total A&E atten	13439.00	3564.41
road injury att	162.50	40.27
SA	Number in group =	23
total A&E atten	25897.96	2739.60
road injury att	802.93	199.81
WA ..City	Number in group =	12
total A&E atten	14244.83	3061.34
road injury att	547.42	120.05
WA ..Country	Number in group =	17
total A&E atten	12476.00	8145.92
road injury att	403.50	263.48
WA	Number in group =	29
total A&E atten	13207.93	4940.36
road injury att	463.05	162.25
Tas..City	Number in group =	2
total A&E atten	20890.50	11391.14
road injury att	973.00	275.77
Tas..Country	Number in group =	2

total A&E atten	20890.50	11391.14
road injury att	973.00	275.77
Tas	Number in group =	4
total A&E atten	20890.50	11391.13
road injury att	973.00	275.77
NT	Number in group =	1
total A&E atten	6837.00	0.00
road injury att	657.00	0.00
ACT	Number in group =	2
total A&E atten	57604.50	0.00
road injury att	831.50	0.00
National...City	Number in group =	101
total A&E atten	28079.72	2482.30
road injury att	828.95	105.24
National...Country	Number in group =	129
total A&E atten	12635.77	1702.71
road injury att	256.26	46.97
National	Number in group =	230
total A&E atten	19417.68	1455.98
road injury att	507.74	53.31
NSW..Type1	Number in group =	13
total A&E atten	24419.08	3458.65
road injury att	641.15	65.23
NSW..Type2	Number in group =	16
total A&E atten	20407.72	4025.32
road injury att	744.69	136.05
NSW..Type3	Number in group =	60
total A&E atten	13022.21	2562.42
road injury att	349.23	117.72
Vic..Type1	Number in group =	8
total A&E atten	39742.67	2560.64
road injury att	873.65	57.44
Vic..Type2	Number in group =	13
total A&E atten	35762.60	6282.09
road injury att	715.13	144.31
Vic..Type3	Number in group =	30
total A&E atten	9282.21	2449.59
road injury att	256.83	28.18
Qld..Type1	Number in group =	6
total A&E atten	44687.00	3118.31
road injury att	612.75	14.21
Qld..Type2	Number in group =	11
total A&E atten	33445.73	2895.56
road injury att	616.18	298.14
Qld..Type3	Number in group =	14
total A&E atten	11366.00	8566.93
road injury att	216.00	113.74
SA ..Type1	Number in group =	5
total A&E atten	43128.60	3033.52
road injury att	1576.90	304.06

SA ..Type2	Number in group =	7
total A&E atten	28236.29	3365.11
road injury att	983.00	326.59
SA ..Type3	Number in group =	11
total A&E atten	16577.82	3289.81
road injury att	336.55	78.20
WA ..Type1	Number in group =	5
total A&E atten	23808.00	2339.17
road injury att	870.70	64.03
WA ..Type2	Number in group =	0
total A&E atten	0.00	0.00
road injury att	0.00	0.00
WA ..Type3	Number in group =	24
total A&E atten	10999.58	5884.99
road injury att	378.12	192.39
Tas..Type1	Number in group =	2
total A&E atten	20890.50	11391.14
road injury att	973.00	275.77
Tas..Type2	Number in group =	2
total A&E atten	20890.50	11391.14
road injury att	973.00	275.77
Tas Type3	Number in group =	0
total A&E atten	0.00	0.00
road injury att	0.00	0.00
NT Type1	Number in group =	0
total A&E atten	0.00	0.00
road injury att	0.00	0.00
NT Type2	Number in group =	1
total A&E atten	6837.00	0.00
road injury att	657.00	0.00
NT Type3	Number in group =	0
total A&E atten	0.00	0.00
road injury att	0.00	0.00
ACT Type1	Number in group =	1
total A&E atten	57604.50	0.00
road injury att	831.50	0.00
ACT Type2	Number in group =	1
total A&E atten	57604.50	0.00
road injury att	831.50	0.00
ACT Type3	Number in group =	0
total A&E atten	0.00	0.00
road injury att	0.00	0.00
National...Type1	Number in group =	40
total A&E atten	33439.49	1768.73
road injury att	850.40	47.80
National...Type2	Number in group =	51
total A&E atten	28690.53	2227.53
road injury att	751.08	97.14
National...Type3	Number in group =	139

total A&E atten	11980.35	1829.67
road injury att	319.85	62.39
NSW..City	Number in group =	46
road injury att	743.59	196.77
through A&E_adm	212.55	33.89
NSW..Country	Number in group =	43
road injury att	162.76	34.84
through A&E_adm	46.14	13.06
NSW	Number in group =	89
road injury att	462.96	103.08
through A&E_adm	132.15	18.62
Vic..City	Number in group =	20
road injury att	872.63	139.95
through A&E_adm	201.95	5.12
Vic..Country	Number in group =	31
road injury att	210.90	23.15
through A&E_adm	83.94	12.91
Vic	Number in group =	51
road injury att	470.41	56.66
through A&E_adm	130.22	8.10
Qld..City	Number in group =	9
road injury att	559.83	23.67
through A&E_adm	153.72	5.75
Qld..Country	Number in group =	22
road injury att	383.64	165.61
through A&E_adm	95.70	28.32
Qld	Number in group =	31
road injury att	434.79	117.73
through A&E_adm	112.54	20.16
SA ..City	Number in group =	9
road injury att	1799.17	506.77
through A&E_adm	457.61	119.03
SA ..Country	Number in group =	14
road injury att	162.50	40.27
through A&E_adm	136.50	10.65
SA	Number in group =	23
road injury att	802.93	199.81
through A&E_adm	262.15	47.02
WA ..City	Number in group =	12
road injury att	547.42	120.05
through A&E_adm	185.33	30.95
WA ..Country	Number in group =	17
road injury att	403.50	263.48
through A&E_adm	75.00	46.97
WA	Number in group =	29
road injury att	463.05	162.25
through A&E_adm	120.66	30.37
Tas..City	Number in group =	2
road injury att	973.00	275.77
through A&E_adm	247.50	72.48

Tas..Country	Number in group =	2
road injury att	973.00	275.77
through A&E_adm	247.50	72.48
Tas	Number in group =	4
road injury att	973.00	275.77
through A&E_adm	247.50	72.48
NT	Number in group =	1
road injury att	657.00	0.00
through A&E_adm	60.00	0.00
ACT	Number in group =	2
road injury att	831.50	0.00
through A&E_adm	304.00	0.00
National...City	Number in group =	101
road injury att	828.95	105.24
through A&E_adm	224.81	19.25
National...Country	Number in group =	129
road injury att	256.26	46.97
through A&E_adm	80.41	9.63
National	Number in group =	230
road injury att	507.74	53.31
through A&E_adm	143.82	10.07
NSW..Type1	Number in group =	13
road injury att	641.15	65.23
through A&E_adm	296.27	28.66
NSW..Type2	Number in group =	16
road injury att	744.69	136.05
through A&E_adm	216.12	44.60
NSW..Type3	Number in group =	60
road injury att	349.23	117.72
through A&E_adm	74.20	14.08
Vic..Type1	Number in group =	8
road injury att	873.65	57.44
through A&E_adm	211.62	2.10
Vic..Type2	Number in group =	13
road injury att	715.13	144.31
through A&E_adm	244.88	5.95
Vic..Type3	Number in group =	30
road injury att	256.83	28.18
through A&E_adm	58.82	13.20
Qld..Type1	Number in group =	6
road injury att	612.75	14.21
through A&E_adm	213.58	7.21
Qld..Type2	Number in group =	11
road injury att	616.18	298.14
through A&E_adm	136.18	49.47
Qld..Type3	Number in group =	14
road injury att	216.00	113.74
through A&E_adm	50.67	21.70
SA ..Type1	Number in group =	5

road injury att	1576.90	304.06
through A&E_adm	507.30	71.84
SA ..Type2	Number in group =	7
road injury att	983.00	326.59
through A&E_adm	247.50	76.70
SA ..Type3	Number in group =	11
road injury att	336.55	78.20
through A&E_adm	160.05	18.89
WA ..Type1	Number in group =	5
road injury att	870.70	64.03
through A&E_adm	372.70	18.38
WA ..Type2	Number in group =	0
road injury att	0.00	0.00
through A&E_adm	0.00	0.00
WA ..Type3	Number in group =	24
road injury att	378.12	192.39
through A&E_adm	68.15	35.35
Tas..Type1	Number in group =	2
road injury att	973.00	275.77
through A&E_adm	247.50	72.48
Tas..Type2	Number in group =	2
road injury att	973.00	275.77
through A&E_adm	247.50	72.48
Tas Type3	Number in group =	0
road injury att	0.00	0.00
through A&E_adm	0.00	0.00
NT Type1	Number in group =	0
road injury att	0.00	0.00
through A&E_adm	0.00	0.00
NT Type2	Number in group =	1
road injury att	657.00	0.00
through A&E_adm	60.00	0.00
NT Type3	Number in group =	0
road injury att	0.00	0.00
through A&E_adm	0.00	0.00
ACT Type1	Number in group =	1
road injury att	831.50	0.00
through A&E_adm	304.00	0.00
ACT Type2	Number in group =	1
road injury att	831.50	0.00
through A&E_adm	304.00	0.00
ACT Type3	Number in group =	0
road injury att	0.00	0.00
through A&E_adm	0.00	0.00
National...Type1	Number in group =	40
road injury att	850.40	47.80
through A&E_adm	300.62	14.37
National...Type2	Number in group =	51
road injury att	751.08	97.14
through A&E_adm	210.41	20.76

National...Type3	Number in group = 139	
road injury att	319.85	62.39
through A&E_adm	74.26	9.45

Appendix 5
Correspondence

Appendix 5.1 Letter of invitation to hospitals

Appendix 5.2 Letter to Chairman, Australian College of Emergency Medicine

Appendix 5.1

26 January 1993

«title» «name» «surname»
«position»
«hospital»
«add1»
«add2» «add3» «add4»

Dear «title» «surname»

The National Injury Surveillance Unit (NISU) and the Federal Office of Road Safety (FORS) are conducting a study to determine the total number of hospital admissions and accident and emergency attendances for road injury in Australia.

The National Injury Surveillance Unit (NISU) is an agency within the Australian Institute of Health and Welfare. NISU is conducting a program to improve information about road injury. The Road Injury Information Program (RIIP) is strongly supported at the highest levels of Government, by the National Road Trauma Advisory Council (AHMAC) and also by major private authorities. State Health Ministers, through AHMAC, have agreed to provide health sector information on road injury in support of the RIIP.

Currently there is no reliable reporting, at a national level, of the extent to which road injuries are treated at hospital accident and emergency departments. It is thought that police reported accidents underestimate the number of road trauma victims requiring hospital treatment. The extent of under-reporting of less severe victims is unknown. However, a recent report by the National Injury Surveillance Unit has shown that one-third of all hospital admissions from road injury at the national level are not reported to police. In order to gain a more comprehensive understanding of Australia's road injury situation, this study will estimate nationally the total accident and emergency attendances from road injury for the financial year 1990/91. KPMG Peat Marwick have been engaged to undertake this project.

Forty-five randomly selected hospitals from across Australia with accident and emergency facilities will participate in the study. This letter is to formally invite you to participate in the project. Two sets of data will be required. The first relates to accident and emergency attendances and the second to admissions. It is expected that data for admissions will be available on computer media. If your hospital does not collect accident and emergency data on computer, you are requested to generate a modified data set manually from your accident and emergency registers.

Data is required for the financial year 1 July 1990 to 31 June 1991 according to the questionnaire attached to this letter. We request that the questionnaire be returned to KPMG Peat Marwick no later than 5 March 1993.

For the purposes of data collection, road injury accident and emergency attendances and admissions relate to those with an external cause coded in the range E810-E819 or E826-E829 using the ICD 9 CM classification system. Where data is not available using this code range (i.e. for accident and emergency data), hospitals are requested to match their data as closely as possible to the defined table.

We are aware that not all of the information requested in this questionnaire will be readily available in all hospitals. More specifically, data relating to accident and emergency attendances may not be held electronically. In such circumstances we request that your hospital sample its attendance register for a shorter period of four weeks during 1990/91. Whilst there is no specified period within 1990/91 during which this data is to be extracted, we ask that it not include Christmas, Easter or any other public holiday. We also emphasise that data provided by your hospital will be treated in the strictest of confidence. No individual hospital data will be released. All results will be published in aggregate form.

If you have any questions regarding this questionnaire, please do not hesitate to contact Mr Chris Collins (telephone 08-237 5339) or myself (telephone 08-237 5307). Mr Peter O'Connor from the National Injury Surveillance Unit (telephone 08-374 0970) may also be contacted should you require further information on the project.

Yours sincerely
KPMG Peat Marwick

Paul Zadow
Manager

Appendix 5.2

8 February 1993

<<title>> <<name>> <<surname>>
Chairman
Australian College of Emergency Medicine
35 Drummond Street
CARLTON VIC 3053

Dear <<title>> <<surname>>

The National Injury Surveillance Unit (NISU) and the Federal Office of Road Safety (FORS) are conducting a study to determine the total number of hospital admissions and accident and emergency attendance's for road injury in Australia.

The National Injury Surveillance Unit (NISU) is an agency within the Australian Institute of Health and Welfare. NISU is conducting a program to improve information about road injury. The Road Injury Information Program (RIIP) is strongly supported at the highest levels of Government, by the National Road Trauma Advisory Council, AHMAC and also by major private authorities. State Health Ministers, through AHMAC, have agreed to provide health sector information on road injury in support of the RIIP.

Currently there is no reliable reporting, at a National level, of the extent to which road injuries are treated at hospital Accident and Emergency departments. It is thought that police reported accidents underestimate the number of road trauma victims requiring hospital treatment. The extent of under-reporting of less severe victims is unknown. However a recent report by the National Injury Surveillance Unit has shown that one third of all hospital admissions from road injury at the national level are not reported to police. In order to gain a more comprehensive understanding of Australia's road injury situation, this study will estimate nationally the total accident and emergency attendances from road injury for the financial year 1990/91. KPMG Peat Marwick have been engaged to undertake this project.

Sixty nine randomly selected hospitals from across Australia with accident and emergency facilities have been invited to participate in the study. This letter is to formally request the support of the Australian College for Emergency Medicine and, in turn its members who will be required to complete the questionnaire. Two sets of data will be required. The first relates to accident and emergency attendances and the second to admissions. It is expected that data for admissions will be available on computer media. Hospitals which do not collect accident and emergency data on computer, are requested to generate a modified data set manually from their accident and emergency registers.

Data is required for the financial year 1 July 1990 to 31 June 1991, and I have attached a copy of the questionnaire to this letter for the College's information. We have requested that hospitals return their questionnaire to KPMG Peat Marwick by no later than 5 March 1993.

For the purposes of data collection, road injury accident and emergency attendances and admissions relate to those which would have an external cause coded in the range E810-E819 or E826-E829 using the ICD 9 CM classification system. Where data is not available using this code range (i.e. for accident and emergency data), hospitals have been requested to match their data as close as possible to the defined table.

We are aware that not all of the information requested in this questionnaire will be readily available in all hospitals. More specifically, data relating to accident and emergency attendances may not be held electronically. In such circumstances, we have requested hospitals to sample their attendance register for a shorter period of four weeks during 1990/91. Whilst there is no specified period within 1990/91 during which this data is to be extracted, we have asked that it not include Christmas, Easter or any other public holiday. We also emphasise that data provided by each hospital will be treated in the strictest of confidence. No individual hospital data will be released. All results will be published in aggregate form.

If you have any questions regarding this questionnaire please do not hesitate to contact Mr Chris Collins (Tel 08-237 5339) or myself (Tel 08-237 5307). Mr Peter O'Connor from the National Injury Surveillance Unit (Tel 08-374 0970) may also be contacted should you require further information on the project.

Yours sincerely
KPMG Peat Marwick

Mr Paul Zadow
Manager
KPMG Peat Marwick