ISBN : 978-616-11-3356-6
Report No : 318-2017-5

20 YEARS ANNIVERSARY

TRAUMA REGISTRY

1997 - 2016




KHON KAEN REGIONAL HOSPITAL

TRAUMA AND CRITICAL CARE CENTER

WHO COLLABORATING CENTER FOR INJURY PREVENTION AND SAFETY PROMOTION

20 YEARS ANNIVERSARY TRAUMA REGISTRY 1997-2016

ISBN : 978-616-11-3356-6
Report No : 318-2017-5

Authors Ms.Varunchaporn Polkert RN.
Dr. Witaya Chadbunchachai MDFRCST.
Ms.Natthira Daengpruan

Editors Dr. Witaya Chadbunchachai MDFRCST.
Dr.Somkid Lertsinudom MDFRCOT.
Ms.Varunchaporn Polkert RN.
Mrs.Nittayaporn Shihabou RN.
Mrs.Thanyaras Piyawatchwela RN.

Cover designed Ms.Natthira Daengpruan

First printing May 2017 500 copies

Dr. Chanchai Janworachaikul
Director of research and publishing project
Director of Khon Kaen Regional Hospital

Mrs Suthida Chancharas
Manager of trauma knowledge management center
Tel/Facsimile (66)43-337-959

www.ebooks.in.th/traumacenterkkh

ACKNOWLEDGEMENT

The authors would like to express the appreciation and deep gratitude to the team who was the pioneer to accomplish the injury surveillance system, trauma registry task force committee. Dr.Witaya Chadbunchachai, the trauma director and the one who adopted this injury surveillance system and also distributed to whole Thailand, Dr.Chamaiparn Santikarn.

The author would like to give a special thanks to Dr.Chanchai Janworachaikul, the director of Khon Kaen Regional Hospital for his vision and mission to support the Trauma and Critical Care Center, and a big thanks to all of the Emergency Department team,: Mrs.Thanyaras Piyawatchwela the head nurse of Emergency Department and also the injury surveillance clerks for their completing the database during the process.

Lastly, the authors would like to dedicate this report to their loving parents for their great supports and encouragements.

List of contents

page

No.	List of table	page

No.	List of table	page

Executive Summary Table of Injury Surveillance 1997-2016																				
No. & %	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
no. of casualty	13,020	15,139	16,747	17,903	18,773	20,091	23,232	22,825	23,500	23,781	24,221	24,422	25,678	26,891	26,206	25,838	23,591	23498	22,811	22,215
Male (%)	72.7	71.6	70.3	70.0	69.5	68.9	69.5	68.7	68.6	67.5	66.3	66.6	66.9	66.1	65.1	65.5	65.4	65.1	64.6	64.7
Female (%)	27.3	28.4	29.7	30.0	30.5	31.1	30.5	31.3	31.4	32.5	33.7	33.4	33.1	33.9	34.9	34.5	34.6	34.9	35.4	35.3
Occupation (%)	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
labor	36.1	30.6	29.2	27.7	31.0	37.4	43.3	43.0	46.0	47.0	43.0	38.8	38.8	38.4	39.3	41.2	42.3	44.1	44.4	42.9
student	23.0	21.5	28.7	28.7	29.1	27.1	27.8	29.0	29.0	30.0	31.0	31.2	29.3	28.0	26.8	26.2	23.1	22.7	24.0	23.8
farmer	16.8	13.9	12.4	13.1	12.5	9.9	7.3	6.0	5.0	4.0	4.0	5.7	6.0	6.7	6.6	6.4	5.6	4.8	4.0	3.7
housewife	5.1	6.1	5.3	5.9	5.6	5.4	5.2	5.0	6.0	5.0	5.0	7.3	5.8	2.8	2.1	2.2	2.5	2.8	2.1	2.9
others	5.4	18.1	15.0	10.4	8.8	9.3	8.7	9.0	7.0	8.0	10.0	8.0	10.7	13.1	14.3	13.8	15.4	14.2	14.4	15.7
merchant	6.7	3.7	3.2	4.2	4.0	2.6	1.7	2.0	1.0	1.0	1.0	1.8	1.9	2.3	2.2	2.1	2.2	2.2	2.1	2.0
police-soldier	2.1	1.3	1.4	1.1	1.3	1.2	1.3	1.0	1.0	1.0	1.0	0.9	0.8	0.8	0.8	0.8	0.9	0.8	7.9	0.8
priest/monk	1.0	0.7	0.7	0.7	0.7	0.5	0.0	0.0	0.0	0.0	1.0	0.7	0.5	0.5	0.4	0.5	0.5	0.4	0.8	0.4
officer	3.8	4.0	4.1	8.1	7.1	6.5	4.4	5.0	5.0	4.0	4.0	5.7	6.2	7.5	7.6	6.9	7.6	8.1	0.4	8.0
Age (%)	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
>0-15	21.0	23.0	24.0	23.0	23.0	21.0	16.0	21.0	21.0	23.0	21.0	20.5	18.9	20.8	20.4	19.5	18.5	15.0	17.4	16.6
>15-30	46.0	43.0	41.0	42.0	40.0	44.0	45.0	41.0	40.0	39.0	38.0	38.1	38.2	36.7	35.0	35.0	33.7	34.6	33.7	34.1
>30-45	22.0	21.0	21.0	20.0	22.0	20.0	20.0	21.0	21.0	20.0	21.0	20.8	21.9	21.4	21.4	21.6	22.2	22.9	22.0	21.5
>45-60	8.0	9.0	9.0	10.0	10.0	10.0	13.0	11.0	12.0	12.0	13.0	12.9	13.4	13.5	14.6	15.1	15.8	16.6	16.4	16.9
>60	3.0	4.0	5.0	5.0	5.0	5.0	6.0	6.0	6.0	6.0	7.0	7.6	7.6	7.6	8.6	8.7	9.8	10.8	10.6	10.9
cause	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
% of traffic injury	53.2	48.6	45.6	44.0	44.1	45.5	42.5	40.8	40.2	37.8	37.1	36.8	39.4	38.6	38.2	38.9	39.2	39.9	39.4	40.9
% of non traffic injury	46.8	51.5	54.4	56.0	56.0	54.6	57.5	59.2	59.8	62.2	62.9	63.2	60.6	61.4	61.8	61.1	60.8	60.1	60.6	59.1
No. of fall	1,308	1,923	2,193	2,255	2,580	2,578	2,946	3,188	3,311	3,470	3,536	3,780	3,812	4,017	4,249	4,107	3,893	3,952	4,058	3,932
No. of self harm	59	236	273	334	262	298	374	390	363	325	366	392	350	406	381	344	330	244	288	254
No. of assault	857	1,143	1,369	1,534	1,609	1,774	2,769	2,467	2,433	2,530	2,493	2,652	2,741	2,644	2,362	2,443	2,044	1,968	1,937	1,684
Hospital information	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
% admission TI	40.3	48.1	45.8	44.8	46.5	45.1	44.4	43.9	43.9	44.7	43.1	42.3	43.0	44.1	41.7	40.3	40.6	40.9	44.4	47.2
%admission non TI	19.9	30.2	29.7	26.7	25.5	25.0	23.8	24.6	25.2	24.7	24.6	26.3	26.8	26.9	28.2	28.6	23.0	29.0	29.7	30.4
MR of TI	4.3	4.8	3.6	4.2	4.0	4.5	4.1	4.7	3.9	4.3	3.6	2.7	2.6	2.9	2.80	2.3	2.9	2.4	2.6	2.4
MR of non TI	0.7	2.4	1.5	1.1	1.0	1.2	1.0	1.1	1.0	0.9	0.8	0.8	0.6	0.8	0.7	0.8	0.6	0.8	0.9	0.7
No. of referral	2,300	3,616	4,462	4,528	4,700	5,497	6,106	5,947	6,323	6,281	6,665	6,738	7,122	7,682	7,680	7,691	7,273	7,179	6,915	6,824
referral rate	17.6	23.9	26.7	25.3	25.0	27.4	26.2	25.6	26.9	26.4	27.5	27.6	27.7	28.6	29.3	29.8	30.8	30.6	30.3	30.7
Admission rate refer in KK	91.0	91.6	87.3	87.0	85.7	79.2	77.5	76.9	76.8	77.1	73.2	72.8	73.5	72.6	69.5	74.4	82.5	74.8	77.5	78.5
Admission rate refer other province	94.0	94.3	93.2	91.4	94.1	89.4	89.8	90.0	88.2	86.5	82.7	88.0	88.1	84.4	82.3	79.2	78.4	77.8	83.7	88.3
admission of referral	2,116	3,292	3,962	3,987	4,202	4,514	4,927	4,799	5,028	4,979	5,018	5,094	5,606	5,808	5,550	5,783	5,476	5,404	5,435	5,434
referral admission rate	92.0	92.3	88.8	88.1	88.7	82.0	80.8	80.3	79.5	79.2	75.4	75.8	76.5	75.2	71.7	75.2	75.3	75.3	78.6	79.6
non referred admission rate	20.2	22.0	18.2	22.3	17.1	16.1	15.4	15.6	15.5	15.4	14.7	15.6	15.9	16.7	15.3	15.3	15.7	15.5	16.7	18.4
MR of non refer in KK province	5.9	4.2	4.7	4.2	3.7	4.3	3.7	3.8	3.6	3.1	3.0	2.9	2.4	2.1	1.9	3.8	4.3	3.2	3.1	1.8
MR of referral in KK province	8.6	8.6	5.9	7.2	6.2	7.0	5.5	7.1	5.9	6.2	4.6	3.6	2.9	3.2	3.6	3.9	4.1	3.6	3.1	2.9
MR of referral by other from KK	15.0	14.0	12.8	12.7	14.4	16.2	17.6	17.6	14.5	16.3	15.5	12.2	7.7	9.8	8.7	9.5	11.6	10.2	10.7	9.0
road users	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
% motorcycle	80.0	76.0	77.0	75.9	76.9	78.7	81.0	79.6	79.9	76.7	79.1	86.0	81.9	82.9	82.7	86.2	86.0	83.0	84.4	85.1

Executive Summary Table of Injury Surveillance 1997-2016																				
No. & %	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
% pedestrian	5.3	6.1	6.6	6.0	5.9	5.1	4.4	4.7	4.4	4.6	5.1	4.8	4.1	3.8	4.1	3.7	3.9	3.4	3.3	3.2
% car	0.8	1.6	1.2	1.4	1.2	1.2	1.1	1.4	1.0	1.3	1.2	1.7	1.4	1.5	2.1	1.8	2.5	2.5	2.1	2.1
% bicycle	2.2	3.4	4.0	4.4	4.1	3.8	3.8	4.4	4.5	4.4	4.4	4.7	3.9	3.6	3.6	3.5	3.6	3.9	3.6	3.5
% pick up	7.0	7.6	6.2	6.4	6.4	6.4	5.0	6.1	6.3	5.4	6.1	4.6	5.7	4.8	4.6	4.7	4.8	4.6	3.7	4.0
Head injury	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
MR of BR1injury; Max AIS1-3	N/A	4.2	1.3	0.6	2.1	1.9	0.4	2.0	3.1	2.2	2.0	0.2	0.7	1.6	2.7	1.3	0.3	1.0	1.1	0.6
MR of BR1injury; Max AIS4-6	N/A	42.7	34.2	36.4	32.6	34.0	31.2	37.6	29.9	33.8	30.8	28.0	59.1	48.8	34.4	30.4	36.0	24.7	25.2	20.8
MR of drunk driver	5.1	4.5	4.5	4.4	2.8	3.5	3.8	3.6	3.0	3.3	2.7	2.2	2.3	2.2	2.2	2.4	2.9	1.5	1.5	1.3
MR of non drunk driver	2.7	3.0	1.9	2.1	2.2	2.3	2.5	2.6	1.4	2.0	1.6	1.0	1.6	3.3	2.8	1.2	2.5	2.0	1.6	1.2
MR of drunk passenger	5.0	3.7	3.7	3.6	3.4	4.4	2.6	3.6	2.5	2.6	2.4	1.1	1.8	2.1	1.7	1.7	2.8	1.3	1.0	0.5
MR of non drunk passenger	3.0	3.9	2.5	2.9	2.5	3.2	2.3	3.5	2.4	2.9	2.6	1.7	1.9	2.3	2.6	1.5	1.8	2.1	1.9	1.6
MR of drunk pedestrian	3.9	8.8	6.8	5.5	10.4	9.4	5.5	13.9	0.0	0.0	0.0	4.2	4.9	9.5	4.3	4.5	2.5	7.7	3.0	0.0
MR of non drunk pedestrian	5.5	6.0	2.2	2.2	3.1	3.3	3.8	6.0	3.2	3.1	5.6	2.7	3.3	6.3	5.8	4.0	4.7	3.6	4.3	3.3
% helmet used driver injury	N/A	19.6	22.0	19.2	13.6	13.7	16.7	19.3	27.6	25.9	26.6	27.9	26.9	23.1	25.9	27.2	24.3	25.2	22.5	23.1
% helmet used passenger injury	N/A	13.2	11.8	10.0	7.3	6.5	8.2	10.7	17.1	15.4	16.4	15.8	15.7	12.5	14.8	14.4	13.2	13.8	11.9	11.7
% seatbelt used driver injury	N/A	17.7	34.0	46.2	23.0	27.2	19.9	22.9	26.0	24.8	22.6	37.7	38.2	45.8	43.2	40.0	39.7	43.9	43.9	48.9
Undo EMS (%)	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
airway care	82.9	88.6	82.3	59.8	57.1	14.6	30.1	23.5	26.8	19.7	20.8	19.4	21.3	14.8	19.7	10.2	7.8	4.9	4.8	3.1
stop bleed	73.8	78.2	73.7	70.3	68.2	52.7	51.7	45.1	51.5	34.0	31.6	5.9	4.4	3.6	4.4	4.7	25.5	2.5	1.7	1.4
splint	78.0	82.3	76.8	60.8	56.5	31.1	24.5	20.8	21.0	10.3	6.5	4.0	2.3	1.3	1.1	1.2	2.1	0.6	0.4	0.0
IV fluid	72.1	83.9	82.7	82.0	77.4	37.6	37.6	25.8	19.8	21.4	18.6	17.6	23.6	15.9	16.8	10.8	12.2	6.7	10.0	0.0
Undo referral (%)	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
airway care	32.5	25.9	25.5	14.5	15.9	12.1	5.2	5.1	4.1	2.4	2.5	5.4	3.1	2.4	2.5	0.9	0.3	0.2	0.1	0.4
stop bleed	15.8	8.7	6.0	5.1	6.7	4.2	4.0	4.4	1.7	0.4	0.8	1.3	1.1	0.6	0.6	0.5	0.2	0.2	0.2	0.1
splint/slab	27.7	19.2	20.9	23.5	19.4	16.4	10.7	10.2	6.1	5.1	2.1	3.0	2.4	1.3	1.2	0.8	0.7	0.6	0.8	0.4
IV fluid	10.5	8.5	4.8	5.3	6.5	3.7	1.8	1.3	0.4	0.4	0.5	1.3	0.6	0.3	0.3	0.3	0.7	0.1	0.3	0.1
MR by TRISS methodology	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
0-0.25	N/A	80.3	72.7	73.0	70.1	74.1	79.5	88.0	66.1	71.7	76.0	75.6	76.7	75.0	81.9	87.5	95.0	80.4	75.0	56.2
>0.25-0.50	N/A	71.7	61.1	65.8	61.7	59.9	65.7	75.7	55.2	61.3	66.1	63.5	60.6	55.1	57.0	41.2	57.1	58.4	64.2	50.6
>0.50-0.75	N/A	49.1	41.5	49.2	45.8	36.7	37.2	49.1	41.6	41.3	40.0	36.2	32.4	39.2	44.1	39.0	57.6	55.6	47.0	31.9
>0.75-1.00	N/A	3.1	1.9	2.6	2.6	2.8	2.4	2.2	2.2	2.7	2.2	1.7	0.5	0.6	0.5	0.6	0.5	0.5	0.5	0.5

I. Introduction

After the Injury Surveillance system (IS) was first implemented and collected in Khon Kaen Regional Hospital (KKH) since 1989, IS data has been reporting in terms of Trauma Registry (TR) annually since then. The IS national software program was started to use since 1997.The annual snapshot of data collected is very important especially for those who are working in these violence and injury area. As far as Khon Kaen team concerns, having continuous data collection and demonstrating them in a continuously manner should be very useful for those who are dealing with this topic.

II. Objectives

The objectives of 19 years Anniversary of Trauma Registry is:

1. To demonstrate the trends of injuries in Khon Kaen Province based on Khon Kaen Regional Hospital Injury Surveillance (IS) database from 1997 to 2016.
2. To establish the information set for supporting the monitoring system of the Continuous Quality Improvement program in trauma care system.
3. To establish the information set for decision makers on the injury prevention and control program.
4. To establish the tool for studying the factors contributing for mortality and morbidity for improving the quality of care.

III. Methodology

1. TR reports, from 1997 to 2016, were collected and analyzed from Khon Kaen Hospital IS database, Khon Kaen Regional Hospital.
2. Descriptive method was used to illustrate the results

---

20 years Trauma registry

Forward

It is a great pleasure to welcome you to the 20 years significant report from the Khon Kaen Regional Hospital Trauma Registry since 1997. Trauma and injuries have claimed many lives, injured many people. The number of injuries in term of deaths, hospitalizations, disabilities and socioeconomic loss are increasing steadily. The public health approach in identifying the scope, magnitude and priority accorded to injury problems is to obtain appropriate information. An injury surveillance (IS) system which is the ongoing and systematic collection analysis and dissemination of injury information to those concerned with prevention is an important tool. The system is a very effective tool for policy-maker to make appropriate decisions in planning and monitoring injury prevention and control activities.

Data flow and processing

Data are being collected by the IS clerk using the injury surveillance form except final diagnosis. Medical statisticians and medical record personnel in the hospital code and enter the set of data. Quality assurance is done by the emergency room nurse and medical record personnel. The IS nurse in trauma center analyses data and prints out all the tables in the menu of the injury surveillance program. The report is disseminated at provincial as well as national levels for advocacy purposes.

Key area of work of injury surveillance system:

- Create health awareness among the population including trauma care center.
- Health service delivery
- Quality improvement.
- Behavior chance.
- Human Resource Development.
- EMS system development.
- Institutional Development

Data utilization at the hospital level

Data generated from the injury surveillance system are being used to evaluate the quality of care by using the outcome of treatment related to the severity of injury, since the high probability of survival (Ps) then it should be less the number of deaths. Therefore the Ps was apply to be the indicator to detect the quality of care especially the preventable death which should have high incidence of survival but death. Moreover by seeking do and undo the critical procedure was also applied to evaluate the quality of care in EMS and referral system.

Data utilization at the community level

The injury surveillance (IS) database can be used to facilitate injury prevention in any point of view. The data utilization which was applied such as the leaflet about the dog bite how big impact to the community, the trend of traffic accident in Khon Kaen Municipality and the suggestion for traffic injury prevention etc.

IV.Result

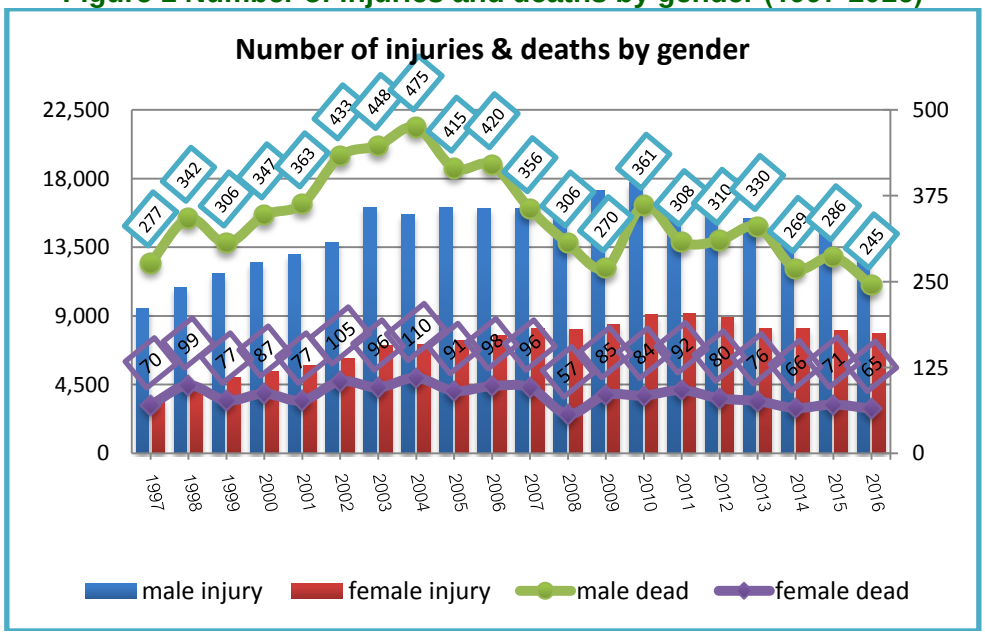
I. Demographic data

I.I. Injuries and fatalities by gender

Table 1 Number of injuries and deaths by gender (1997-2016)

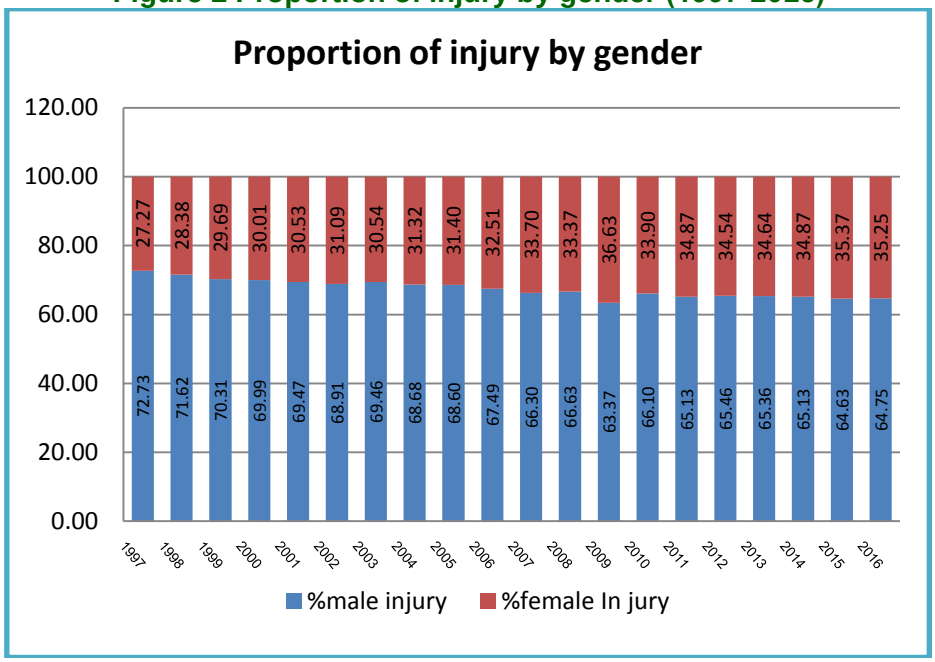
	injury			dead				% injury		%dead	
Year	male	female	total injury	male	female	total dead	% dead	male	female	male	female
1997	9,469	3,551	13,020	277	70	347	2.67	72.73	27.27	2.93	1.97
1998	10,843	4,296	15,139	342	99	441	2.91	71.62	28.38	3.15	2.30
1999	11,775	4,972	16,747	306	77	383	2.29	70.31	29.69	2.60	1.55
2000	12,531	5,372	17,903	347	87	434	2.42	69.99	30.01	2.77	1.62
2001	13,042	5,731	18,773	363	77	440	2.34	69.47	30.53	2.78	1.34
2002	13,844	6,247	20,091	433	105	538	2.68	68.91	31.09	3.13	1.68
2003	16,137	7,095	23,232	448	96	544	2.34	69.46	30.54	2.78	1.35
2004	15,676	7,149	22,825	475	110	585	2.56	68.68	31.32	3.03	1.54
2005	16,120	7,380	23,500	415	91	506	2.15	68.60	31.40	2.57	1.23
2006	16,050	7,731	23,781	420	98	518	2.18	67.49	32.51	2.62	1.27
2007	16,059	8,162	24,221	356	96	452	1.87	66.30	33.70	2.22	1.18
2008	16,272	8,150	24,422	306	57	363	1.49	66.63	33.37	1.88	0.70
2009	17,209	8,469	25,678	270	85	355	1.38	63.37	36.63	1.57	1.00
2010	17,776	9,115	26,891	361	84	445	1.65	66.10	33.90	2.03	0.92
2011	17,068	9,138	26,206	308	92	400	1.53	65.13	34.87	1.80	1.01
2012	16,914	8,924	25,838	310	80	390	1.51	65.46	34.54	1.83	0.90
2013	15,419	8,172	23,591	330	76	406	1.72	65.36	34.64	2.14	0.93
2014	15,305	8,193	23,498	269	66	335	1.43	65.13	34.87	1.76	0.81
2015	14,743	8,068	22,811	286	71	357	1.57	64.63	35.37	1.94	0.88
2016	14,383	7,831	22,214	245	65	310	1.40	64.75	35.25	1.70	0.83

Figure 1 Number of injuries and deaths by gender (1997-2016)



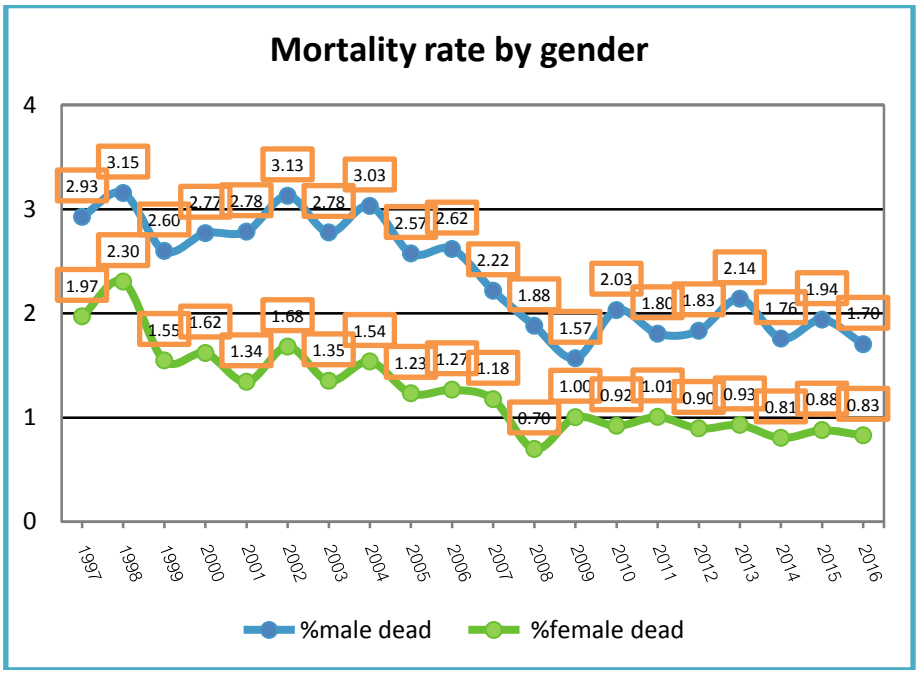
Injuries and deaths both in male and female were increasing from 1997 to 2003, since then the number of injury and deaths were quite similar in each year.

Figure 2 Proportion of injury by gender (1997-2016)



It was show that the proportion of injuries in male were two times more than female.

Figure 3 Mortality rate by gender (1997-2016)



The proportion of fatalities in male was two times more than female.
The trends of mortality rate were decreasing in both genders.

I.2. Injuries and fatalities by age

Table 2 Number and percentage of injuries and deaths by age distribution (1997-2016)

Year	>0-15				>15-30				>30-45				>45-60				>60			
	injury	%	dead	%	injury	%	dead	%	injury	%	dead	%	injury	%	dead	%	injury	%	dead	%
1997	2,676	21.0	35	11.0	5,849	46.0	156	47.0	2,807	22.0	79	24.0	1,001	8.0	33	10.0	444	3.0	26	8.0
1998	3,474	23.0	42	10.0	6,352	43.0	185	42.0	3,249	21.0	104	24.0	1,383	9.0	72	16.0	666	4.0	35	8.0
1999	3,979	24.0	38	10.0	6,933	41.0	145	38.0	3,539	21.0	107	28.0	1,496	9.0	57	15.0	755	5.0	36	9.0
2000	4,104	23.0	42	10.0	7,674	42.0	182	42.0	3,533	20.0	108	25.0	1,785	10.0	66	15.0	807	5.0	36	8.0
2001	4,301	23.0	42	10.0	7,592	40.0	175	39.0	4,074	22.0	117	27.0	1,909	10.0	68	15.0	897	5.0	38	9.0
2002	4,204	21.0	50	9.0	8,772	44.0	220	41.0	4,082	20.0	133	25.0	2,086	10.0	86	16.0	947	5.0	49	9.0
2003	1,243	16.0	56	10.0	3,393	45.0	228	42.0	1,551	20.0	123	23.0	975	13.0	83	15.0	487	6.0	54	10.0
2004	4,861	21.0	55	9.0	9,246	41.0	212	37.0	4,766	21.0	148	25.0	2,616	11.0	117	20.0	1,336	6.0	53	9.0
2005	4,961	21.0	39	8.0	9,400	40.0	194	39.0	5,003	21.0	118	23.0	2,712	12.0	88	17.0	1,424	6.0	67	13.0
2006	5,709	23.0	52	10.0	9,258	39.0	189	36.0	4,980	20.0	118	23.0	2,896	12.0	87	17.0	1,568	6.0	72	14.0
2007	5,135	21.0	31	7.0	9,164	38.0	143	32.0	5,098	21.0	115	25.0	3,044	13.0	91	20.0	1,780	7.0	71	16.0
2008	5,013	20.5	34	9.4	9,306	38.1	116	32.0	5,088	20.8	105	28.9	3,151	12.9	59	16.3	1,864	7.6	49	13.5
2009	4,854	18.9	32	9.5	9,806	38.2	135	37.5	5,636	21.9	89	25.4	3,437	13.4	51	17.7	1,945	7.6	50	9.9
2010	5,589	20.8	37	8.3	9,877	36.7	131	29.4	5,759	21.4	122	27.4	3,634	13.5	93	20.9	2,032	7.6	62	13.9
2011	5,342	20.4	36	9.0	9,180	35.0	113	28.3	5,610	21.4	88	22.0	3,833	14.6	92	23.0	2,241	8.6	71	17.8
2012	5,043	19.5	28	7.2	9,050	35.0	129	33.1	5,593	21.6	105	26.9	3,894	15.1	82	21.0	2,258	8.7	46	11.8
2013	4,360	18.5	25	6.2	7,956	33.7	120	29.6	5,230	22.2	108	26.6	3,724	15.8	89	21.9	2,321	9.8	64	15.8
2014	3,535	15.0	13	3.9	8,122	34.6	77	23.0	5,392	22.9	99	29.6	3,905	16.6	84	25.1	2,544	10.8	62	18.5
2015	3,958	17.4	26	7.3	7,677	33.7	74	20.7	5,017	22.0	90	25.1	3,751	16.4	91	25.4	2,408	10.6	77	21.5
2016	3,696	16.6	18	5.8	7,585	34.1	82	26.5	4,772	21.5	66	21.3	3,747	16.9	78	25.2	2,414	10.9	66	21.3

The injuries and fatalities in age group between 15-30 were the most vulnerable.

Table 3 Percentage of injuries and deaths by age distribution (1997-2016)

injury	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
>0-15	21.0	23.0	24.0	23.0	23.0	21.0	16.0	21.0	21.0	23.0	21.0	20.5	18.9	20.8	20.4	19.5	18.5	15.0	17.4	16.6
>15-30	46.0	43.0	41.0	42.0	40.0	44.0	45.0	41.0	40.0	39.0	38.0	38.1	38.2	36.7	35.0	35.0	33.7	34.6	33.7	34.1
>30-45	22.0	21.0	21.0	20.0	22.0	20.0	20.0	21.0	21.0	20.0	21.0	20.8	21.9	21.4	21.4	21.6	22.2	22.9	22.0	21.5
>45-60	8.0	9.0	9.0	10.0	10.0	10.0	13.0	11.0	12.0	12.0	13.0	12.9	13.4	13.5	14.6	15.1	15.8	16.6	16.4	16.9
>60	3.0	4.0	5.0	5.0	5.0	5.0	6.0	6.0	6.0	6.0	7.0	7.6	7.6	7.6	8.6	8.7	9.8	10.8	10.6	10.9
death	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
>0-15	11.0	10.0	10.0	10.0	10.0	9.0	10.0	9.0	8.0	10.0	7.0	9.4	9.5	8.3	9.0	7.2	6.2	3.9	7.3	5.8
>15-30	47.0	42.0	38.0	42.0	39.0	41.0	42.0	37.0	39.0	36.0	32.0	32.0	37.5	29.4	28.3	33.1	29.6	23.0	20.7	26.5
>30-45	24.0	24.0	28.0	25.0	27.0	25.0	23.0	25.0	23.0	23.0	25.0	28.9	25.4	27.4	22.0	26.9	26.6	29.6	25.1	21.3
>45-60	10.0	16.0	15.0	15.0	15.0	16.0	15.0	20.0	17.0	17.0	20.0	16.3	17.7	20.9	23.0	21.0	21.9	25.1	25.4	25.2
>60	8.0	8.0	9.0	8.0	9.0	9.0	10.0	9.0	13.0	14.0	16.0	13.5	9.9	13.9	17.8	11.8	15.8	18.5	21.5	21.3

Figure 4 Percentage of injury by age group (1997-2016)

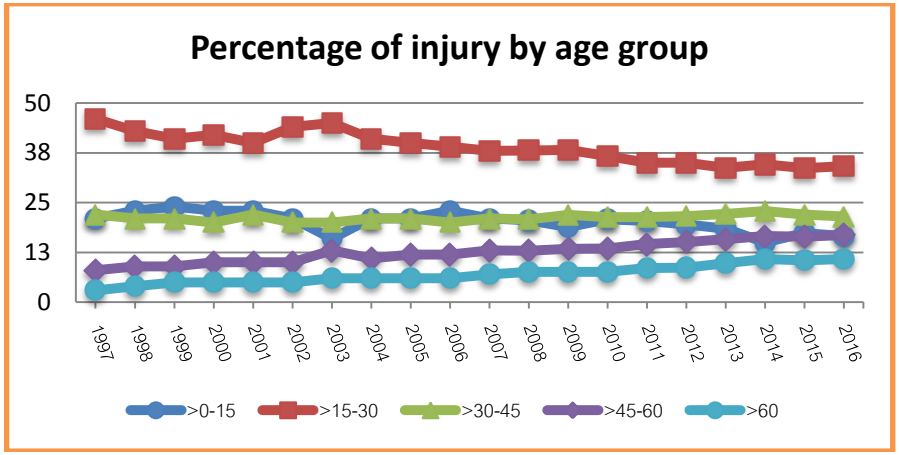
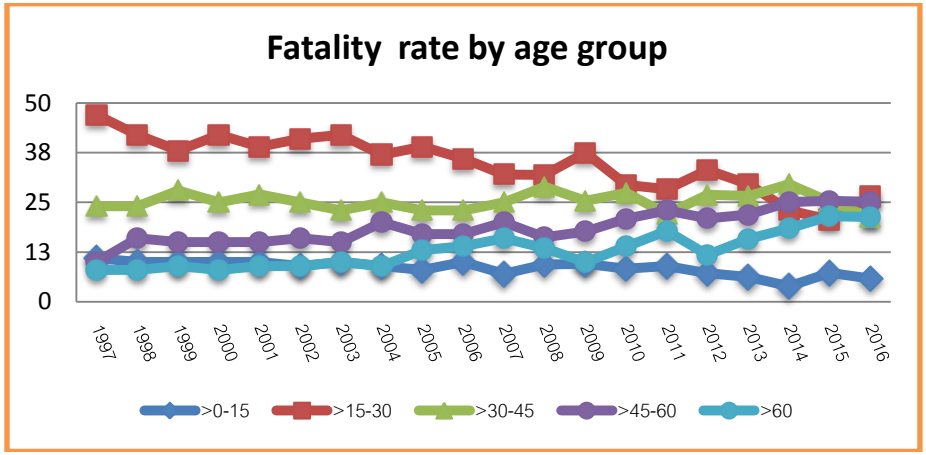


Figure 5 Percentage of fatality by age group (1997-2016)

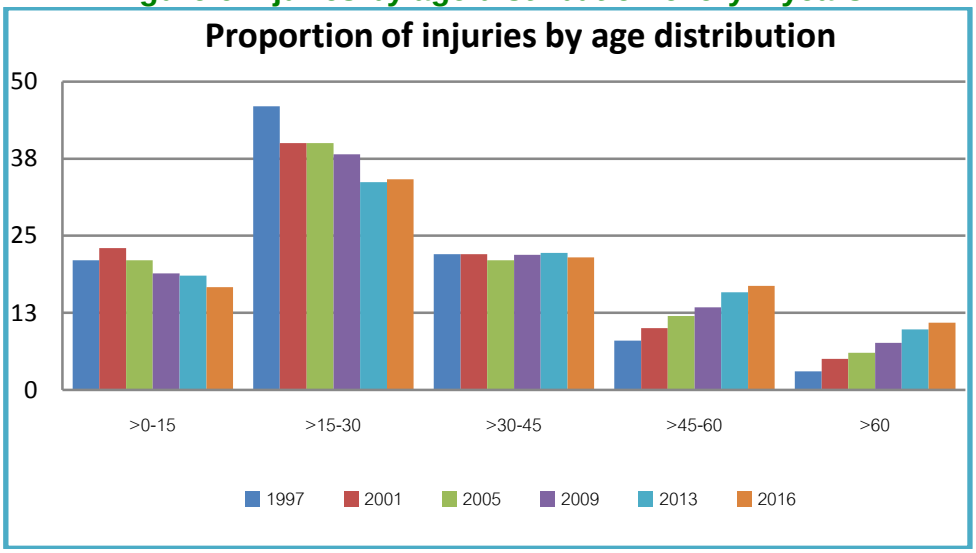


The percentage of injury in age group between 15-30 was 33-46 % of all injuries and tended to be decreased. While the injury in other group of age tended to be increased.

It was shown that the age group between 15-30 were the most vulnerable with 33-46% of all injuries but tended to be reduced.

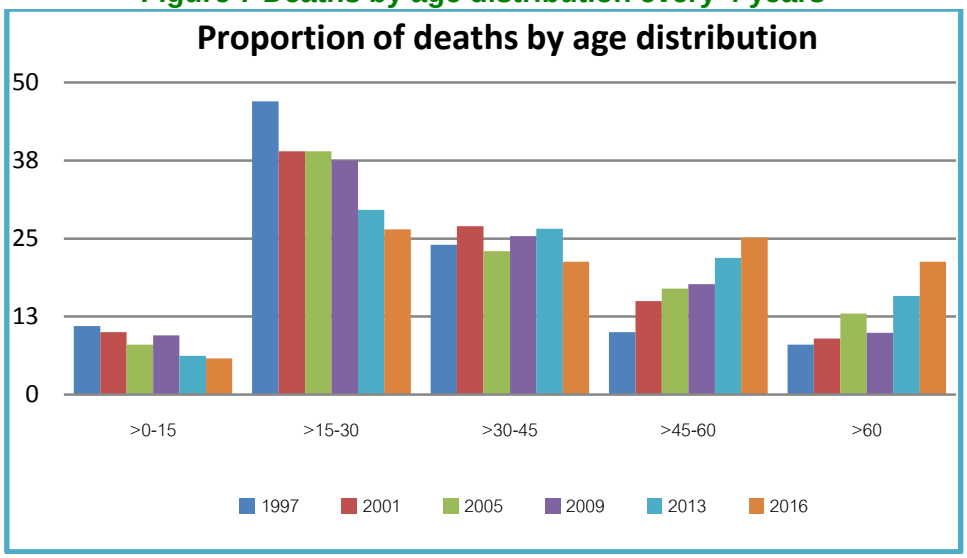
The victims whose age 15-30 years old was indicated the most vulnerable group by the fatality rate in 1997 to 2013 but in 2014 age 30- 45 years old were the most and tended to be increased.

Figure 6 Injuries by age distribution every 4 years



The injuries at age >15-30 years old were the largest group with tended to be decreased. Then concern the age group more than 45 years old, the injury rate were tended to be increased.

Figure 7 Deaths by age distribution every 4 years



The age group between 15-30 years old were the most vulnerable group but tended to be decreased.

I.3. Injury by occupations

Table 4 Number of injury by occupation (1997-2016)

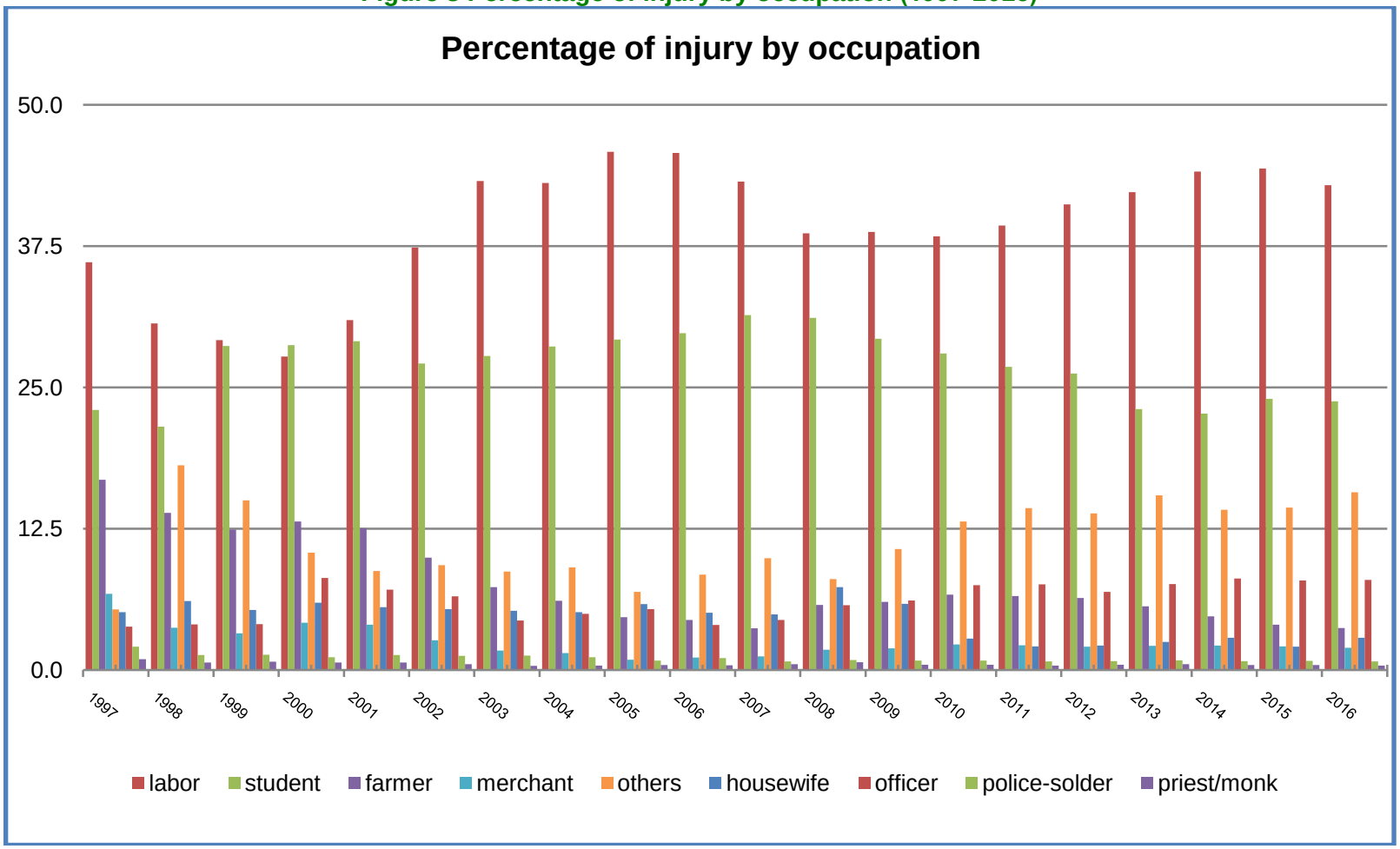
Occupation	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
labor	2,593	4,560	4,817	4,745	5,588	7,454	10,013	9,806	10,750	10,848	10,465	9,406	9,931	10,318	10,301	10,643	9,972	10,341	10,119	9,525
student	1,653	3,202	4,731	4,917	5,252	5,407	6,431	6,513	6,858	7,063	7,606	7,586	7,510	7,527	7,031	6,776	5,447	5,321	5,471	5,278
farmer	1,210	2,067	2,050	2,248	2,263	1,982	1,694	1,392	1,095	1,047	892	1,398	1,546	1,792	1,717	1,646	1,329	1,114	915	823
housewife	367	907	876	1,018	1,002	1,073	1,212	1,165	1,367	1,200	1,191	1,786	1,498	745	548	561	583	667	474	436
others	385	2,693	2,478	1,777	1,581	1,851	2,013	2,065	1,620	1,999	2,397	1,957	2,739	3,533	3,752	3,578	3,644	3,324	3,275	3,492
merchant	485	557	535	714	723	524	396	342	210	262	290	436	489	606	575	531	506	505	471	635
police-solder	149	197	224	193	237	248	293	256	193	251	184	216	216	224	198	200	201	182	1,804	1,770
priest/monk	69	98	121	112	121	104	86	91	100	99	124	169	118	127	100	117	118	104	182	167
officer	276	599	669	1,392	1,285	1,299	1,013	1,133	1,261	945	1,072	1,395	1,578	2,019	1,984	1,786	1,791	1,895	100	89
total	7,187	14,880	16,501	17,116	18,052	19,942	23,151	22,763	23,454	23,714	24,221	24,349	25,625	26,891	26,206	25,838	23,591	23,453	22,811	22,215

Table 5 Percentage of injury by occupation (1997-2016)

Occupation	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
labor	36.1	30.6	29.2	27.7	31.0	37.4	43.3	43.0	46.0	47.0	43.0	38.6	38.8	38.4	39.3	41.2	42.3	44.1	44.4	**42.9**
student	23.0	21.5	28.7	28.7	29.1	27.1	27.8	29.0	29.0	30.0	31.0	31.2	29.3	28.0	26.8	26.2	23.1	22.7	24.0	**23.8**
farmer	16.8	13.9	12.4	13.1	12.5	9.9	7.3	6.0	5.0	4.0	4.0	5.7	6.0	6.7	6.6	6.4	5.6	4.7	4.0	**3.7**
housewife	5.1	6.1	5.3	5.9	5.6	5.4	5.2	5.0	6.0	5.0	5.0	7.3	5.8	2.8	2.1	2.2	2.5	2.8	2.1	**2.0**
others	5.4	18.1	15.0	10.4	8.8	9.3	8.7	9.0	7.0	8.0	10.0	8.0	10.7	13.1	14.3	13.8	15.4	14.2	14.4	**15.7**
merchant	6.7	3.7	3.2	4.2	4.0	2.6	1.7	2.0	1.0	1.0	1.0	1.8	1.9	2.3	2.2	2.1	2.1	2.2	2.1	**2.9**
police-solder	2.1	1.3	1.4	1.1	1.3	1.2	1.3	1.0	1.0	1.0	1.0	0.9	0.8	0.8	0.8	0.8	0.9	0.8	7.9	**8.0**
priest/monk	1.0	0.7	0.7	0.7	0.7	0.5	0.4	0.0	0.0	0.0	1.0	0.7	0.5	0.5	0.4	0.5	0.5	0.4	0.8	**0.8**
officer	3.8	4.0	4.1	8.1	7.1	6.5	4.4	5.0	5.0	4.0	4.0	5.7	6.2	7.5	7.6	6.9	7.6	8.1	0.4	**0.4**

It was shown that the labors group was the most vulnerable, followed by the student.

Figure 8 Percentage of injury by occupation (1997-2016)



It was shown that the labors group was the most vulnerable, followed by the student.

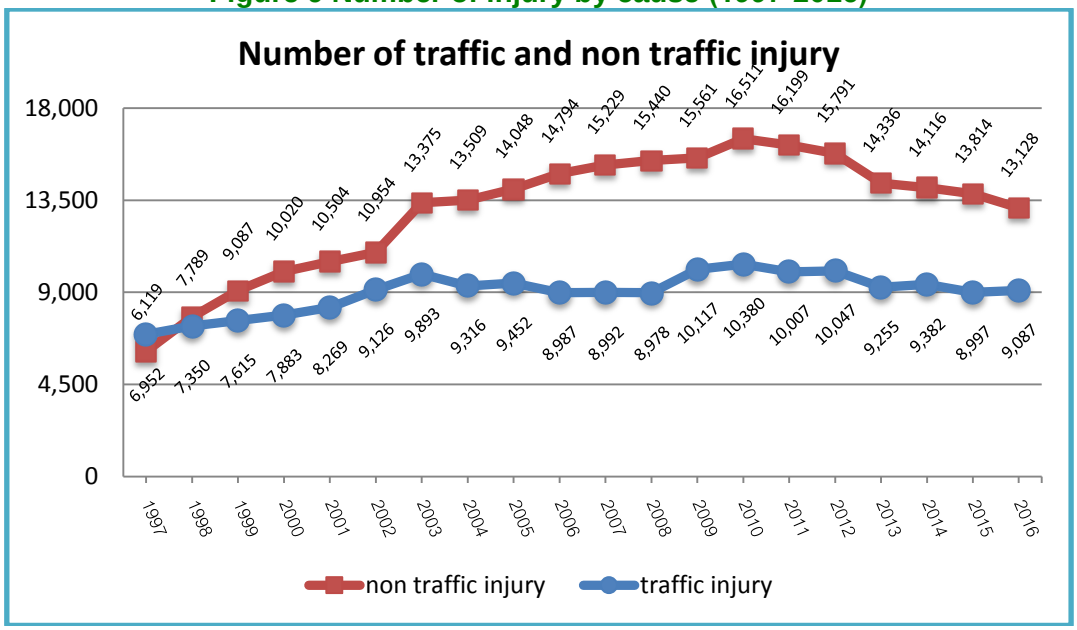
I.4.Cause of Injury

Table 6 Number of injuries by causes (1997-2016)

year	traffic injury	% TI	non traffic injury	% non TI	total injury
1997	6,952	53.19	6,119	46.81	13,071
1998	7,350	48.55	7,789	51.45	15,139
1999	7,615	45.59	9,087	54.41	16,702
2000	7,883	44.03	10,020	55.97	17,903
2001	8,269	44.05	10,504	55.95	18,773
2002	9,126	45.45	10,954	54.55	20,080
2003	9,893	45.52	13,375	57.48	23,268
2004	9,316	40.81	13,509	59.19	22,825
2005	9,452	40.22	14,048	59.78	23,500
2006	8,987	37.79	14,794	62.21	23,781
2007	8,992	37.12	15,229	62.88	24,221
2008	8,978	36.77	15,440	63.23	24,418
2009	10,117	39.40	15,561	60.60	25,678
2010	10,380	38.60	16,511	61.40	26,891
2011	10,007	38.19	16,199	61.81	26,206
2012	10,047	38.88	15,791	61.12	25,838
2013	9,255	39.23	14,336	60.77	23,591
2014	9,382	39.93	14,116	60.07	23,498
2015	8,997	39.44	13,814	60.56	22,811
2016	9,087	40.90	13,128	59.10	22,215

The number and percentage of non-traffic injuries were increasing and more than traffic injury since 1998.

Figure 9 Number of injury by cause (1997-2016)



While the non traffic injury rate was indicated increasing, traffic cause was decreasing.

1.4.1 Deaths by causes

Table 7 Number of deaths by causes (1997-2016)

year	traffic cause				non traffic cause			
	DBA	at ER	at ward	total	DBA	at ER	at ward	total
1997	27	36	238	301	9	4	32	45
1998	11	51	290	352	4	9	176	189
1999	5	37	229	271	1	15	123	139
2000	12	47	268	327	6	7	94	107
2001	8	52	271	331	6	15	88	109
2002	8	62	342	412	3	18	105	126
2003	3	56	350	409	2	16	117	135
2004	5	58	371	434	5	9	137	151
2005	11	51	304	366	3	16	121	140
2006	1	43	340	384	3	13	118	134
2007	1	41	285	327	4	6	115	125
2008	1	45	199	245	0	13	105	108
2009	1	48	209	258	5	12	82	99
2010	2	48	255	305	3	18	119	140
2011	1	50	229	280	4	8	108	120
2012	1	43	227	271	0	17	102	119
2013	0	51	222	273	1	12	120	133
2014	0	37	187	224	0	11	100	111
2015	0	40	195	235	0	20	102	122
2016	**0**	**47**	**168**	**215**	**0**	**11**	**83**	**94**

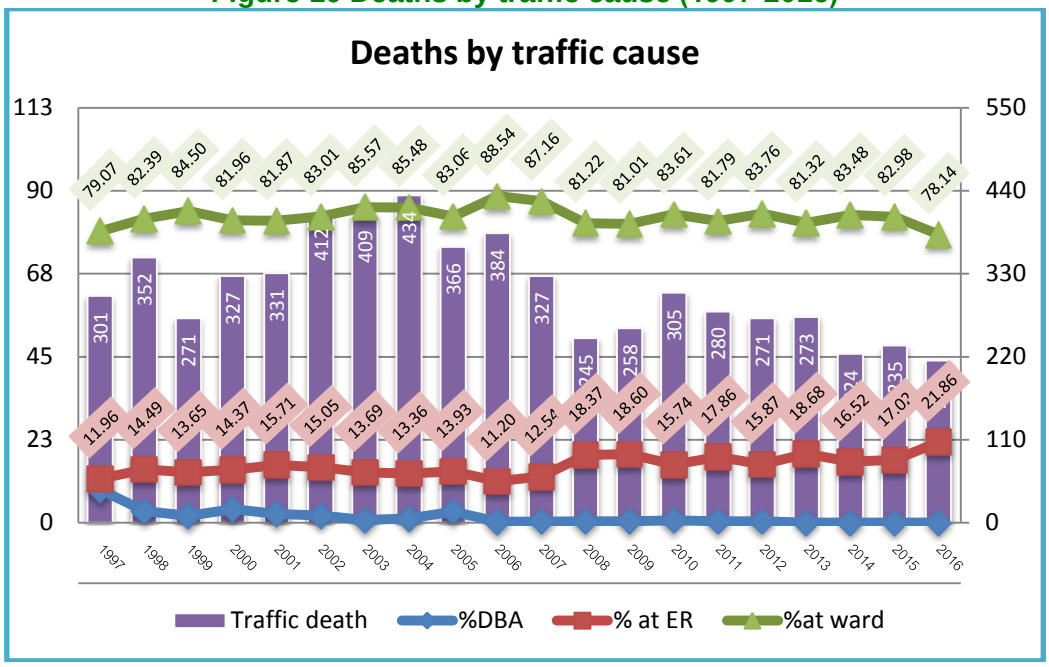
When concerning the type of death, there were classified into 3 places consisted of 1: Dead Before Arrival (DBA), 2: Death at Emergency Room and 3:Death at ward. Even though the number of death of traffic cause was higher than non traffic cause.

Table 8 Percentage of death by causes (1997-2016)

year	traffic cause				non traffic cause			
	%DBA	% at ER	%at ward	total	%DBA	%at ER	%at ward	total
1997	8.97	11.96	79.07	100	20.00	8.89	71.11	100
1998	3.13	14.49	82.39	100	2.12	4.76	93.12	100
1999	1.85	13.65	84.50	100	0.72	10.79	88.49	100
2000	3.67	14.37	81.96	100	5.61	6.54	87.85	100
2001	2.42	15.71	81.87	100	5.50	13.76	80.73	100
2002	1.94	15.05	83.01	100	2.38	14.29	83.33	100
2003	0.73	13.69	85.57	100	1.48	11.85	86.67	100
2004	1.15	13.36	85.48	100	3.31	5.96	90.73	100
2005	3.01	13.93	83.06	100	2.14	11.43	86.43	100
2006	0.26	11.20	88.54	100	2.24	9.70	88.06	100
2007	0.31	12.54	87.16	100	3.20	4.80	92.00	100
2008	0.41	18.37	81.22	100	0.00	12.04	97.22	100
2009	0.39	18.60	81.01	100	5.05	12.12	82.83	100
2010	0.66	15.74	83.61	100	2.14	12.86	85.00	100
2011	0.36	17.86	81.79	100	3.33	6.67	90.00	100
2012	0.37	15.87	83.76	100	0.00	14.29	85.71	100
2013	0.00	18.68	81.32	100	0.75	9.02	90.23	100
2014	0.00	16.52	83.48	100	0.00	9.91	90.09	100
2015	0.00	17.02	82.98	100	0.00	16.39	83.61	100
2016	0.00	21.86	78.14	100	0.00	11.70	88.30	100

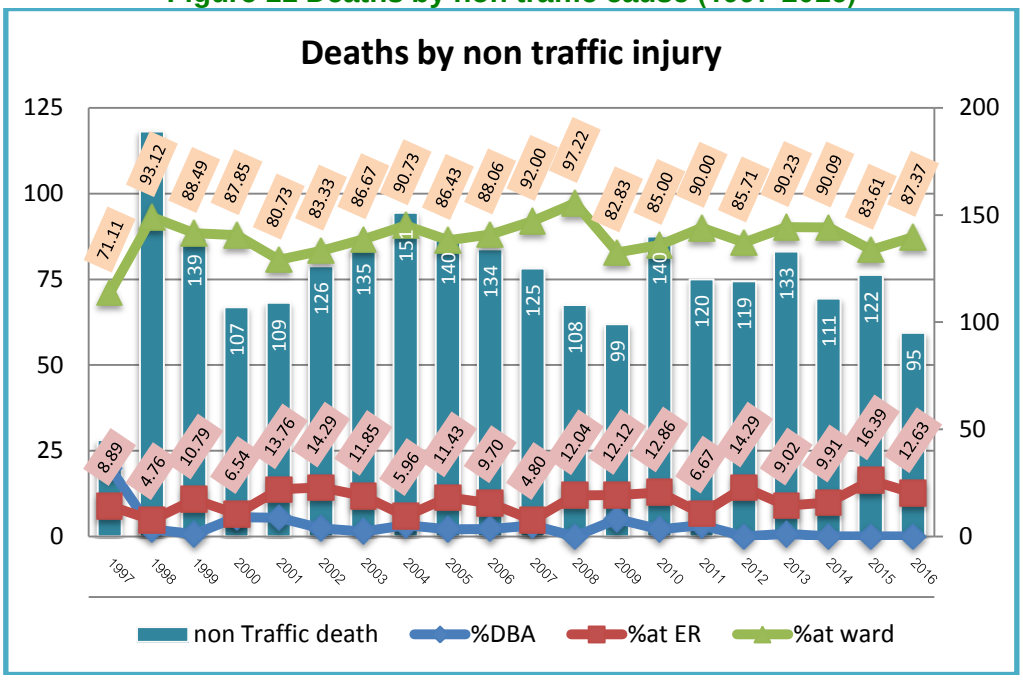
In both causes of death, the death at ward was among the place of death (79-88% by traffic cause and 71-97 % by non traffic cause)

Figure 10 Deaths by traffic cause (1997-2016)



The percentage of traffic fatality at ward was highest (78-90%) and tended to be increased

Figure 11 Deaths by non traffic cause (1997-2016)

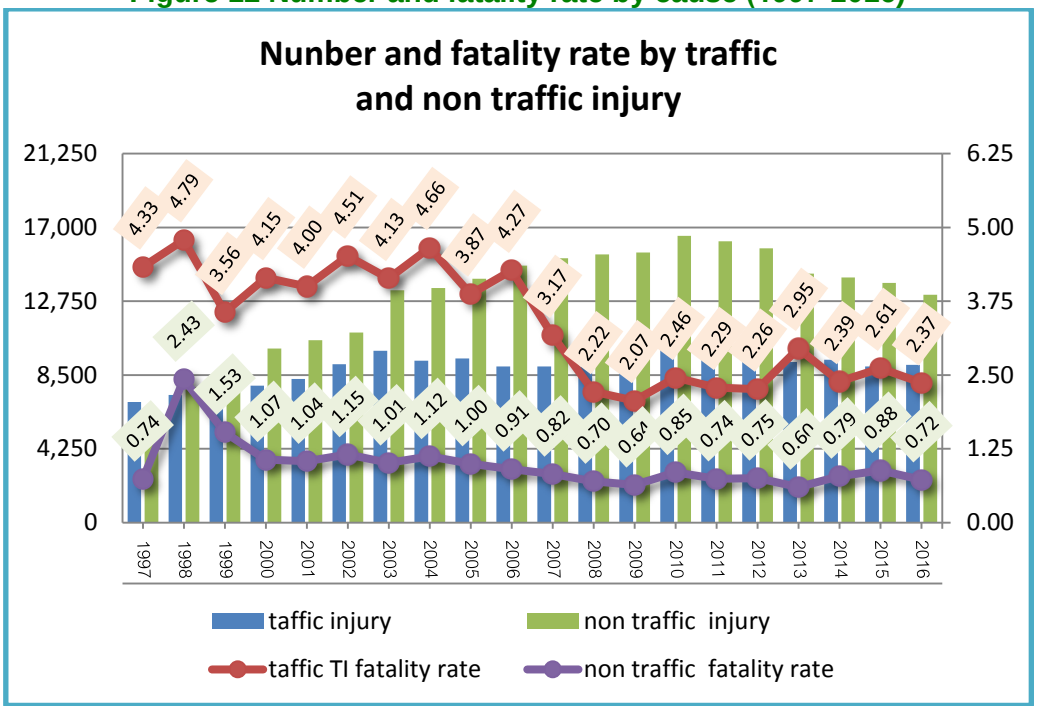


In non-traffic injury group, the percentage of the deaths at ward was highest (70-97%) when comparing with the death at ER and DBA.

Table 9 Number and fatality rate by causes (1997-2016)

Years	traffic			non traffic		
	injury	death	TI fatality rate	injury	death	fatality rate
1997	6,952	301	4.33	6,119	45	0.74
1998	7,350	352	4.79	7,789	189	2.43
1999	7,615	271	3.56	9,087	139	1.53
2000	7,883	327	4.15	10,020	107	1.07
2001	8,269	331	4.00	10,504	109	1.04
2002	9,126	412	4.51	10,954	126	1.15
2003	9,893	409	4.13	13,375	135	1.01
2004	9,316	434	4.66	13,509	151	1.12
2005	9,452	366	3.87	14,048	140	1.00
2006	8,987	384	4.27	14,794	134	0.91
2007	8,992	285	3.17	15,229	125	0.82
2008	8,978	199	2.22	15,440	108	0.70
2009	10,117	209	2.07	15,561	99	0.64
2010	10,380	255	2.46	16,511	140	0.85
2011	10,007	229	2.29	16,199	120	0.74
2012	10,047	227	2.26	15,791	119	0.75
2013	9,255	273	2.95	14,336	86	0.60
2014	9,382	224	2.39	14,116	111	0.79
2015	8,997	235	2.61	13,814	122	0.88
2016	9,087	215	2.37	13,128	95	0.72

Figure 12 Number and fatality rate by cause (1997-2016)



1.4.2 Injury by various causes

Table 10 Number of injury by various causes (1997-2016)

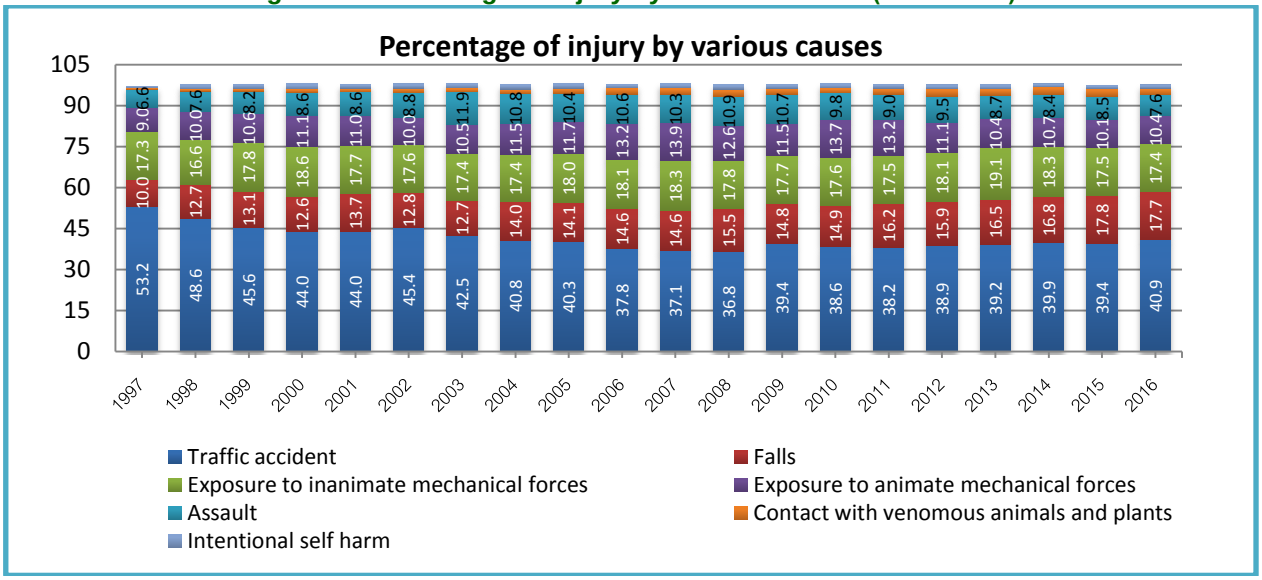
Causes of injury	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Traffic accident	6,952	7,350	7,615	7,883	8,269	9,126	9,893	9,316	9,452	8,987	8,992	8,978	10,117	10,380	10,007	10,047	9,255	9,382	8,997	9,087
Falls	1,306	1,923	2,193	2,255	2,580	2,578	2,946	3,186	3,311	3,470	3,536	3,780	3,812	4,017	4,249	4,107	3,893	3,952	4,058	3,932
Exposure to inanimate mechanical forces	2,266	2,507	2,977	3,326	3,324	3,536	4,058	3,963	4,230	4,293	4,424	4,344	4,545	4,746	4,597	4,674	4,502	4,309	3,991	3,873
Exposure to animate mechanical forces	1,170	1,518	1,771	1,991	2,067	2,017	2,454	2,634	2,747	3,140	3,374	3,074	2,965	3,676	3,461	2,872	2,456	2,506	2,311	2,318
Accidental drowning and submersion	5	25	39	38	40	40	28	29	41	34	31	32	33	30	32	26	17	23	13	19
Others accidental threats to breathing	2	2	24	8	16	3	2	1	5	9	2	0	0	2	0	0	0	0	0	1
Exposure to electric current	29	51	57	79	59	68	60	67	56	66	52	65	67	97	93	94	116	69	90	90
Exposure to smoke, fire and flames	12	19	27	21	32	28	27	46	29	36	30	40	30	30	51	45	48	33	31	33
Contact with heat and hot substances	60	78	79	62	100	87	119	119	118	113	121	137	128	103	117	134	111	98	108	89
Contact with venomous animals and plants	87	118	165	230	267	359	350	372	455	545	565	635	576	499	596	736	563	669	676	538
Exposure to forces of nature	3	3	5	11	0	2	1	5	7	2	4	3	6	3	3	2	3	0	5	0
Accidental poisoning by noxious substances	18	32	55	43	51	64	60	63	48	45	41	57	115	63	85	96	65	65	52	77
Overexertion, travel	1	13	10	72	76	90	87	118	131	152	161	177	149	123	128	155	156	134	172	159
Accidental exposure to other and unspecified factors	0	2	3	3	3	0	0	0	2	0	0	0	0	1	0	0	0	0	1	0
Intentional self harm	59	236	273	334	262	298	374	390	363	325	366	392	350	406	381	344	330	244	288	254
Assault	857	1,143	1,369	1,534	1,609	1,774	2,769	2,467	2,433	2,530	2,493	2,652	2,741	2,644	2,362	2,443	2,044	1,968	1,937	1,684
Event of undetermined intent	42	31	33	6	11	5	9	7	19	14	9	9	16	60	40	60	32	44	79	59
Legal intervention and operations of war	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	2	0	0
Unknown	202	88	7	7	7	16	31	42	5	20	20	43	28	10	3	2	0	0	2	2
All injury	13,071	15,139	16,702	17,903	18,773	20,091	23,268	22,825	23,452	23,781	24,221	24,418	25,678	26,891	26,206	25,838	23,591	23,498	22,811	22,215

The comparative data of injuries by various causes, the traffic injuries was most common in every year.

Table 11 Percentage of injury by various causes (1997-2016)

Causes of Injury rate	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Traffic accident	53.2	48.6	45.6	44.0	44.0	45.4	42.5	40.8	40.3	37.8	37.1	36.8	39.4	38.6	38.2	38.9	39.2	39.9	**39.4**	**40.9**
Falls	10.0	12.7	13.1	12.6	13.7	12.8	12.7	14.0	14.1	14.6	14.6	15.5	14.8	14.9	16.2	15.9	16.5	16.8	**17.8**	**17.7**
Exposure to inanimate mechanical forces	17.3	16.6	17.8	18.6	17.7	17.6	17.4	17.4	18.0	18.1	18.3	17.8	17.7	17.6	17.5	18.1	19.1	18.3	**17.5**	**17.4**
Exposure to animate mechanical forces	9.0	10.0	10.6	11.1	11.0	10.0	10.5	11.5	11.7	13.2	13.9	12.6	11.5	13.7	13.2	11.1	10.4	10.7	**10.1**	**10.4**
Accidental drowning and submersion	0.0	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	**0.1**	**0.1**
Others accidental threats to breathing	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
Exposure to electric current	0.2	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.2	0.3	0.2	0.3	0.3	0.4	0.4	0.4	0.5	0.3	**0.4**	**0.4**
Exposure to smoke, fire and flames	0.1	0.1	0.2	0.1	0.2	0.1	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.1	0.2	0.2	0.2	0.1	**0.1**	**0.1**
Contact with heat and hot substances	0.5	0.5	0.5	0.3	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.6	0.5	0.4	0.4	0.5	0.5	0.4	**0.5**	**0.4**
Contact with venomous animals and plants	0.7	0.8	1.0	1.3	1.4	1.8	1.5	1.6	1.9	2.3	2.3	2.6	2.2	1.9	2.3	2.8	2.4	2.8	**3.0**	**2.4**
Exposure to forces of nature	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
Accidental poisoning by noxious substances	0.1	0.2	0.3	0.2	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.4	0.2	0.3	0.4	0.3	0.3	**0.2**	**0.3**
Overexertion, travel	0.0	0.1	0.1	0.4	0.4	0.4	0.4	0.5	0.6	0.6	0.7	0.7	0.6	0.5	0.5	0.6	0.7	0.6	**0.8**	**0.7**
Accidental exposure to other and unspecified factors	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
Intentional self harm	0.5	1.6	1.6	1.9	1.4	1.5	1.6	1.7	1.5	1.4	1.5	1.6	1.4	1.5	1.5	1.3	1.4	1.0	**1.3**	**1.1**
Assault	6.6	7.6	8.2	8.6	8.6	8.8	11.9	10.8	10.4	10.6	10.3	10.9	10.7	9.8	9.0	9.5	8.7	8.4	**8.5**	**7.6**
Event of undetermined intent	0.3	0.2	0.2	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.1	0.2	0.2	0.2	0.1	0.2	**0.3**	**0.3**
Legal intervention and operations of war	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**
Unknown	1.5	0.6	0.0	0.0	0.0	0.1	0.1	0.2	0.0	0.1	0.1	0.2	0.1	0.0	0.0	0.0	0.0	0.0	**0.0**	**0.0**

Figure 13 Percentage of injury by various causes (1997-2016)

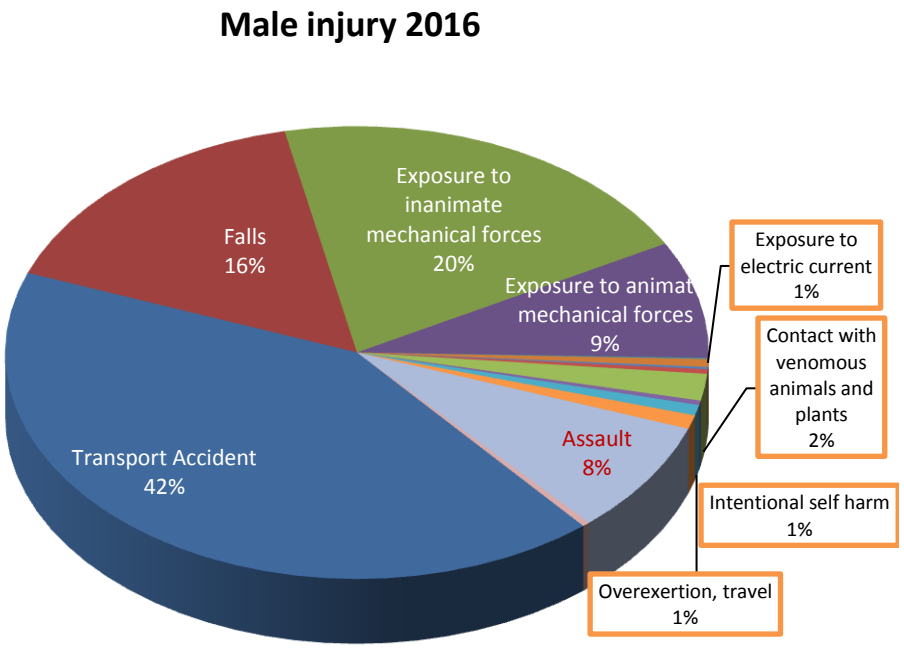


It was shown that the percentage of traffic injury was highest (>35%), inanimate injury was the second; fall was the third, animate injury was the fourth, and injury by assault was the fifth.
Although the number of the traffic injury was increasing but if analyzed by proportion, it was found that traffic injury was relatively decreasing.
Right wise, the injury by fall, inanimate injury, animate injury and assault seemed to be increasing.

Table 12 Number of various causes injury by gender (2008-2016)

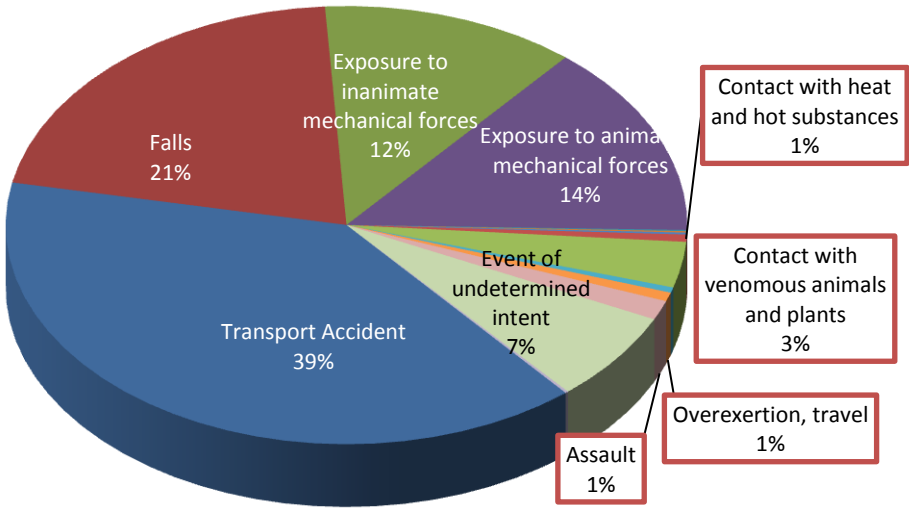
	male injury							female injury						
Causes of Injury	2008	2009	2012	2013	2014	2015	2016	2008	2009	2012	2013	2014	2015	2016
Transport Accident	6,109	6,851	6,689	6,140	6,203	5,857	6,016	2,867	3,267	3,358	3,115	3,179	3,140	3,071
Falls	2,297	2,394	2,475	2,262	2,319	2,355	2,297	1,479	1,418	1,632	1,631	1,633	1,703	1,635
Exposure to inanimate mechanical forces	3,221	3,373	3,466	3,428	3,232	2,981	2,923	1,122	1,172	1,208	1,074	1,077	1,010	950
Exposure to animate mechanical forces	1,704	1,640	1,507	1,258	1,338	1,259	1,202	1,368	1,325	1,365	1,198	1,168	1,052	1,115
Accidental drowning and submersion	26	25	17	13	17	11	12	6	8	9	4	6	2	7
Others accidental threats to breathing	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Exposure to electric current	50	58	71	98	51	71	82	15	9	23	18	18	19	8
Exposure to smoke, fire and flames	21	24	38	31	24	24	22	19	6	7	17	9	7	11
Contact with heat and hot substances	68	64	69	59	49	55	47	69	64	65	52	49	53	42
Contact with venomous animals and plants	346	303	382	316	345	341	274	289	273	354	247	324	335	264
Exposure to forces of nature	2	5	2	3	0	2	0	1	1	0	0	0	3	0
Accidental poisoning by noxious substances	35	58	57	38	42	27	46	22	57	39	27	23	25	31
Overexertion, travel	126	114	102	103	91	123	108	51	35	53	53	43	49	51
Accidental exposure to other and unspecified factors	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Intentional self harm	190	176	175	183	136	172	142	202	174	169	147	108	116	112
Assault	2,026	2,084	1,813	1,458	1,418	1,390	1,162	625	657	630	586	550	547	522
Event of undetermined intent	7	15	50	29	38	75	48	2	1	10	3	6	4	11
Legal intervention and operations of war	0	0	1	0	2	0	0	0	0	0	0	0	0	0
Unknown	3	22	0	0	0	0	1	9	5	2	0	0	2	1
Total	**16,231**	**17,206**	**16,914**	**15,419**	**15,305**	14,743	14,383	**8,146**	**8,472**	**8,924**	**8,172**	8,193	8,068	7,831

Figure 14 Male injuries in 2016 by cause



It was shown that in male group the percentage of traffic injury was highest (42%), inanimate injury was the second (20%), and fall was the third (16%).

Figure 15 Female injuries in 2016 by cause



It was shown that in female group the percentage of traffic injury was highest (39%), fall was the second (21%), and inanimate injury was the third (14%).

1.4.3 Fatality by various causes

Table 13 Number of death by various causes (1997-2016)

Causes of Fatality	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Traffic accident	301	352	271	327	331	412	409	434	366	384	327	245	258	305	280	271	273	224	**235**	**215**
Falls	20	28	32	30	29	36	39	56	36	48	59	45	40	55	46	32	60	46	**40**	**36**
Exposure to inanimate mechanical forces	8	7	5	11	13	13	10	9	6	8	8	9	3	9	13	3	8	4	**5**	**5**
Exposure to animate mechanical forces	5	1	0	2	0	0	2	1	1	5	3	0	0	2	3	1	3	1	**1**	**1**
Accidental drowning and submersion	0	9	13	14	15	21	13	14	17	14	5	8	7	7	9	4	1	2	**3**	**3**
Others accidental threats to breathing	0	0	3	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	**0**	**0**
Exposure to electric current	3	2	3	7	9	8	5	8	8	5	2	5	4	5	3	7	10	3	**6**	**6**
Exposure to smoke, fire and flames	0	3	2	2	5	6	3	3	2	3	3	3	1	1	1	1	3	3	**4**	**6**
Contact with heat and hot substances	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	**0**	**0**
Contact with venomous animals and plants	1	3	5	2	1	0	1	3	3	3	1	0	0	0	0	0	0	0	**0**	**0**
Exposure to forces of nature	0	0	3	0	0	0	0	1	3	1	1	1	4	1	2	0	0	0	**1**	**0**
Accidental poisioning by noxious substances	0	2	0	1	1	0	1	7	0	0	1	0	0	0	0	2	1	1	**0**	**2**
Overexertion, travel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Accidental exposure to other and unspecified factors	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Intentional self harm	0	10	16	16	14	14	14	13	14	7	14	6	10	19	18	18	18	13	**22**	**12**
Assault	7	19	27	18	19	23	43	33	31	27	21	33	26	32	16	42	23	31	**30**	**14**
Event of undetermined intent	0	3	0	0	1	0	2	0	2	1	2	0	0	8	8	7	6	7	**10**	**10**
Legal intervention and operations of war	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Unknown	3	2	2	2	1	5	1	3	13	11	3	6	4	1	1	1	0	0	**0**	**0**
total	348	441	383	434	440	538	544	585	502	518	451	361	357	445	400	390	406	335	**357**	**310**

Table 14 Percentage of death by various causes (1997-2016)

Causes of Fatality rate	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Traffic accident	86.5	79.8	70.8	75.3	75.2	76.6	75.2	74.2	72.9	74.1	72.5	67.9	72.3	68.5	70.0	69.5	67.2	66.9	65.8	69.4
Falls	5.7	6.3	8.4	6.9	6.6	6.7	7.2	9.6	7.2	9.3	13.1	12.5	11.2	12.4	11.5	8.2	14.8	13.7	11.2	11.6
Exposure to inanimate mechanical forces	2.3	1.6	1.3	2.5	3.0	2.4	1.8	1.5	1.2	1.5	1.8	2.5	0.8	2.0	3.3	0.8	2.0	1.2	1.4	1.6
Exposure to animate mechanical forces	1.4	0.2	0.0	0.5	0.0	0.0	0.4	0.2	0.2	1.0	0.7	0.0	0.0	0.4	0.8	0.3	0.7	0.3	0.3	0.3
Accidental drowning and submersion	0.0	2.0	3.4	3.2	3.4	3.9	2.4	2.4	3.4	2.7	1.1	2.2	2.0	1.6	2.3	1.0	0.2	0.6	0.8	1.0
Others accidental threats to breathing	0.0	0.0	0.8	0.2	0.2	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Exposure to electric current	0.9	0.5	0.8	1.6	2.0	1.5	0.9	1.4	1.6	1.0	0.4	1.4	1.1	1.1	0.8	1.8	2.5	0.9	1.7	1.9
Exposure to smoke, fire and flames	0.0	0.7	0.5	0.5	1.1	1.1	0.6	0.5	0.4	0.6	0.7	0.8	0.3	0.2	0.3	0.3	0.7	0.9	1.1	1.9
Contact with heat and hot substances	0.0	0.0	0.3	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0
Contact with venomous animals and plants	0.3	0.7	1.3	0.5	0.2	0.0	0.2	0.5	0.6	0.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Exposure to forces of nature	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.2	0.6	0.2	0.2	0.3	1.1	0.2	0.5	0.0	0.0	0.0	0.3	0.0
Accidental poisoning by noxious substances	0.0	0.5	0.0	0.2	0.2	0.0	0.2	1.2	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.5	0.2	0.3	0.0	0.6
Overexertion, travel	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Accidental exposure to other and unspecified factors	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Intentional self harm	0.0	2.3	4.2	3.7	3.2	2.6	2.6	2.2	2.8	1.4	3.1	1.7	2.8	4.3	4.5	4.6	4.4	3.9	6.2	3.9
Assault	2.0	4.3	7.0	4.1	4.3	4.3	7.9	5.6	6.2	5.2	4.7	9.1	7.3	7.2	4.0	10.8	5.7	9.3	8.4	4.5
Event of undetermined intent	0.0	0.7	0.0	0.0	0.2	0.0	0.4	0.0	0.4	0.2	0.4	0.0	0.0	1.8	2.0	1.8	1.5	2.1	2.8	3.2
Legal intervention and operations of war	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Unknown	0.9	0.5	0.5	0.5	0.2	0.9	0.2	0.5	2.6	2.1	0.7	1.7	1.1	0.2	0.3	0.3	0.0	0.0	0.0	0.0
total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

The percentage of traffic fatality was the highest (66.4% of all fatality), fall injury was the second, and assault was the third biggest cause of fatalities.

Figure 16 Death rate by various causes (1997-2016)

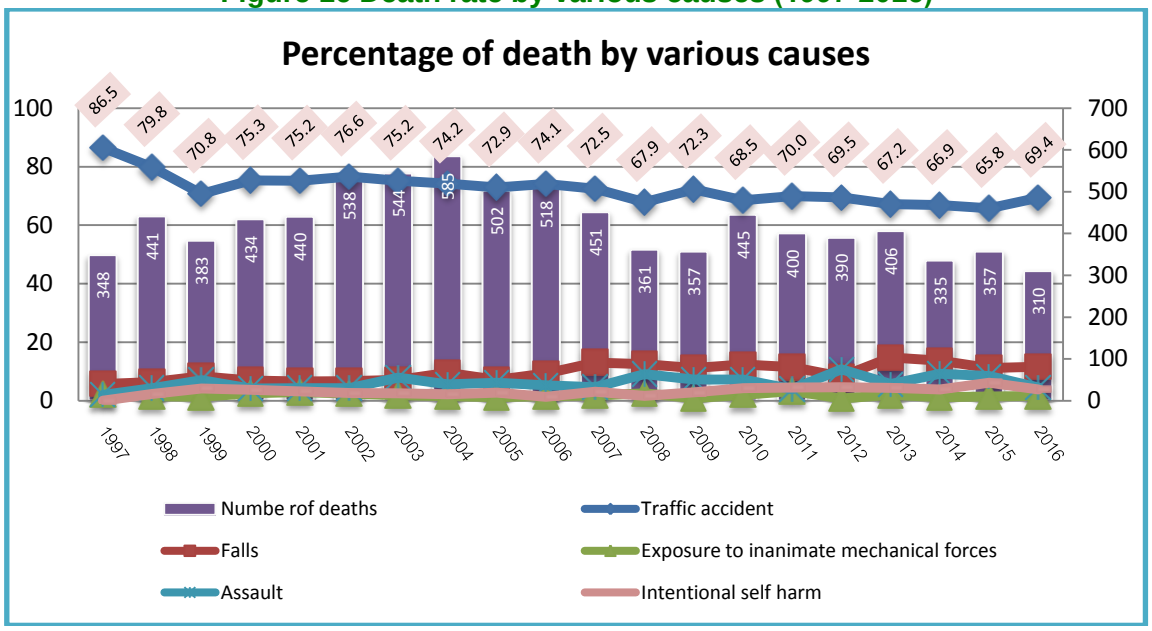
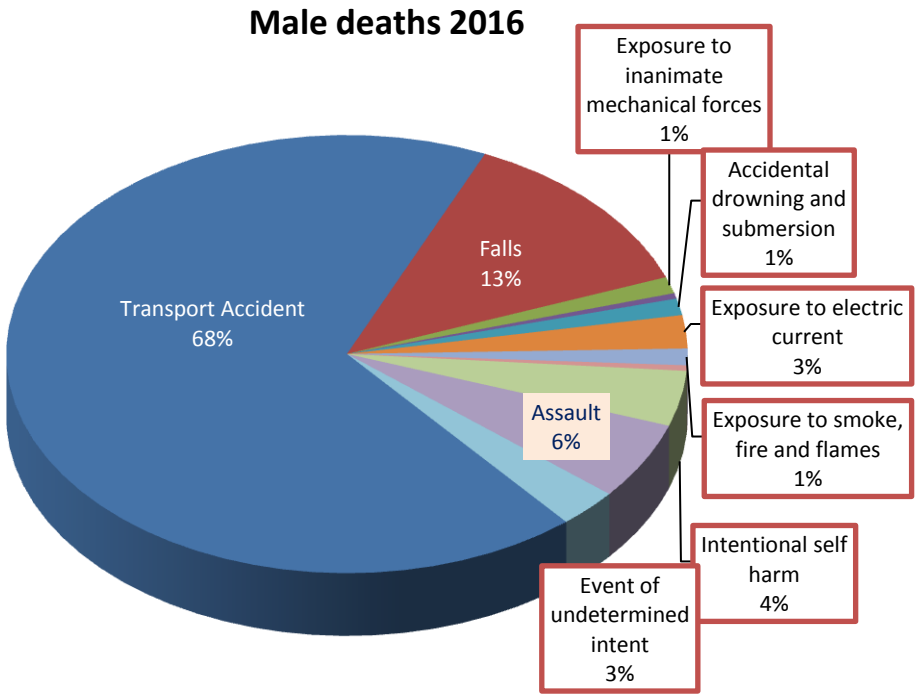


Table 15 Number of death by various causes and gender (2008-2016)

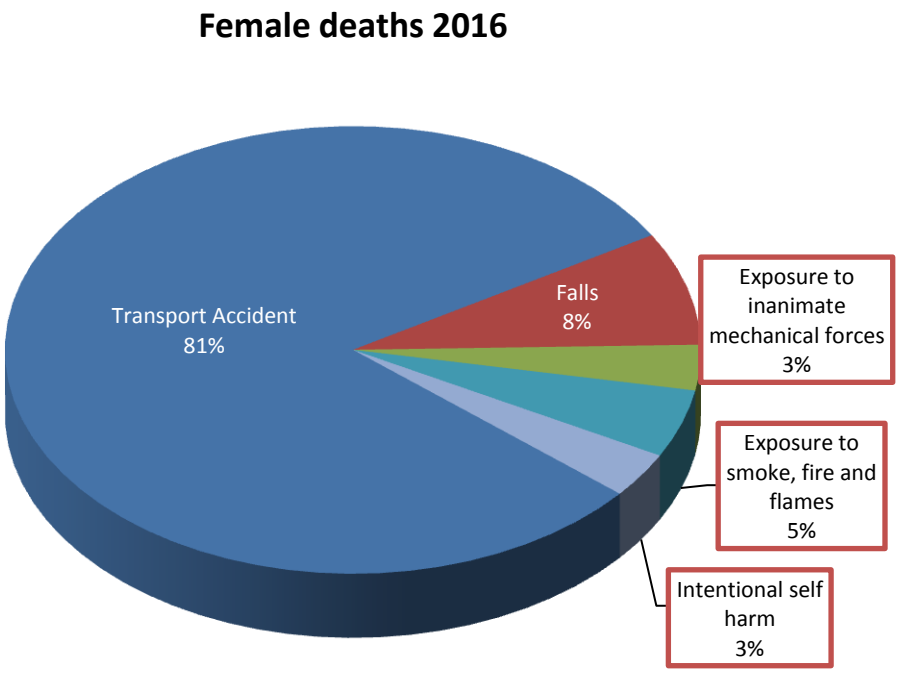
Causes of Injury	male death							female death						
	2008	2009	2012	2013	2014	2015	2016	2008	2009	2012	2013	2014	2015	2016
Transport Accident	208	197	215	219	174	185	166	37	61	56	54	50	50	49
Falls	34	25	24	48	35	29	31	11	15	8	12	11	11	5
Exposure to inanimate mechanical forces	7	2	2	6	3	4	3	2	1	1	2	1	1	2
Exposure to animate mechanical forces	0	0	0	3	1	1	1	0	0	1	0	0	0	0
Accidental drowning and submersion	7	7	3	1	1	2	3	1	0	1	0	1	1	0
Others accidental threats to breathing	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exposure to electric current	5	4	7	10	3	6	6	0	0	0	0	0	0	0
Exposure to smoke, fire and flames	0	0	1	1	3	3	3	3	1	0	2	0	1	3
Contact with heat and hot substances	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Contact with venomous animals and plants	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exposure to forces of nature	1	3	0	0	0	0	0	0	1	0	0	0	1	0
Accidental poisoning by noxious substances	0	0	2	1	1	0	1	0	0	0	0	0	0	1
Overexertion, travel	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Accidental exposure to other and unspecified factors	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Intentional self harm	6	8	13	14	12	19	10	2	2	5	4	1	3	2
Assault	33	24	37	23	30	27	14	0	2	5	0	1	3	0
Event of undetermined intent	0	0	5	4	6	10	7	0	0	2	2	1	0	3
Legal intervention and operations of war	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	5	2	0	0	0	0	0	1	2	1	0	0	0	0
Total	306	272	310	330	269	286	245	57	85	80	76	66	71	65

Figure 17 Male deaths in 2016 by cause



It was shown that in male group the percentage of traffic fatality was highest (68% of all fatality), fall injury was the second 13 %, and assault was the third 6% biggest cause of fatalities.

Figure 18 Female deaths in 2016 by cause



It was shown that in female group the percentage of traffic fatality was highest (81 % of all fatality), fall injury was the second 6%.

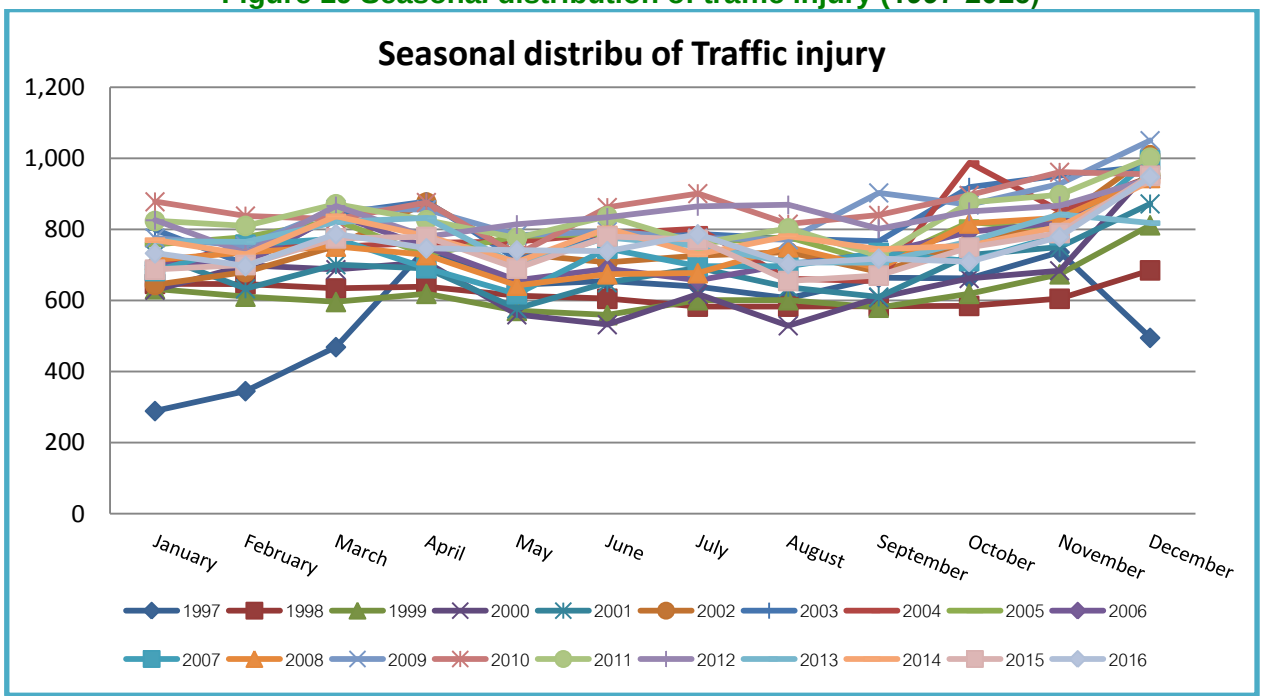
2. Traffic injury

2.1 Seasonal distribution of traffic injury

Table 16 Seasonal distribution of traffic injury (1997-2016)

Year	January	February	March	April	May	June	July	August	September	October	November	December	Total
1997	289	345	469	747	644	655	639	606	664	662	736	495	**6,951**
1998	647	646	634	639	613	605	583	583	584	585	605	685	**7,409**
1999	632	611	596	619	571	559	601	601	580	619	674	812	**7,475**
2000	629	699	687	707	560	532	618	529	608	662	684	968	**7,883**
2001	729	633	701	690	577	650	692	637	610	728	750	872	**8,269**
2002	644	680	753	876	731	707	726	736	680	759	825	1009	**9,126**
2003	799	702	844	878	715	779	787	774	767	919	951	978	**9,893**
2004	698	752	751	762	766	788	802	661	654	987	852	948	**9,421**
2005	758	778	825	728	781	787	762	778	704	821	798	954	**9,474**
2006	699	704	841	750	657	689	657	702	731	793	820	944	**8,987**
2007	683	757	774	691	618	746	696	696	734	711	784	995	**8,885**
2008	714	735	752	728	642	674	677	750	690	817	832	945	**8,956**
2009	776	754	857	856	784	794	776	771	903	869	928	1050	**10,118**
2010	878	838	829	876	729	862	901	815	840	896	961	955	**10,380**
2011	824	810	871	826	776	837	760	803	725	876	897	1002	**10,007**
2012	826	733	866	779	814	834	865	869	802	850	867	942	**10,047**
2013	767	765	821	832	700	777	753	707	706	767	842	818	**9,255**
2014	770	730	837	781	708	803	730	781	744	754	808	936	**9,382**
2015	687	700	775	779	690	780	771	655	670	749	790	951	**8,997**
2016	733	697	787	747	741	739	786	703	718	709	779	948	9,087

Figure 19 Seasonal distribution of traffic injury (1997-2016)



In group of traffic injury, the number of injuries was increased during New Year Festival (December to January) and Thai Traditional New Year Festival (Watering Festival in April)

2.2 Type of vehicle

Table 17 Number of traffic injury by vehicles (1997-2016)

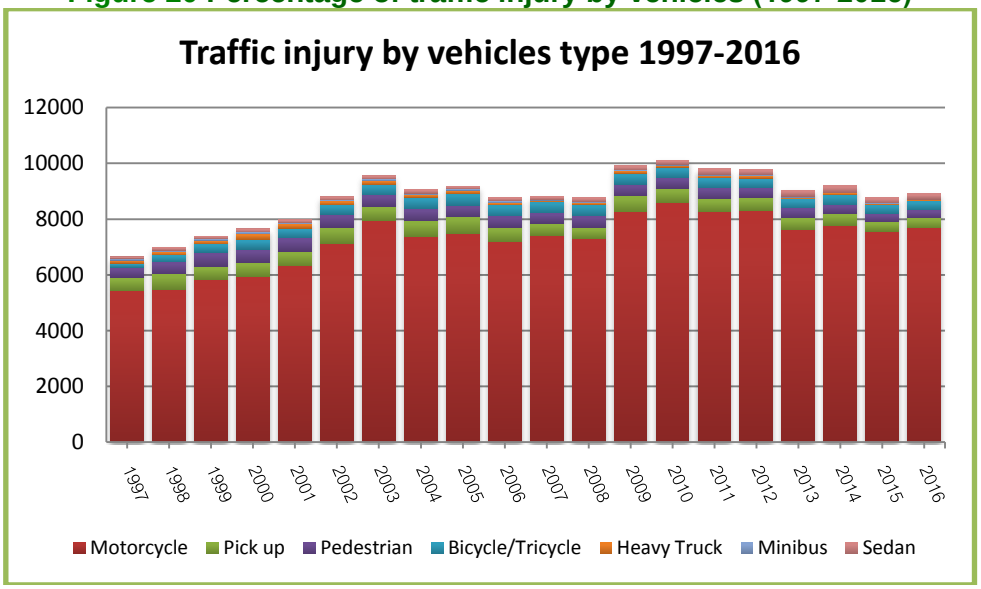
Road user/injury	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Motorcycle	5,443	5,488	5,842	5,958	6,329	7,141	7,954	7,381	7,500	7,200	7,425	7,304	8,261	8,603	8,272	8,318	7,624	7,772	7,568	7,687
Pick up	473	551	473	504	529	577	492	567	589	505	430	392	575	499	460	457	422	433	335	358
Pedestrian	360	437	503	467	483	464	433	433	414	413	376	435	418	391	407	359	364	316	297	288
Bicycle/Tricycle	149	248	300	344	339	340	370	408	419	394	395	397	391	376	356	342	315	361	325	320
Heavy Truck	107	108	127	204	152	134	138	98	116	81	58	71	95	68	83	91	59	76	44	54
Minibus	68	52	59	64	50	40	59	42	49	70	26	33	24	30	21	34	37	5	17	16
Sedan	56	113	89	109	95	106	110	132	92	114	106	141	146	151	207	177	219	236	187	190
Motor Tricycle	55	60	47	74	54	67	87	53	62	39	30	34	42	50	45	47	35	29	33	38
Bus	35	93	39	50	92	94	82	45	35	56	46	38	22	92	43	42	30	31	66	19
Agricultural vehicle	24	47	72	56	79	78	67	103	69	69	76	55	73	61	64	69	72	50	43	27
Trailer	11	11	2	4	4	8	10	1	14	2	5	3	1	6	11	14	5	7	7	3
Motor plough with pick up	10	3	21	4	7	10	0	2	12	7	11	3	8	4	6	7	4	2	2	0
Others	6	4	8	10	15	11	14	8	13	4	8	7	24	433	435	44	39	9	1	0
Taxi	3	0	1	1	6	0	0	0	0	0	0	1	0	2	2	5	3	1	1	2
Train	3	3	3	3	2	3	2	1	5	0	1	1	2	5	2	1	1	6	0	0
Van	2	0	0	0	0	0	0	0	0	0	0	14	14	23	23	34	26	27	38	29
Total	**6,803**	**7,221**	**7,589**	**7,853**	**8,236**	**9,075**	**9,818**	**9,274**	**9,389**	**8,954**	**8,993**	**8,929**	**10,096**	**10,403**	**10,030**	**9,682**	**9,255**	**9,361**	8,964	9,031

Table 18 Percentage of vehicle causes traffic injury (1997-2016)

Road user/injury	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Motorcycle	80.0	76.0	77.0	75.9	76.8	78.7	81.0	79.6	79.9	80.4	82.6	81.8	81.8	82.7	82.5	85.9	82.4	83.0	84.4	85.1
Pick up	7.0	7.6	6.2	6.4	6.4	6.4	5.0	6.1	6.3	5.6	4.8	4.4	5.7	4.8	4.6	4.7	4.6	4.6	3.7	4.0
Pedestrian	5.3	6.1	6.6	5.9	5.9	5.1	4.4	4.7	4.4	4.6	4.2	4.9	4.1	3.8	4.1	3.7	3.9	3.4	3.3	3.2
Bicycle/Tricycle	2.2	3.4	4.0	4.4	4.1	3.7	3.8	4.4	4.5	4.4	4.4	4.4	3.9	3.6	3.5	3.5	3.4	3.9	3.6	3.5
Heavy Truck	1.6	1.5	1.7	2.6	1.8	1.5	1.4	1.1	1.2	0.9	0.6	0.8	0.9	0.7	0.8	0.9	0.6	0.8	0.5	0.6
Minibus	1.0	0.7	0.8	0.8	0.6	0.4	0.6	0.5	0.5	0.8	0.3	0.4	0.2	0.3	0.2	0.4	0.4	0.1	0.2	0.2
Sedan	0.8	1.6	1.2	1.4	1.2	1.2	1.1	1.4	1.0	1.3	1.2	1.6	1.4	1.5	2.1	1.8	2.4	2.5	2.1	2.1
Motor Tricycle	0.8	0.8	0.6	0.9	0.7	0.7	0.9	0.6	0.7	0.4	0.3	0.4	0.4	0.5	0.4	0.5	0.4	0.3	0.4	0.4
Bus	0.5	1.3	0.5	0.6	1.1	1.0	0.8	0.5	0.4	0.6	0.5	0.4	0.2	0.9	0.4	0.4	0.3	0.3	0.7	0.2
Agricultural vehicle	0.4	0.7	0.9	0.7	1.0	0.9	0.7	1.1	0.7	0.8	0.8	0.6	0.7	0.6	0.6	0.7	0.8	0.5	0.5	0.3
Trailer	0.2	0.2	0.0	0.1	0.0	0.1	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0
Motor plough with pick up	0.1	0.0	0.3	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0
Others	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.2	4.2	4.3	0.5	0.4	0.1	0.0	0.0
Taxi	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Train	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Van	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.2	0.2	0.4	0.3	0.3	0.4	0.3

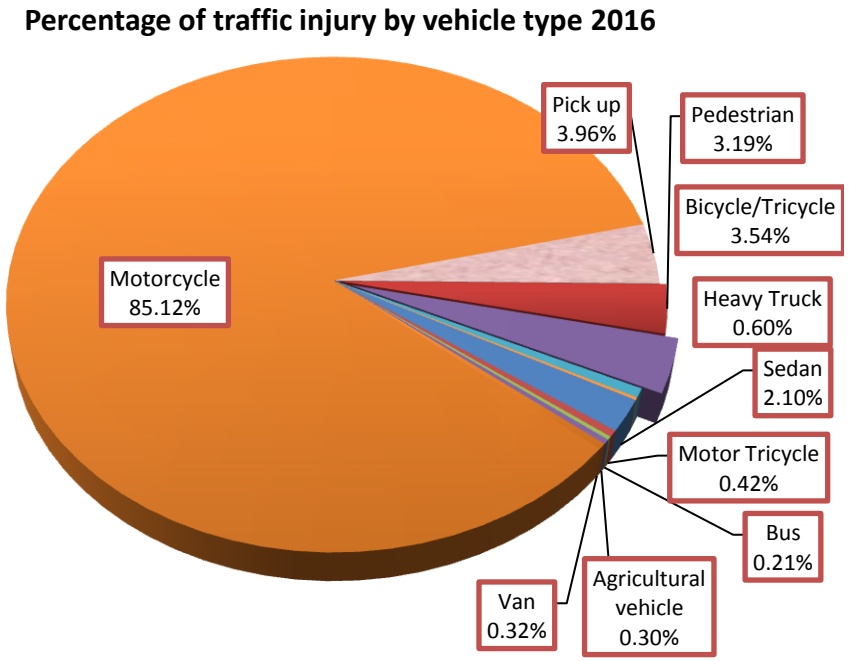
Traffic injury was the most common cause of all injury. Among road traffic injury, 85.1 % was motorcycle injury. The pick-up truck injury was the second (4.0%), followed by bicycle or tricycle injury (3.5%) and sedan (2.1%). The pedestrians had higher risk to get injury (3.2 %)

Figure 20 Percentage of traffic injury by vehicles (1997-2016)



Motorcycle was the most vulnerable when comparing with the other road users.
The motorcycle injury tended to be increased year by year.

Figure 21 traffic injuries by vehicle type in 2016



By comparison the vehicle caused traffic injuries; it was show the motorcycle accident was the most common cause of injuries (85.12%) the second was the pickup accident (3.96 %)

2.3 Age group distribution

Table 19 Number of traffic injury and death by age distribution 2016

Age group	2014				2015				2016			
	Injury		Death		Injury		Death		Injury		Death	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
<10	269	149	2	1	203	150	4	2	209	159	4	0
10-<20	1,517	870	27	11	1,373	872	20	4	1,577	880	20	12
20-<30	1,596	824	29	6	1,494	796	29	5	1,548	753	30	9
30-<40	1,023	440	31	10	945	415	23	4	951	391	17	5
40-<50	806	457	38	9	805	391	41	7	715	383	24	4
50-<60	550	262	19	5	556	313	33	14	548	292	31	8
≥60	442	177	28	8	481	203	35	14	468	213	40	10
total	6,203	3,179	174	50	5,857	3,140	185	50	6,016	3,071	166	48

Figure 22 Traffic injuries by age distribution in 2016

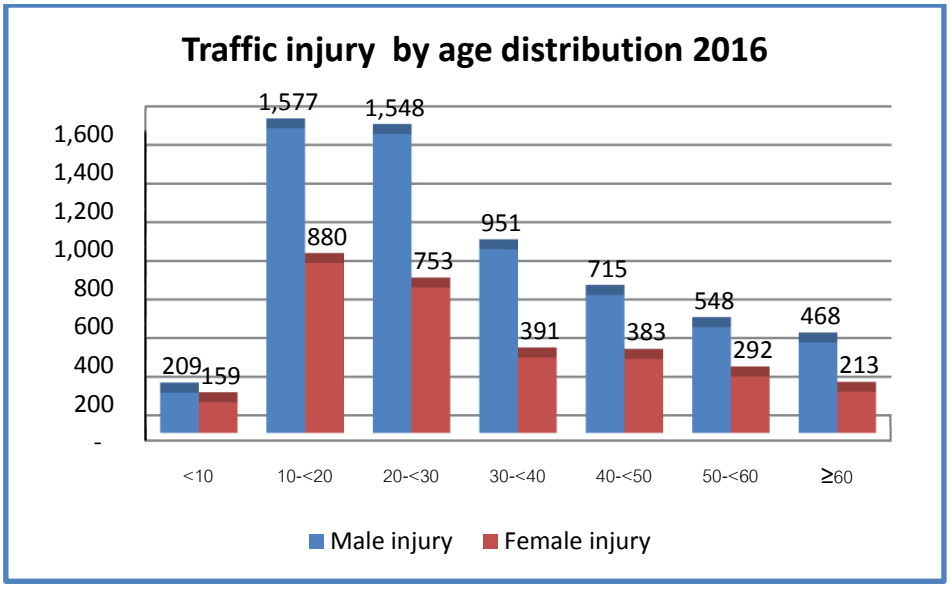
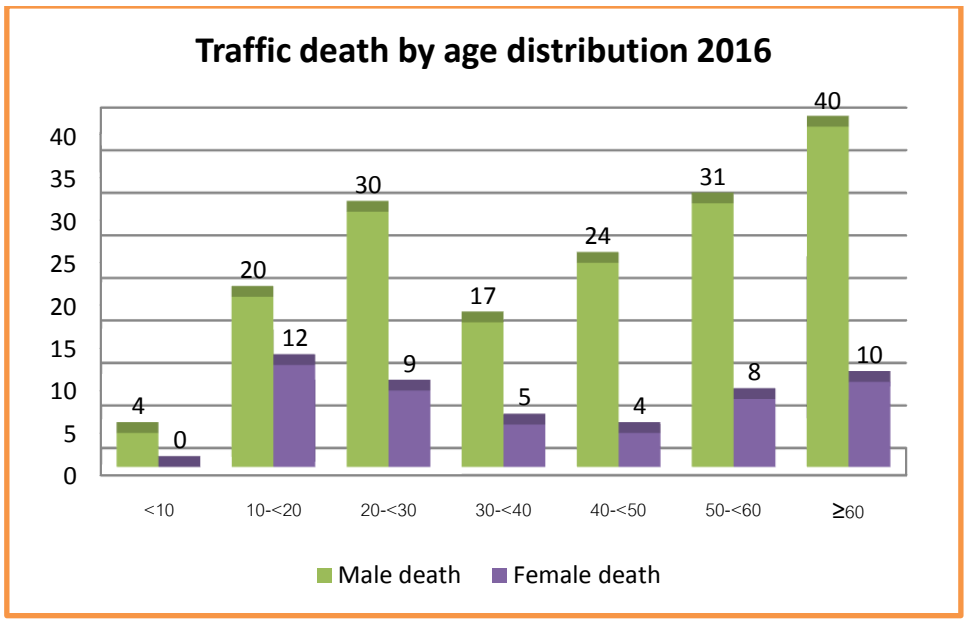


Figure 23 deaths by age distribution in 2016

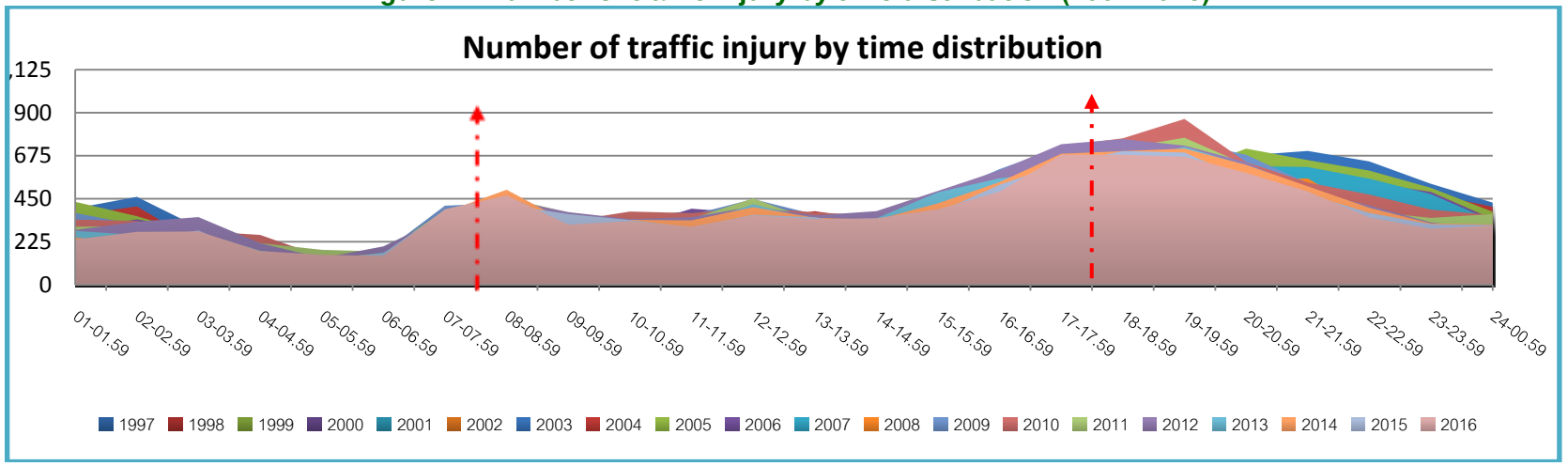


2.4 Traffic injury by time of crashes

Table 20 Number of crashes by time (1997-2016)

Time	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
01-01.59	230	230	247	255	309	348	400	365	434	291	337	317	376	341	304	287	282	248	229	237
02-02.59	183	183	207	225	273	334	460	410	359	342	326	307	314	334	307	330	261	212	237	277
03-03.59	146	146	180	204	237	246	300	220	263	290	301	237	273	281	329	354	273	250	284	279
04-04.59	131	131	177	130	181	154	209	193	183	182	174	155	191	261	218	218	179	154	150	177
05-05.59	92	92	128	126	120	133	132	150	121	127	126	148	134	148	183	140	130	140	137	157
06-06.59	76	76	117	122	104	131	125	106	112	120	115	159	170	181	174	201	169	162	165	151
07-07.59	134	134	172	185	169	172	174	154	188	171	184	305	414	366	390	356	337	380	390	395
08-08.59	232	232	299	294	301	334	342	326	316	352	356	359	426	474	454	447	461	497	418	467
09-09.59	227	227	244	312	282	308	340	330	294	285	289	288	359	332	378	380	328	324	370	315
10-10.59	254	254	282	310	318	318	356	328	347	298	304	293	351	383	330	344	333	340	339	333
11-11.59	285	285	299	340	337	391	384	376	364	398	355	286	366	375	346	354	310	337	300	304
12-12.59	269	269	334	354	343	354	379	338	361	374	381	360	448	404	452	409	421	406	366	363
13-13.59	269	269	295	306	352	378	332	385	353	367	372	339	368	379	334	363	338	351	353	344
14-14.59	295	295	313	285	315	344	369	336	362	349	359	300	360	361	369	385	348	340	307	348
15-15.59	289	289	338	347	355	398	370	424	409	370	359	487	466	417	460	491	484	426	379	395
16-16.59	275	275	366	368	375	454	481	416	410	419	408	505	605	579	591	598	557	537	523	487
17-17.59	333	333	479	512	483	534	537	505	508	505	535	653	720	724	664	735	593	685	633	680
18-18.59	352	352	466	474	516	498	570	571	627	565	559	656	707	766	715	762	643	699	699	680
19-19.59	398	398	494	469	486	566	653	604	590	604	551	675	751	867	769	728	722	712	692	670
20-20.59	441	441	550	561	593	628	676	673	712	627	621	555	680	642	628	641	623	627	547	585
21-21.59	419	419	540	550	539	645	700	652	652	579	616	556	532	535	509	491	473	515	473	488
22-22.59	371	371	439	436	519	602	645	571	597	534	555	371	425	472	383	415	389	403	376	352
23-23.59	346	346	364	372	434	476	528	475	507	486	474	375	367	393	350	326	314	321	317	293
24-00.59	294	294	285	346	328	380	430	408	382	344	334	292	315	365	370	292	287	316	313	310
total	**6,341**	**6,341**	**7,615**	**7,883**	**8,269**	**9,126**	**9,892**	**9,316**	**9,451**	**8,979**	**8,991**	**8,978**	**10,118**	**10,380**	**10,007**	**10,047**	**9,255**	**9,382**	**8,997**	**9,087**

Figure 24 Number of traffic injury by time distribution (1997-2016)



It was found that the peak time of the traffic injuries were 08.00 - 9.00 a.m., and 06.00-08.00 p.m. consecutively.

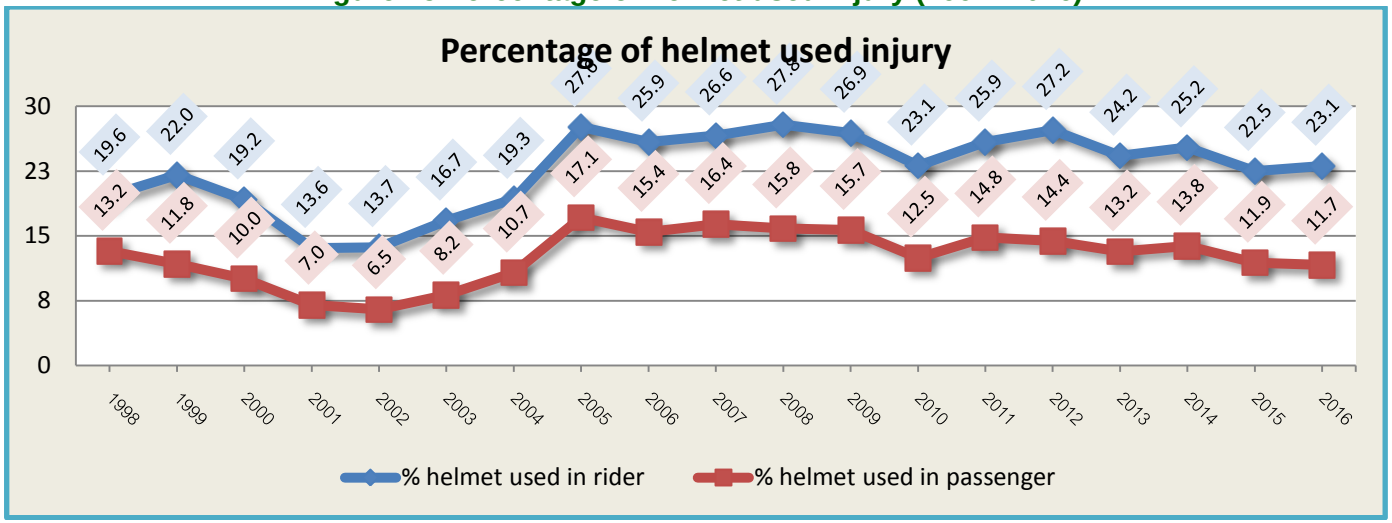
2.5 Risk behaviors

2.5.1 Helmet used

Table 21 Injury with and without helmet used (1997-2016)

Rider	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
helmet	798	962	853	649	742	1,007	1,122	1,600	1,466	1,558	1,577	1,762	1,670	1,809	1,802	1,520	1,611	1,386	1,410
non helmet	3,266	3,406	3,592	4,132	4,684	5,010	4,705	4,200	4,201	4,302	4,088	4,787	5,559	5,184	4,819	4,749	4,779	4,779	4,698
total	4,064	4,368	4,445	4,781	5,426	6,017	5,827	5,800	5,667	5,860	5,665	6,549	7,229	6,993	6,621	6,269	6,390	6,165	6,108
% helmet used in rider	19.6	22.0	19.2	13.6	13.7	16.7	19.3	27.6	25.9	26.6	27.8	26.9	23.1	25.9	27.2	24.2	25.2	22.5	23.1
passenger	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
helmet	156	156	127	98	95	149	165	271	216	241	220	250	220	242	211	172	180	145	144
non helmet	1,022	1,171	1,138	1,299	1,368	1,676	1,372	1,311	1,183	1,233	1,169	1,596	1,545	1,393	1,254	1,132	1,121	1,076	1,092
total	1,178	1,327	1,265	1,397	1,463	1,825	1,537	1,582	1,399	1,474	1,389	1,846	1,765	1,635	1,465	1,304	1,301	1,221	1,236
% helmet used in passenger	13.2	11.8	10.0	7.0	6.5	8.2	10.7	17.1	15.4	16.4	15.8	15.7	12.5	14.8	14.4	13.2	13.8	11.9	11.7

Figure 25 Percentage of helmet used injury (1997- 2016)

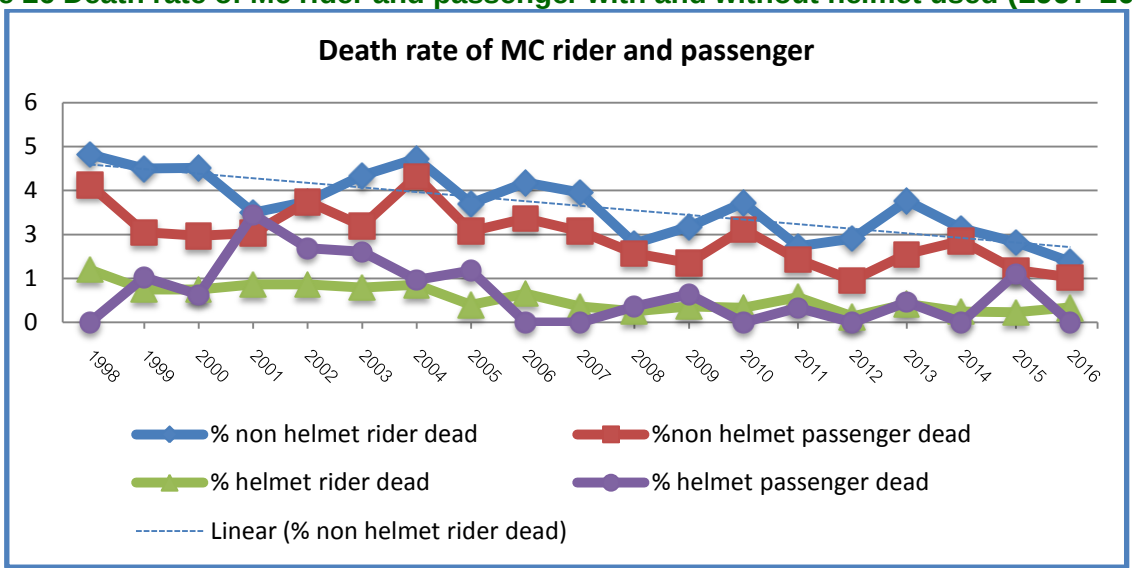


The proportion of helmet used in motorcycle driver injured in transport accident was higher than passenger. It was shown that the trend of helmet used was increased significantly, and it tended to be progressively increased in the recent year.

Table 22 Death with and without helmet used (1997-2016)

non helmet	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
non helmet rider dead	156	149	158	129	161	209	219	142	167	159	92	130	189	112	115	164	128	109	81
% non helmet rider dead	4.8	4.4	4.4	3.1	3.4	4.2	4.7	3.4	4.0	3.7	2.3	2.7	3.4	2.2	2.4	3.5	2.7	2.3	1.7
passenger dead	40	30	28	33	47	46	57	34	35	32	23	27	41.0	25	15	22	26	16	14
%non helmet passenger dead	3.9	2.6	2.5	2.5	3.4	2.7	4.2	2.6	3.0	2.6	2.0	1.7	2.7	1.8	1.2	1.9	2.3	1.5	1.3
helmet	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
rider dead	12	9	8	7	8	10	12	8	12	7	5	8	7	13	3	8	5	4	6
% helmet rider dead	1.5	0.9	0.9	1.1	1.1	1.0	1.1	0.5	0.8	0.4	0.3	0.5	0.4	0.7	0.2	0.5	0.3	0.3	0.4
passenger dead	-	2	1	3	2	3	2	4	-	-	1	2	-	1	-	1	-	2	-
% helmet passenger dead	0.0	1.3	0.8	3.1	2.1	2.0	1.2	1.5	0.0	0.0	0.5	0.8	0.0	0.4	-	0.6	-	1.4	-

Figure 26 Death rate of Mc rider and passenger with and without helmet used (1997-2016)



The mortality rate in group of non helmet used was significantly higher than in helmet used. The group of driver was shown to have higher risk to death than passenger in both helmet and non helmet used.

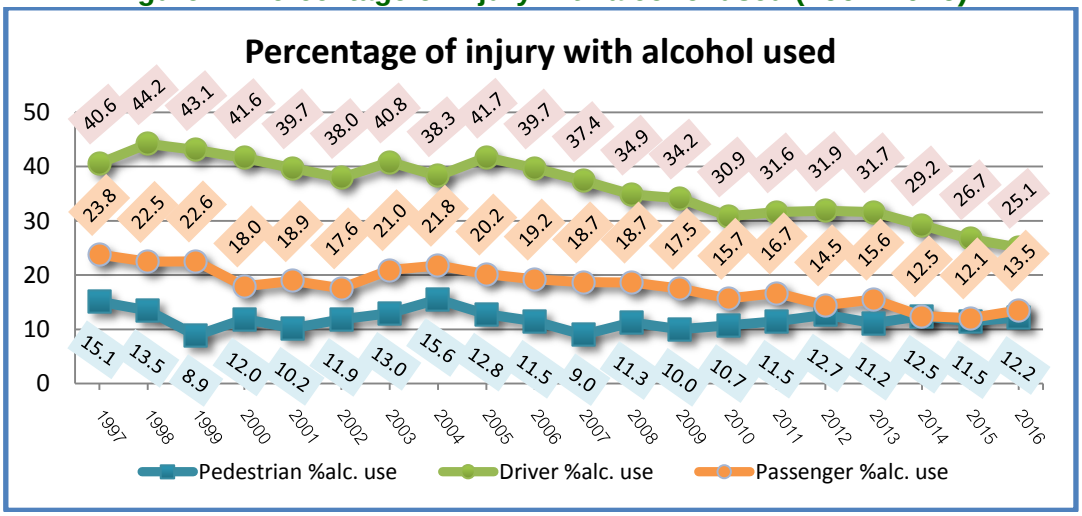
2.5.2 Alcohol used

Table 23 Number of injury with and without alcohol used (1997-2016)

	Pedestrian				Driver				Passenger			
Year	non alc.	Alc.	total	%alc. use	non alc.	Alc.	total	%alc. use	non alc.	Alc.	total	%alc. use
1997	292	52	344	15.1	2,698	1,846	4,544	40.6	1,356	423	1,779	23.8
1998	364	57	421	13.5	2,598	2,057	4,655	44.2	1,506	437	1,943	22.5
1999	451	44	495	8.9	2,803	2,123	4,926	43.1	1,591	464	2,055	22.6
2000	405	55	460	12.0	2,909	2,075	4,984	41.6	1,774	389	2,163	18.0
2001	421	48	469	10.2	3,131	2,065	5,196	39.7	1,771	414	2,185	18.9
2002	393	53	446	11.9	3,642	2,229	5,871	38.0	1,930	413	2,343	17.6
2003	368	55	423	13.0	3,834	2,646	6,480	40.8	2,058	546	2,604	21.0
2004	353	65	418	15.6	3,863	2,397	6,260	38.3	1,776	495	2,271	21.8
2005	346	51	397	12.8	3,614	2,585	6,199	41.7	1,876	474	2,350	20.2
2006	353	46	399	11.5	3,641	2,399	6,040	39.7	1,645	392	2,037	19.2
2007	342	34	376	9.0	4,109	2,455	6,564	37.4	1,646	379	2,025	18.7
2008	377	48	425	11.3	4,056	2,175	6,231	34.9	1,553	357	1,910	18.7
2009	367	41	408	10.0	4,677	2,428	7,105	34.2	1,872	398	2,270	17.5
2010	349	42	391	10.7	5,191	2,319	7,510	30.9	2,029	378	2,407	15.7
2011	360	47	407	11.5	5,052	2,338	7,390	31.6	1,801	361	2,162	16.7
2012	303	44	347	12.7	4,895	2,292	7,187	31.9	1,781	302	2,083	14.5
2013	318	40	358	11.2	4,718	2,186	6,904	31.7	1,558	287	1,845	15.6
2014	274	39	313	12.5	4,975	2,055	7,030	29.2	1,607	229	1,836	12.5
2015	255	33	288	11.5	4,851	1,766	6,617	26.7	1,504	207	1,711	12.1
2016	244	34	278	12.2	4,927	1,651	6,578	25.1	1,421	222	1,643	13.5

Alcohol used was an important indicator to indicate the vulnerability of drink drive and the impact of drink drive campaign.

Figure 27 Percentage of injury with alcohol used (1997-2016)



The trend of alcohol used among driver was slightly decreasing but the passenger and pedestrian seemed to have no significant change.

Table 24 Number of death, with and without alcohol used (1997-2016)

Year	Pedestrian death				Driver death				Passenger death			
	non alc. use	Fatality rate of non alc. use	Alc. use	Fatality rate of alc. use	non alc. use	Fatality rate of non alc. use	Alc. use	Fatality rate of alc. use	non alc. use	Fatality rate of non alc. use	Alc. use	Fatality rate of alc. use
1997	16	5.5	2	3.8	72	2.7	94	5.1	40	2.9	21	5.0
1998	22	6.0	5	8.8	77	3.0	93	4.5	58	3.9	16	3.7
1999	10	2.2	3	6.8	53	1.9	95	4.5	39	2.5	17	3.7
2000	9	2.2	3	5.5	62	2.1	92	4.4	52	2.9	14	3.6
2001	13	3.1	5	10.4	64	2.0	58	2.8	45	2.5	14	3.4
2002	13	3.3	5	9.4	83	2.3	79	3.5	62	3.2	18	4.4
2003	14	3.8	3	5.5	97	2.5	101	3.8	47	2.3	14	2.6
2004	21	5.9	9	13.8	102	2.6	86	3.6	62	3.5	18	3.6
2005	11	3.2	0	0.0	51	1.4	78	3.0	45	2.4	12	2.5
2006	11	3.1	0	0.0	72	2.0	78	3.3	48	2.9	10	2.6
2007	19	5.6	0	0.0	64	1.6	67	2.7	43	2.6	10	2.6
2008	10	2.7	2	4.2	41	1.0	47	2.2	26	1.7	4	1.1
2009	12	3.3	2	4.9	75	1.6	56	2.3	35	1.9	7	1.8
2010	22	6.3	4	9.5	164	3.2	50	2.2	47	2.3	8	2.1
2011	21	5.8	2	4.3	142	2.8	51	2.2	46	2.6	6	1.7
2012	12	4.0	2	4.5	58	1.2	55	2.4	27	1.5	5	1.7
2013	15	4.7	1	2.5	118	2.5	63	2.9	28	1.8	8	2.8
2014	10	3.6	3	7.7	98	2.0	30	1.5	33	2.1	3	1.3
2015	11	4.3	1	3.0	76	1.6	27	1.5	29	1.9	2	1.0
2016	8	3.3	0	0.0	59	1.2	22	1.3	23	1.6	1	0.5

The mortality rate of driver with alcohol used was highest but the rate trend to be decreasing. Mortality rate of driver without alcohol used was lowest and also seemed to be decreasing. Mortality rate of passenger with alcohol used was the second and also tended to be decreasing while the mortality rate of the passenger without the alcohol used did not have a significant changed.

Figure 28 Fatality rate of driver with and without alcohol used

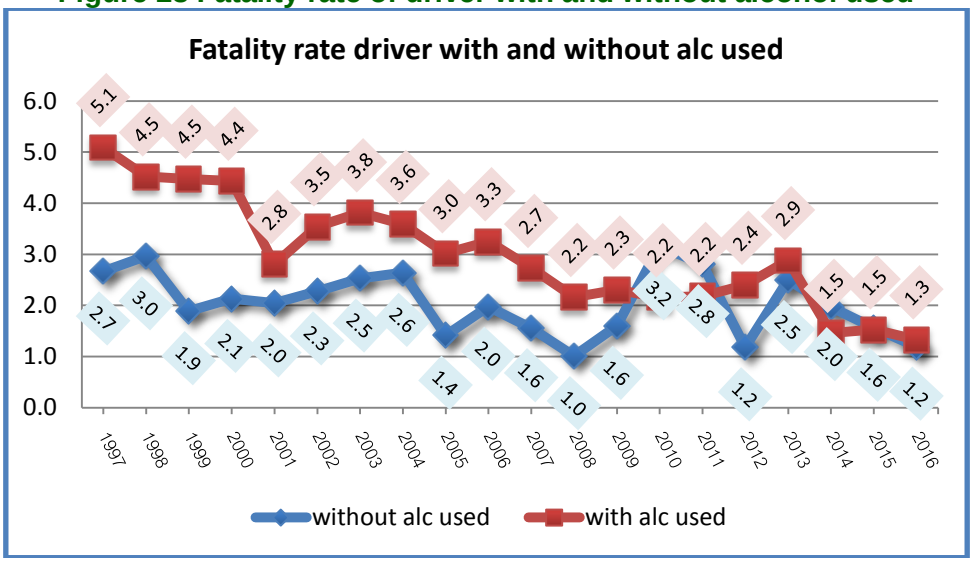


Figure 29 Fatality rate of passenger with and without alcohol used

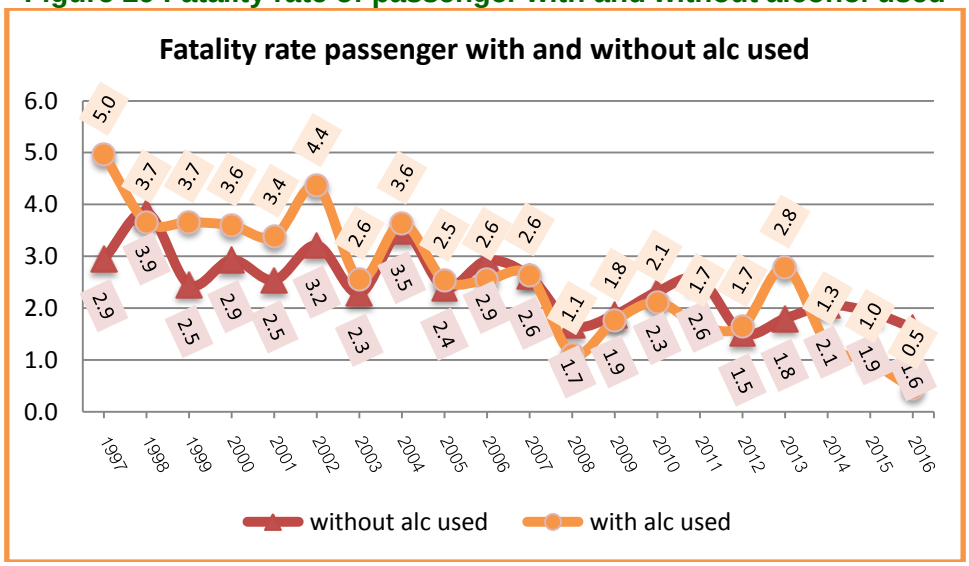
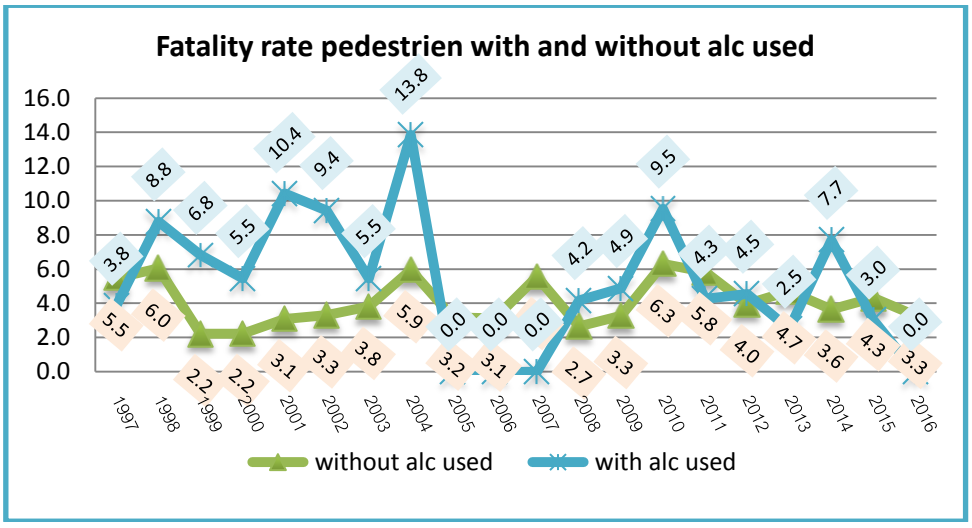


Figure 30 Fatality rate of pedestrian with and without alcohol used



2.5.3 Alcohol used by vehicle type

Table 25 Road user injury related with alcohol used (1997-2016)

Vehicle type	alcohol	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Bicycle/Tricycle	yes	19	28	29	38	34	37	26	32	33	37	27	28	30	36	35	28	37	29	**23**	**30**
	no	94	151	204	221	237	249	225	285	295	274	296	309	285	340	321	267	233	287	**297**	**250**
	total	113	179	233	259	271	286	251	317	328	311	323	337	315	376	356	295	270	316	**320**	**280**
	% alc. used	16.8	15.6	12.4	14.7	12.5	12.9	10.4	10.1	10.1	11.9	8.4	8.3	9.5	9.6	9.8	9.5	13.7	9.2	**7.2**	**10.7**
Motorcycle	yes	1,727	1,894	1,984	1,938	1,939	2,112	2,523	2,272	2,449	2,280	2,335	2,054	2,298	2,524	2,511	2,161	2,030	1,906	**1,836**	**1,763**
	no	2,442	2,233	2,413	2,521	2,665	3,192	3,390	3,335	3,137	3,174	3,355	3,552	4,136	6,079	5,761	4,369	4,193	4,406	**5,411**	**4,669**
	total	4,169	4,127	4,397	4,459	4,604	5,304	5,913	5,607	5,586	5,454	5,690	5,606	6,434	8,603	8,272	6,530	6,223	6,312	**7,247**	**5,986**
	% alc. used	41.4	45.9	45.1	43.5	42.1	39.8	42.7	40.5	43.8	41.8	41.0	36.6	35.7	29.3	30.4	33.1	32.6	30.2	**25.3**	**25.7**
Motor Tricycle	yes	3	13	18	16	7	5	12	11	4	3	2	5	5	8	4	8	5	3	**4**	**7**
	no	14	18	11	20	15	20	25	19	20	14	16	13	15	42	41	22	21	10	**28**	**19**
	total	17	31	29	36	22	25	37	30	24	17	18	18	20	50	45	30	26	13	**32**	**26**
	% alc. used	17.6	41.9	62.1	44.4	31.8	20.0	32.4	36.7	16.7	17.6	11.1	38.5	25.0	16.0	8.9	26.7	19.2	23.1	**12.5**	**26.9**
Sedan	yes	11	21	14	20	18	12	22	23	19	20	25	35	32	40	61	31	45	43	**45**	**37**
	no	14	35	24	25	25	32	34	42	28	35	27	36	50	111	146	69	81	73	**135**	**62**
	total	25	56	38	45	43	44	56	65	47	55	52	71	82	151	207	100	126	116	**180**	**99**
	% alc. used	44.0	37.5	36.8	44.4	41.9	27.3	39.3	35.4	40.4	36.4	48.1	49.3	39.0	26.5	29.5	31.0	35.7	37.1	**25.0**	**37.4**
Pick up	yes	61	69	65	45	53	49	51	51	63	51	60	44	48	75	70	47	61	63	**63**	**36**
	no	66	89	83	65	105	87	91	107	77	91	84	85	126	424	390	89	103	127	**261**	**98**
	total	127	158	148	110	158	136	142	158	140	142	144	129	174	499	460	136	164	190	**324**	**134**
	% alc. used	48.0	43.7	43.9	40.9	33.5	36.0	35.9	32.3	45.0	35.9	41.7	34.1	27.6	15.0	15.2	34.6	37.2	33.2	**19.4**	**26.9**
Heavy Truck	yes	7	10	8	13	4	5	4	2	6	5	1	5	4	2	5	8	3	3	**1**	**0**
	no	21	16	26	24	28	25	31	28	22	18	17	20	26	66	78	28	25	32	**43**	**24**
	total	28	26	34	37	32	30	35	30	28	23	18	25	30	68	83	36	28	35	**44**	**24**
	% alc. used	25.0	38.5	23.5	35.1	12.5	13.3	11.4	6.7	21.4	21.7	5.6	20.0	13.3	2.9	6.0	22.2	10.7	8.6	**2.3**	**0.0**

Vehicle type	alcohol	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Trailer	yes	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	2	0	1	**0**	**0**
	no	9	1	0	2	0	2	4	1	5	1	3	1	0	6	11	5	3	4	**7**	**2**
	total	9	1	0	2	0	3	5	1	5	1	3	1	0	6	11	11	3	3	**7**	**2**
	% alc. used	0	0	0	0	0	33.3	20	0	0	0	0	0	0	0	0	18.2	0.0	33.3	**0.0**	**0.0**
Minibus	yes	0	4	0	0	0	2	1	0	0	0	0	0	0	0	2	1	0	0	**0**	**0**
	no	2	3	0	0	1	1	1	1	3	1	2	2	0	30	19	1	3	0	**17**	**0**
	total	2	7	0	0	1	3	2	1	3	1	2	2	0	30	21	2	3	3	**17**	**0**
	% alc. used	0	57.1	0	0	0	66.7	100	0	0	0	0	0	0	0	9.5	50.0	0.0	0.0	**0.0**	**0.0**
Bus	yes	0	1	1	0	1	1	0	1	0	0	0	0	0	0	1	0	0	0	**0**	**0**
	no	1	0	1	1	3	3	3	4	1	2	4	2	0	92	42	3	4	2	**66**	**0**
	total	1	1	2	1	4	4	3	5	1	2	4	2	0	92	43	3	4	4	**66**	**0**
	% alc. used	0	100	100	0	25	25	0	20	0	0	0	0	0	0	2	0	0	0.0	**0**	**0.0**
Taxi	yes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**
	no	0	0	0	0	2	0	0	0	0	0	0	0	0	2	2	4	3	0	**1**	**2**
	total	0	0	0	0	2	0	0	0	0	0	0	0	0	2	2	4	3	3	**1**	**2**
	% alc. used	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	**0**	**0.0**
Train	yes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	**0**	**0**
	no	0	0	0	0	0	0	0	0	0	0	0	0	0	5	1	0	0	0	**0**	**0**
	total	0	0	0	0	0	0	0	0	0	0	0	0	0	5	2	0	0	0	**0**	**0**
	% alc. used	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0	0.0	**0**	**0.0**
Animal, Animal drawn vehicle	yes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**
	no	0	2	3	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	**0**	**0**
	total	0	2	3	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	**0**	**0**
	% alc. used	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	**0**	**0.0**
Airplane, helicopter	yes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**
	no	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**

Vehicle type	alcohol	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
	total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**
	% alc. used	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	**0**	**0.0**
Watercraft	yes	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	**0**	**0**
	no	0	1	0	0	0	0	0	0	0	0	4	0	0	0	0	1	0	0	**0**	**0**
	total	0	1	0	0	0	0	0	0	0	0	10	0	0	0	0	1	0	0	**0**	**0**
	% alc. used	0	0	0	0	0	0	0	0	0	0	60	0	0	0	0	0	0	0.0	**0**	**0.0**
Agricultural vehicle	yes	2	2	3	3	8	5	4	5	7	2	6	3	5	9	4	3	4	6	**1**	**0**
	no	7	26	29	27	44	25	25	38	23	28	28	30	25	52	60	25	36	23	**42**	**15**
	total	9	28	32	30	52	30	29	43	30	30	34	33	30	61	64	28	40	29	**43**	**15**
	% alc. used	22.2	7.1	9.4	10	15.4	16.7	13.8	17.2	23.3	6.7	17.6	10	16.7	14.8	6.3	10.7	10.0	20.7	**2.3**	**0.0**
Motor plough with pick up	yes	0	0	1	0	0	0	0	0	0	1	0	0	0	0	3	2	0	1	**0**	**0**
	no	2	1	6	0	1	3	0	0	1	1	4	2	3	4	3	2	2	0	**1**	**0**
	total	2	1	7	0	1	3	0	0	1	2	4	2	3	4	6	4	2	1	**1**	**0**
	% alc. used	0.0	0.0	14.3	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	50.0	50.0	0.0	100	**0.0**	**0.0**
Motorcycle with pick up	yes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**
	no	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	**0**
	total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	**0**
	% alc. used	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	**0**	**0.0**
Others	yes	2	0	0	2	0	0	2	0	4	0	0	0	0	45	49	1	1	0	**0**	**0**
	no	2	4	0	0	5	3	5	8	2	2		2	5	388	386	9	6	3	**38**	**4**
	total	4	4	0	2	5	3	7	8	6	2	0	2	5	433	435	10	7	3	**38**	**4**
	% alc. used	50	0	0	100	0	0	28.6	66.7	66.7	0	0	0	0	10.4	11.3	10.0	14.3	0.0	**0.0**	**0.0**

The alcohol used in injured patients in motorcycle, sedan and pick up users were highest among all vehicle user but the trend did not have significant changed.

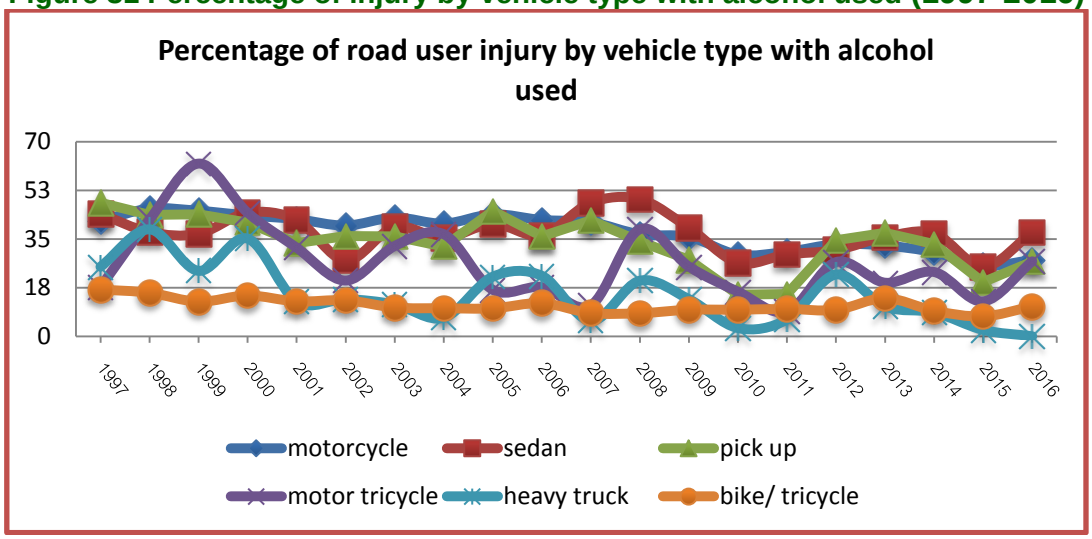
Table 26 Road user deaths related with alcohol used (1997-2016)

Vehicle type	alc. used	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Bicycle/Tricycle	yes	2	0	0	1	0	0	1	0	1	2	1	1	2	0	0	1	0	1	**2**	**0**
	no	1	3	4	4	1	3	4	4	8	9	7	3	5	2	3	5	5	5	**6**	**5**
Motorcycle	yes	91	90	90	86	56	78	100	85	75	74	64	42	54	65	56	53	57	28	**26**	**37**
	no	66	60	46	54	58	75	80	87	40	60	54	35	62	201	160	46	105	86	**80**	**105**
Motor Tricycle	yes	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	**0**	**1**
	no	0	1	0	1	1	0	5	2	0	0	0	0	1	4	2	1	0	0	**3**	**1**
Sedan	yes	0	0	1	1	1	1	0	0	1	0	0	0	0	2	0	0	1	0	**1**	**2**
	no	0	3	1	1	0	0	0	3	0	0	1	0	0	5	6	2	3	3	**2**	**0**
Pick up	yes	1	1	3	2	1	0	0	0	1	2	1	3	0	3	1	0	3	1	**0**	**2**
	no	2	4	0	2	2	1	3	3	2	3	0	2	5	17	22	2	4	2	**9**	**4**
Heavy Truck	yes	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**
	no	1	1	0	0	0	1	2	1	0	0	0	0	1	1	2	1	0	2	**2**	**0**
Trailer	yes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**
	no	0	0	0	1	0	0	1	0	0	0	1	0	0	0	0	0	1	0	**0**	**0**
Minibus	yes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**
	no	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Bus	yes	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	**0**	**0**
	no	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	**2**	**0**
Animal, Animal drawn vehicle	yes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**
	no	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**
Agricultural vehicle	yes	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0	1	1	0	**0**	**0**
	no	1	3	1	0	2	3	1	2	1	0	1	1	1	1	2	1	1	0	**0**	**0**
Motor plough with pick up	yes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**
	no	1	1	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	**0**	**0**
Others	yes	0	0	0	0	0	0	0	0	0	0	0	1	0	4	2	0	0	0	**0**	**0**
	no	0	0	0	0	0	0	0	0	0	0	0	0	0	23	23	0	0	0	**2**	**0**

Table 27 Motorcycle accident by injury and fatality (1997-2016)

	Alc. used	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
injury	yes	1,727	1,894	1,984	1,938	1,939	2,112	2,523	2,272	2,449	2,280	2,335	2,054	2,298	2,524	2,511	2,161	2,186	1,906	1,836	1,763
	no	2,442	2,233	2,413	2,521	2,665	3,192	3,390	3,335	3,137	3,174	3,355	3,552	4,136	6,079	5,761	4,369	4,717	4,406	5,411	4,669
	total	4,169	4,127	4,397	4,459	4,604	5,304	5,913	5,607	5,586	5,454	5,690	5,606	6,434	8,603	8,272	6,530	6,903	6,312	7,247	6,432
	% alc. used	41.4	45.9	45.1	43.5	42.1	39.8	42.7	40.5	43.8	41.8	41.0	36.6	35.7	29.3	30.4	33.1	31.7	30.2	25.3	27.4
	% no alc. used	58.6	54.1	54.9	56.5	57.9	60.2	57.3	59.5	56.2	58.2	59.0	63.4	64.3	70.7	69.6	66.9	68.3	69.8	74.7	72.6
Death	yes	91	90	90	86	56	78	100	85	75	74	64	42	54	65	56	53	63	28	26	37
	no	66	60	46	54	58	75	80	87	40	60	54	35	62	201	160	46	118	86	80	105
	total	157	150	136	140	114	153	180	172	115	134	118	77	116	266	216	99	181	114	106	142
	% alc. used	58.0	60.0	66.2	61.4	49.1	51.0	55.6	49.4	65.2	55.2	54.2	54.5	46.6	24.4	25.9	53.5	34.8	24.6	24.5	26.1
	% no alc. used	42.0	40.0	33.8	38.6	50.9	49.0	44.4	50.6	34.8	44.8	45.8	45.5	53.4	75.6	74.1	46.5	65.2	75.4	75.5	73.9
Fatality rate	Alc. used	5.3	4.8	4.5	4.4	2.9	3.7	4.0	3.7	3.1	3.2	2.7	2.0	2.3	2.6	2.2	2.5	2.9	1.5	1.4	2.1
	no alc. used	2.7	2.7	1.9	2.1	2.2	2.3	2.4	2.6	1.3	1.9	1.6	1.0	1.5	3.3	2.8	1.1	2.5	2.0	1.5	2.2

Figure 31 Percentage of injury by vehicle type with alcohol used (1997-2016)



The alcohol used in injured patients in motorcycle, sedan and pick up users were highest among all vehicle user but the trend did not have significant changed.

Figure 32 Proportion of motorcyclist injury with & without alcohol used (1997-2016)

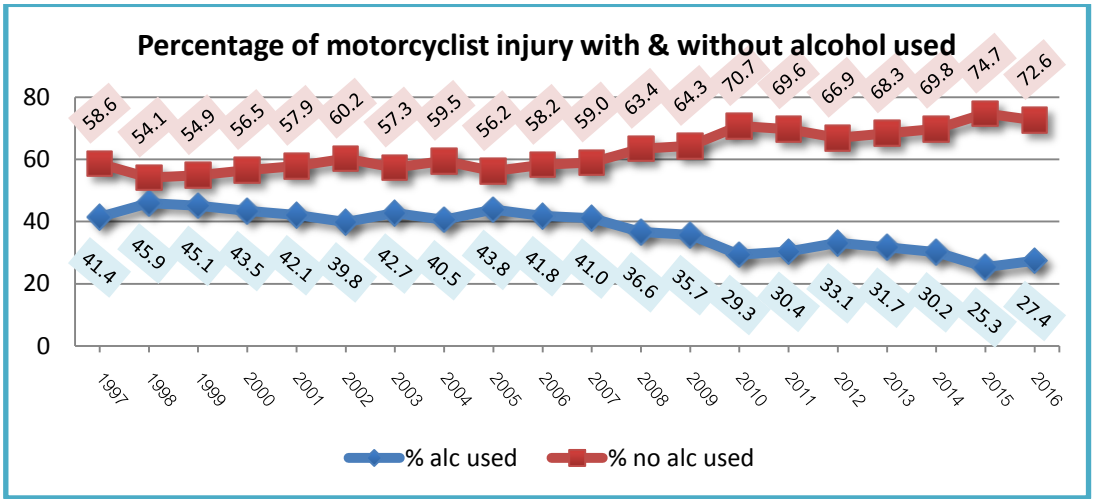
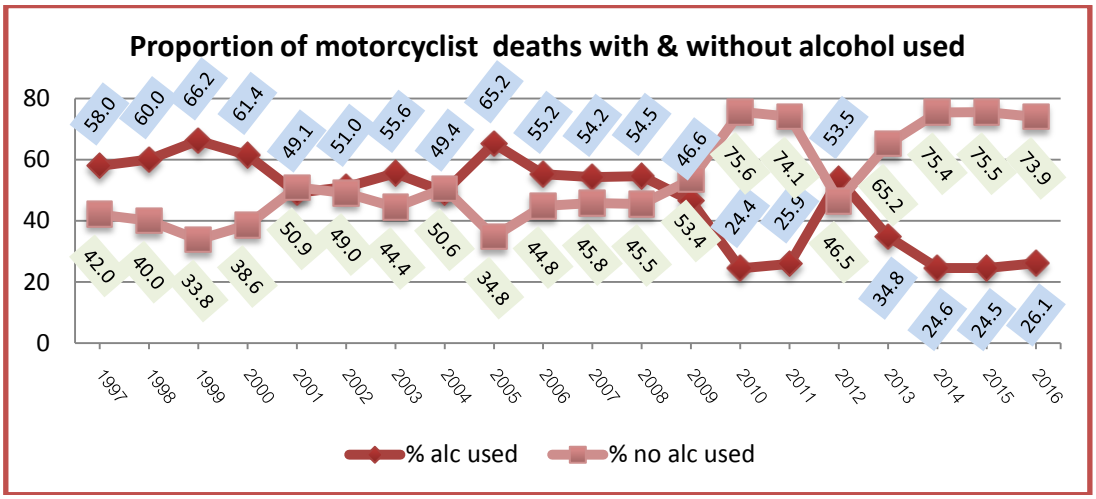
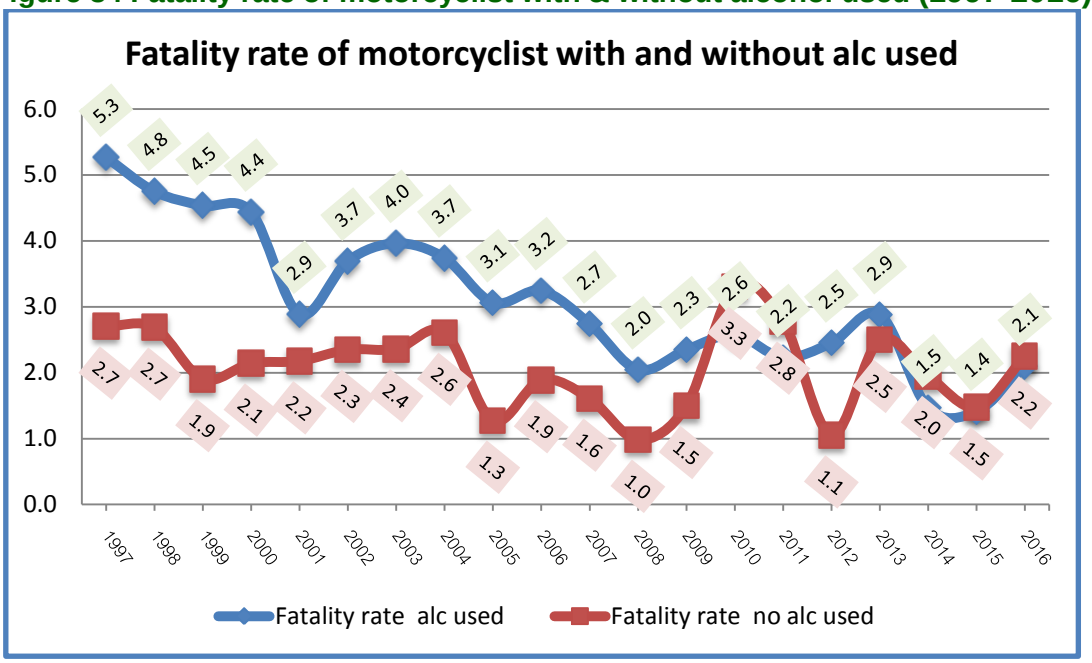


Figure 33 Proportion of motorcyclist death with & without alcohol used (1997-2016)



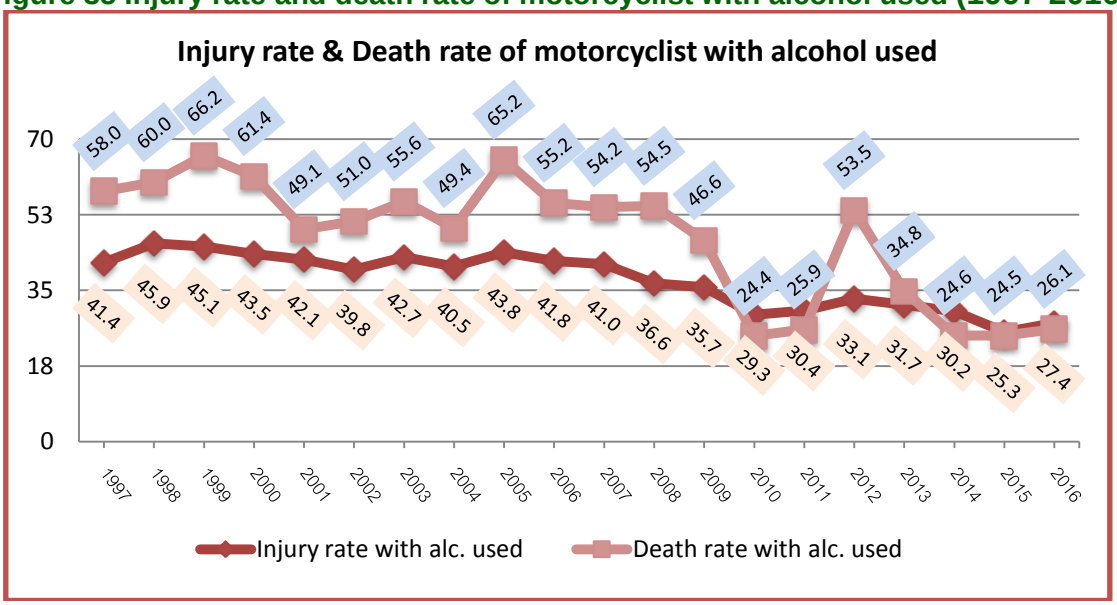
Due to number of death among vehicle users apart from motorcycle was small and the rate was fluctuated, we would not analyze the mortality of other vehicle user.

Figure 34 Fatality rate of motorcyclist with & without alcohol used (1997-2016)



Fatality rate of motorcyclist with alcohol used tended to be decreasing .

Figure 35 Injury rate and death rate of motorcyclist with alcohol used (1997-2016)



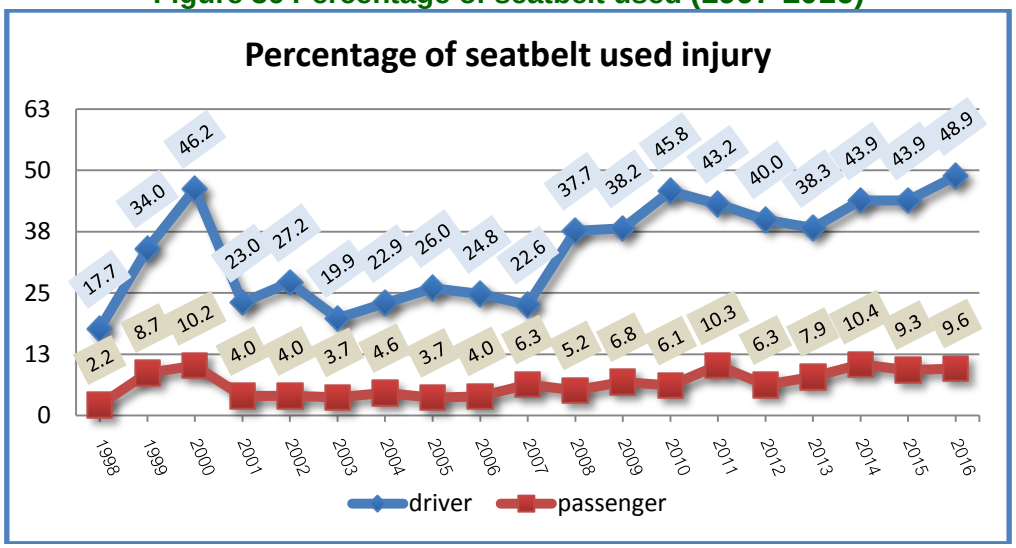
For motorcycle injury, the fatality rate of alcohol used tended to be decreasing in both group.

2.5.4 Seatbelt used

Table 28 Injury and fatality with and without seatbelt used (1997-2016)

Injury																				
Year		1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Driver	Seatbelt	51	80	86	67	66	60	75	73	68	62	75	110	125	152	118	127	157	111	130
	Non Seatbelt	237	155	100	224	177	242	252	208	206	212	124	178	148	200	177	205	201	142	136
	total	288	235	186	291	243	302	327	281	274	274	199	288	273	352	295	332	358	253	266
	% seatbelt used	17.7	34.0	46.2	23.0	27.2	19.9	22.9	26.0	24.8	22.6	37.7	38.2	45.8	43.2	40.0	38.3	43.9	43.9	48.9
Passenger	Seatbelt	14	37	45	25	27	25	30	26	23	29	18	30	38	51	32	36	47	36	33
	Non Seatbelt	630	389	397	600	644	644	620	686	559	428	331	408	582	446	480	421	404	351	310
	total	644	426	442	625	671	669	650	712	582	457	349	438	620	497	512	457	451	387	343
	%seatbelt used	2.2	8.7	10.2	4.0	4.0	3.7	4.6	3.7	4.0	6.3	5.2	6.8	6.1	10.3	6.3	7.9	10.4	9.3	9.6
Fatality																				
Year		1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Driver	Seatbelt	1	0	0	1	0	2	0	1	1	0	2	2	4	1	2	4	3	1	0
	%	2.0	0.0	0.0	1.5	0.0	3.3	0.0	1.4	1.5	0.0	2.7	1.9	3.2	0.7	1.7	3.1	1.9	0.9	0.0
	Non Seatbelt	13	5	3	3	3	17	12	4	8	8	3	7	9	12	7	10	4	3	8
	%	5.5	3.2	3.0	1.3	1.7	7.0	4.8	1.9	3.9	3.8	2.4	3.9	6.1	6.0	4.0	4.9	2.0	2.1	5.9
Passenger	Seatbelt	0	0	3	1	2	0	0	0	0	0	1	1	0	1	3	2	0	0	0
	%	0.0	0.0	6.7	4.0	7.4	0.0	0.0	0.0	0.0	0.0	5.6	3.3	0	2.0	9.4	5.6	0.0	0.0	0.0
	Non Seatbelt	31	11	15	21	29	15	33	22	26	19	6	10	12	19	15	13	10	14	11
	%	4.9	2.8	3.8	3.5	4.5	2.3	5.3	3.2	4.7	4.4	1.8	2.5	2.1	4.3	3.1	3.1	2.5	4.0	3.5

Figure 36 Percentage of seatbelt used (1997-2016)



The injured drivers used much more seatbelt than passengers.

Figure 37 Death rate of non-seatbelt used (1997-2016)

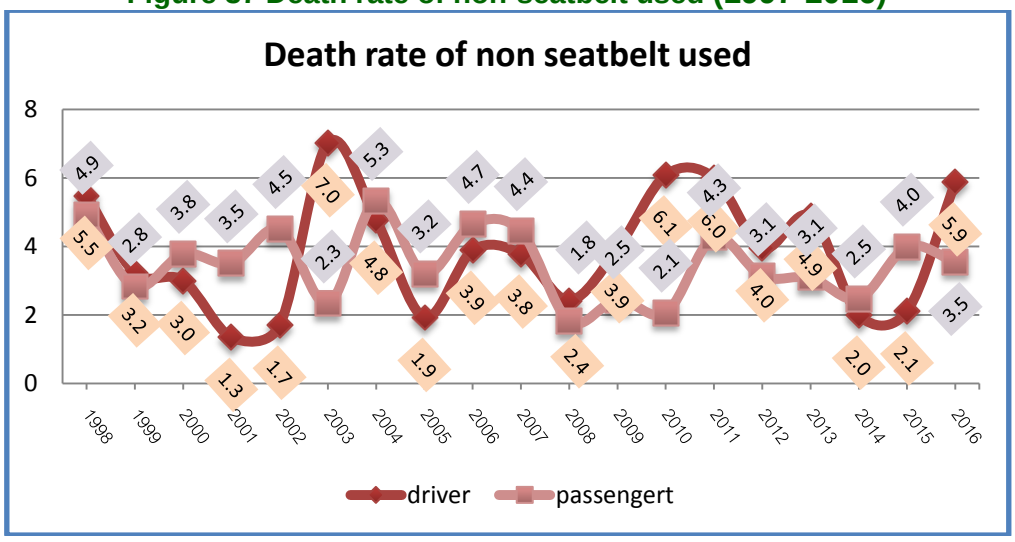
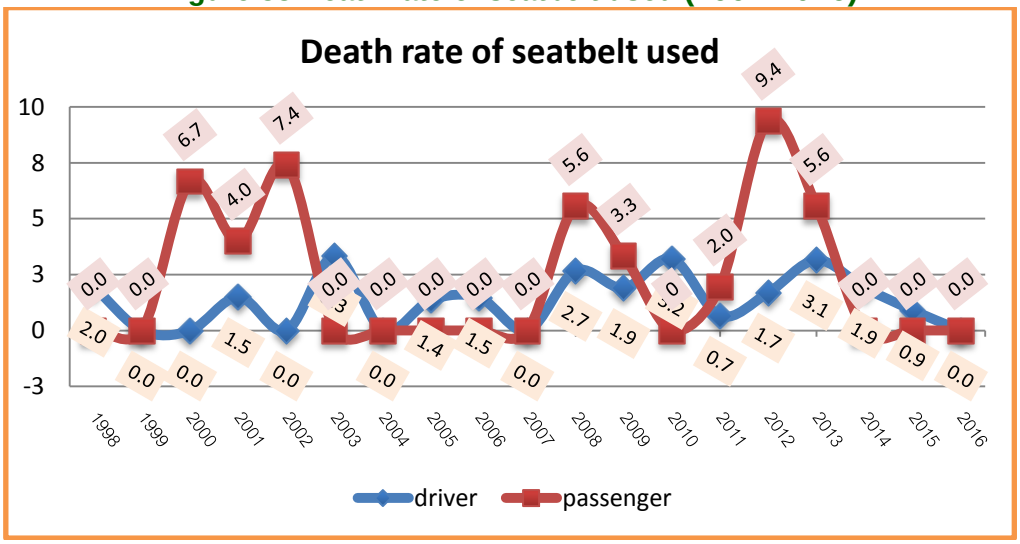


Figure 38 Death rate of seatbelt used (1997-2016)



The trend of seatbelt used fatality in both drivers and passengers had significant increased.

2.5.5 Helmet used and alcohol used

Table 29 Number of riders and passenger with and without helmet and alcohol used (1997-2016)

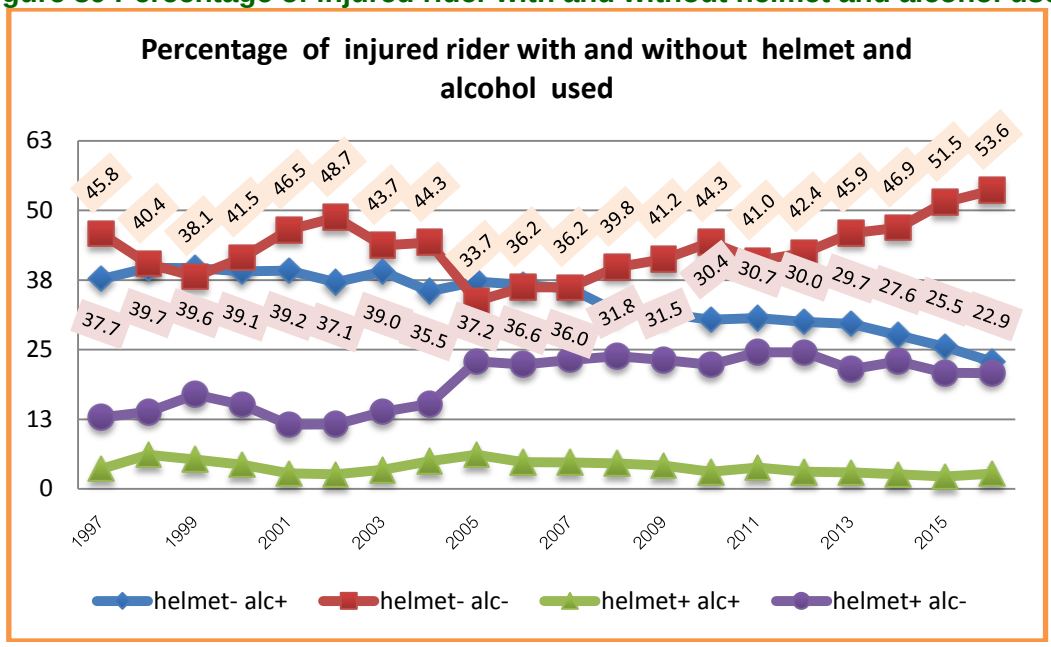
drive injury	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
helmet- alc+	1,555	1,601	1,723	1,720	1,786	1,949	2,289	1,980	2,053	1,978	2,016	1,759	2,020	1,994	1,950	1,959	1,845	1,741	1,532	1,364
helmet- alc-	1,890	1,630	1,658	1,828	2,121	2,560	2,567	2,467	1,861	1,955	2,027	2,202	2,647	2,906	2,604	2,770	2,856	2,959	3,091	3,198
helmet+ alc+	149	248	229	192	127	136	201	277	339	261	267	253	269	201	243	200	184	164	133	163
helmet+ alc-	531	557	737	665	526	609	812	850	1,262	1,207	1,297	1,316	1,484	1,464	1,559	1,601	1,336	1,447	1,251	1,241
total	4,125	4,036	4,347	4,405	4,560	5,254	5,869	5,574	5,515	5,401	5,604	5,530	6,420	6,565	6,356	6,530	6,221	6,311	6,007	5,966
passenger injury	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
helmet- alc+	329	304	351	298	324	304	447	383	371	330	310	263	322	298	274	228	216	167	156	180
helmet- alc-	681	684	824	830	943	1,058	1,153	933	870	793	877	894	1,009	1,135	1,011	1,023	912	948	911	900
helmet+ alc+	12	26	22	11	9	10	16	22	28	14	21	24	15	20	23	9	6	12	5	6
helmet+ alc-	85	129	136	117	91	87	136	145	247	202	219	195	232	198	219	202	166	168	140	138
total	1,107	1,143	1,333	1,256	1,367	1,459	1,752	1,483	1,516	1,339	1,427	1,376	1,578	1,651	1,527	1,462	1,300	1,295	1,212	1,224

non helmet used = helmet – ,helmet used = helmet +,non alcohol used = alcohol – ,alcohol used = alcohol +

Table 30 Percentage of riders and passenger with and without helmet and alcohol used (1997-2016)

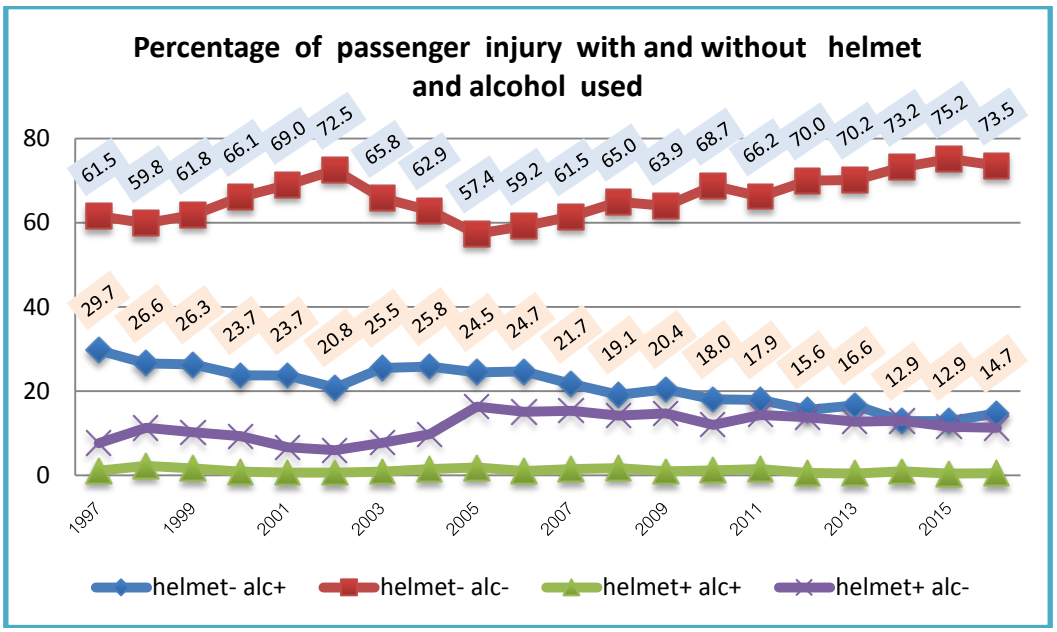
rider injury	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
helmet- alc+	37.7	39.7	39.6	39.1	39.2	37.1	39.0	35.5	37.2	36.6	36.0	31.8	31.5	30.4	30.7	30.0	29.7	27.6	25.5	22.9
helmet- alc-	45.8	40.4	38.1	41.5	46.5	48.7	43.7	44.3	33.7	36.2	36.2	39.8	41.2	44.3	41.0	42.4	45.9	46.9	51.5	53.6
helmet+ alc+	3.6	6.1	5.3	4.4	2.8	2.6	3.4	5.0	6.2	4.8	4.8	4.6	4.2	3.1	3.8	3.1	3.0	2.6	2.2	2.7
helmet+ alc-	12.9	13.8	17.0	15.1	11.5	11.6	13.8	15.3	22.9	22.4	23.1	23.8	23.1	22.3	24.5	24.5	21.5	22.9	20.8	20.8
passenger injury	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
helmet- alc+	29.7	26.6	26.3	23.7	23.7	20.8	25.5	25.8	24.5	24.7	21.7	19.1	20.4	18.0	17.9	15.6	16.6	12.9	12.9	14.7
helmet- alc-	61.5	59.8	61.8	66.1	69.0	72.5	65.8	62.9	57.4	59.2	61.5	65.0	63.9	68.7	66.2	70.0	70.2	73.2	75.2	73.5
helmet+ alc+	1.1	2.3	1.7	0.9	0.7	0.7	0.9	1.5	1.9	1.1	1.5	1.7	1.0	1.2	1.5	0.6	0.5	0.9	0.4	0.5
helmet+ alc-	7.7	11.3	10.2	9.3	6.7	6.0	7.8	9.8	16.3	15.1	15.4	14.2	14.7	12.0	14.3	13.8	12.8	13.0	11.6	11.3

Figure 39 Percentage of injured rider with and without helmet and alcohol used



It was found that riders with helmet and non-alcohol used were increasing.
Riders without helmet and non-alcohol used was tended to be slightly decreased.
Riders without helmet and alcohol used did not significantly reduce.

Figure 40 Percentage of passenger injury with and without helmet and alcohol used



It was found that passengers with helmet and non alcohol used were increasing, but the proportion of the patients in this group was still quite low. Passengers without helmet and non alcohol used had no significant changed.

Table 31 Death of riders and passenger with and without helmet and alcohol used (1997- 2016)

rider death	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
helmet- alc+	86	69	79	67	45	54	80	57	54	57	36	56	51	42	45	49	55	28	23	16
helmet- alc-	56	46	37	42	47	57	64	55	34	45	27	40	57	61	49	43	99	81	62	44
helmet+ alc+	3	4	4	4	1	2	3	1	1	3	1	0	2	3	3	1	2	0	0	0
helmet+ alc-	5	7	2	3	4	5	6	7	4	4	3	7	5	3	10	2	6	5	4	3
total	150	126	122	116	97	118	153	120	93	109	67	103	115	109	107	95	162	114	89	63
passenger death	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
helmet- alc+	14	10	10	8	8	13	8	9	10	6	3	8	7	6	6	4	6	3	2	1
helmet- alc-	21	23	16	13	14	19	28	23	11	14	17	20	18	27	18	10	15	20	12	13
helmet+ alc+	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
helmet+ alc-	0	0	1	0	3	2	2	1	1	0	0	0	2	0	1	0	1	0	2	0
total	36	33	28	22	25	34	38	33	22	20	20	28	27	33	25	14	22	23	16	14

Table 32 Proportion of death of riders and passenger with and without helmet and alcohol used (1997-2016)

rider death	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
helmet- alc+	57.3	54.8	64.8	57.8	46.4	45.8	52.3	47.5	58.1	52.3	53.7	54.4	44.3	38.5	42.1	51.6	34.0	24.6	25.8	25.4
helmet- alc-	37.3	36.5	30.3	36.2	48.5	48.3	41.8	45.8	36.6	41.3	40.3	38.8	49.6	56.0	45.8	45.3	61.1	71.1	69.7	69.8
helmet+ alc+	2.0	3.2	3.3	3.4	1.0	1.7	2.0	0.8	1.1	2.8	1.5	0.0	1.7	2.8	2.8	1.1	1.2	0.0	0.0	0.0
helmet+ alc-	3.3	5.6	1.6	2.6	4.1	4.2	3.9	5.8	4.3	3.7	4.5	6.8	4.3	2.8	9.3	2.1	3.7	4.4	4.5	4.8
passenger death	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
helmet- alc+	38.9	30.3	35.7	36.4	32.0	38.2	21.1	27.3	45.5	30.0	15.0	28.6	25.9	18.2	24.0	28.6	27.3	13.0	12.5	7.1
helmet- alc-	58.3	69.7	57.1	59.1	56.0	55.9	73.7	69.7	50.0	70.0	85.0	71.4	66.7	81.8	72.0	71.4	68.2	87.0	75.0	92.9
helmet+ alc+	2.8	0.0	3.6	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
helmet+ alc-	0.0	0.0	3.6	0.0	12.0	5.9	5.3	3.0	4.5	0.0	0.0	0.0	7.4	0.0	4.0	0.0	4.5	0.0	12.5	0.0

Figure 41 Proportion of rider death with and without helmet and alcohol used

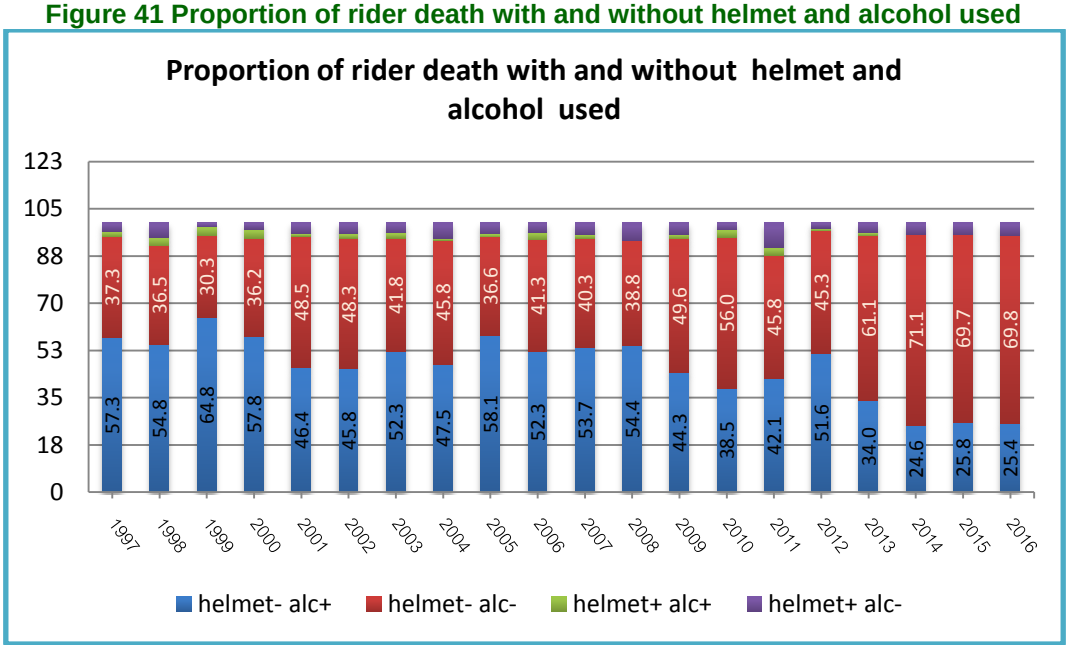
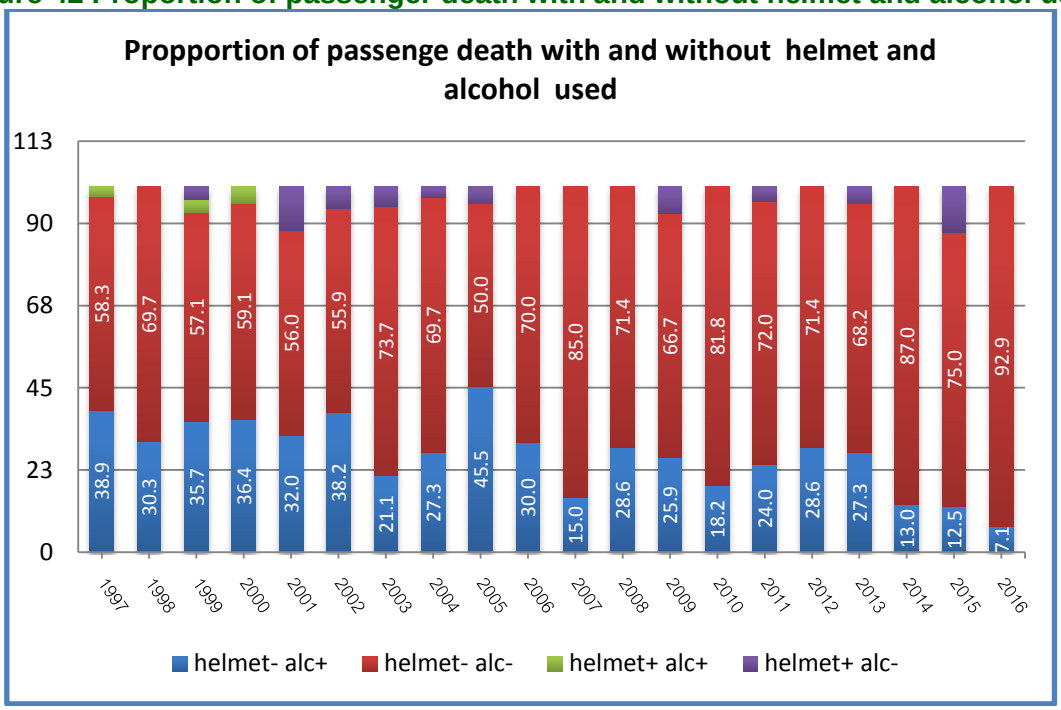


Figure 42 Proportion of passenger death with and without helmet and alcohol used



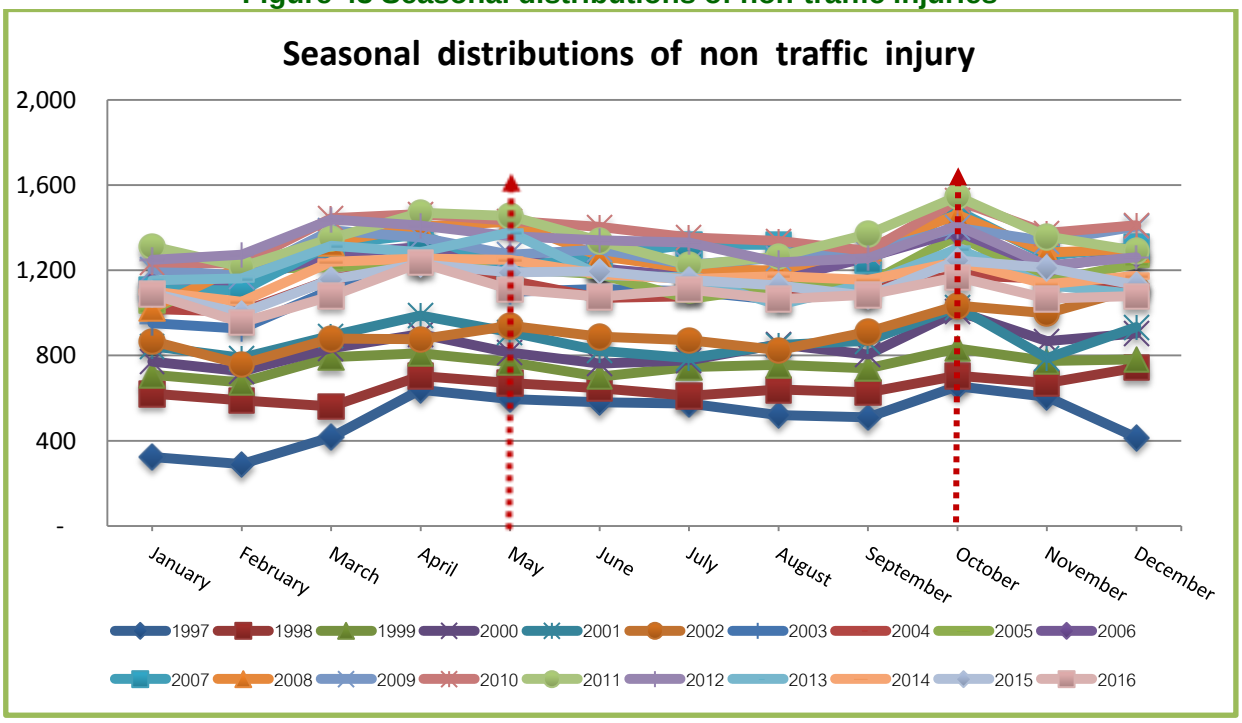
3. Non traffic injury

3.1 Non traffic injury by seasonal distribution

Table 33 Seasonal distribution of non-traffic injury (1997-2016)

Year	January	February	March	April	May	June	July	August	September	October	November	December	Total
1997	324	290	417	639	596	581	574	521	510	655	606	415	6,128
1998	621	590	561	704	671	646	611	640	627	705	670	743	7,789
1999	710	674	792	811	768	701	746	756	740	833	774	782	9,087
2000	771	726	834	900	814	763	778	852	804	1,007	868	903	10,020
2001	844	789	893	988	910	823	788	850	869	1,028	788	934	10,504
2002	867	759	879	876	940	888	872	825	911	1,034	998	1,116	10,965
2003	952	926	1,110	1,323	1,099	1,112	1,102	1,060	1,099	1,284	1,184	1,124	13,375
2004	1,018	1,006	1,158	1,250	1,152	1,070	1,078	1,111	1,114	1,177	1,161	1,124	13,419
2005	1,016	1,206	1,215	1,240	1,207	1,181	1,066	1,123	1,138	1,364	1,147	1,232	14,135
2006	1,138	1,146	1,277	1,310	1,257	1,208	1,172	1,155	1,262	1,381	1,211	1,277	14,794
2007	1,111	1,105	1,322	1,368	1,211	1,269	1,320	1,320	1,249	1,480	1,269	1,310	15,334
2008	1,022	1,222	1,330	1,405	1,428	1,267	1,208	1,198	1,306	1,461	1,284	1,299	15,430
2009	1,204	1,174	1,388	1,355	1,274	1,298	1,227	1,258	1,285	1,400	1,336	1,405	15,604
2010	1,238	1,231	1,445	1,464	1,432	1,404	1,354	1,338	1,291	1,528	1,375	1,411	16,511
2011	1,312	1,217	1,350	1,470	1,456	1,338	1,224	1,265	1,370	1,547	1,359	1,291	16,199
2012	1,249	1,273	1,438	1,410	1,361	1,341	1,331	1,237	1,257	1,410	1,223	1,261	15,791
2013	1,153	1,162	1,316	1,286	1,378	1,177	1,167	1,037	1,139	1,301	1,131	1,089	14,336
2014	1,100	1,052	1,241	1,256	1,249	1,182	1,159	1,173	1,155	1,240	1,135	1,174	14,116
2015	1,091	999	1,157	1,228	1,190	1,195	1,155	1,129	1,080	1,247	1,212	1,131	13,814
2016	1,089	955	1,080	1,236	1,111	1,076	1,110	1,065	1,086	1,168	1,067	1,079	13,122

Figure 43 Seasonal distributions of non-traffic injuries



It was shown that the number of non-traffic injury was increasing, highest during the vacation period (summer vacation during May, midterm vacation in October.

3.2 Specific type of non traffic injuries

3.2.1 Burn

Table 34 Burn injury classified by burn type (1997-2016)

Burn	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
electrical/radiation	29	51	57	79	59	68	60	67	58	66	52	65	67	97	93	94	116	69	90	90
flame burn	12	19	27	21	32	28	27	46	29	36	30	40	30	30	51	45	48	33	31	33
heat material/liquid	60	78	79	62	100	87	119	119	118	113	121	137	128	103	117	134	111	98	108	89
TOTAL	101	148	163	162	191	183	206	232	205	215	203	242	225	230	261	273	275	200	229	212
%Burn	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
electrical/radiation	28.7	34.5	35.0	48.8	30.9	37.2	29.1	28.9	28.3	30.7	25.6	26.9	29.8	42.2	35.6	34.4	42.2	34.5	39.3	42.5
flame burn	11.9	12.8	16.6	13.0	16.8	15.3	13.1	19.8	14.1	16.7	14.8	16.5	13.3	13.0	19.5	16.5	17.5	16.5	13.5	15.6
heat material/liquid	59.4	52.7	48.5	38.3	52.4	47.5	57.8	51.3	57.6	52.6	59.6	56.6	56.9	44.8	44.8	49.1	40.4	49.0	47.2	42.0
TOTAL	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Figure 44 Number of burn by burn type (1997-2016)

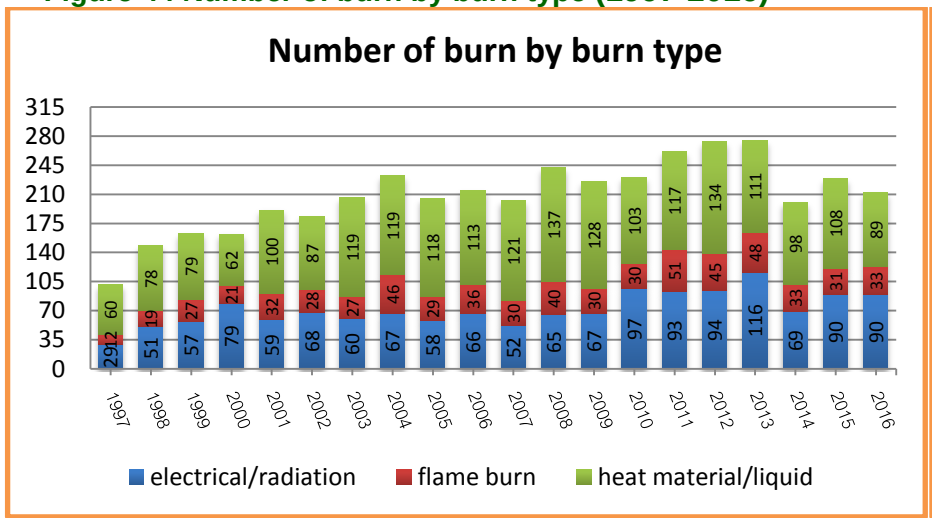
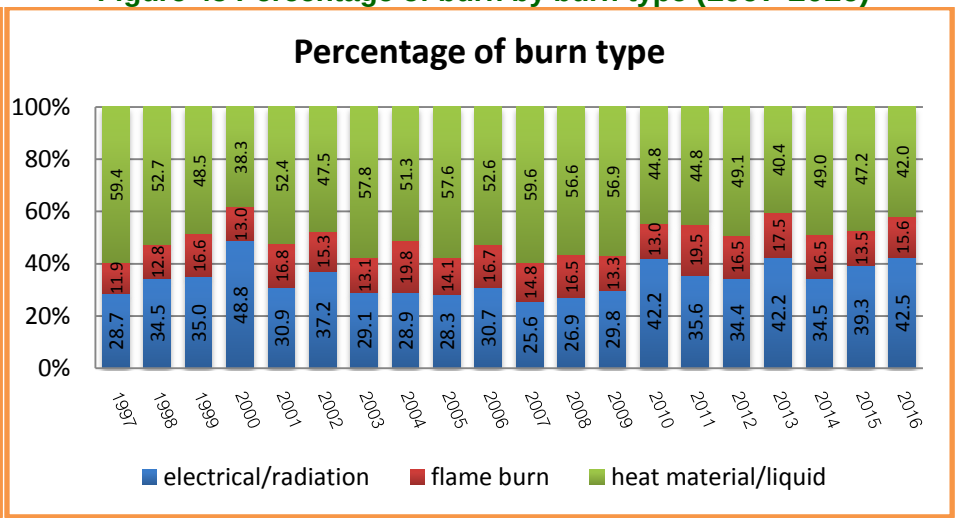


Figure 45 Percentage of burn by burn type (1997-2016)



Burn was classified into 3 types based on ICD 10. It was indicated that the heat material or liquid was the most common cause of burn injury.
The number of burn injury was increasing but the cause of burn injury was proportionally the same except the electric/radiation which seemed to be slightly decreased.

3.2.2 Animate injury

Table 35 Causes of animate injury (1997-2016)

cause of animate	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
twisted, bitten, striking or scratched by person	161	180	232	194	223	166	210	231	179	167	195	136	214	211	238	194	231	215	158
bitten by rat	26	35	35	43	21	20	31	47	45	52	48	40	90	86	56	59	65	60	44
bitten or struck by dog	1,149	1,347	1,541	1,641	1,576	2,050	2,161	2,234	2,621	2,847	2,505	1,882	2,900	2,749	2,139	1,806	1,807	1,678	1,679
bitten or struck by other mammals	99	111	118	148	179	202	215	225	280	305	307	210	457	402	427	395	402	350	432
contact with marine animal	0	3	2	1	4	1	1	1	0	0	0	0	7	6	6	0	1	5	3
bitten or stung by non venomous insect	17	15	6	8	1	7	3	4	4	0	3	2	2	1	1	1	0	2	0
expose to other unspecified animate	40	8	32	26	5	8	1	1	4	0	0	1	5	2	4	1	0	1	1
Total	1,518	1,749	1,991	2,061	2,017	2,455	2,629	2,745	3,137	3,373	3,059	2,273	3,676	3,461	2,872	2,456	2,506	2,311	2,317
Percentage of animate injury by cause	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**
dog bite	75.7	77.0	77.4	79.6	78.1	83.5	82.2	81.4	83.6	84.4	81.9	82.8	78.9	79.4	74.5	73.5	72.1	72.6	72.5
rat bite	1.7	2.0	1.8	2.1	1.0	0.8	1.2	1.7	1.4	1.5	1.6	1.8	2.4	2.5	1.9	2.4	2.6	2.6	1.9
bitten, striking by person	10.6	10.3	11.7	9.4	11.1	6.8	8.0	8.4	5.7	5.0	6.4	6.0	5.8	6.1	8.3	7.9	9.2	9.3	6.8
bitten, struck by other mammal	6.5	6.3	5.9	7.2	8.9	8.2	8.2	8.2	8.9	9.0	10.0	9.2	12.4	11.6	14.9	16.1	16.0	15.1	18.6
expose unspecified animal	2.6	0.5	1.6	1.3	0.2	0.3	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0

Table 46 Number of animate injury by cause (1997-2016)

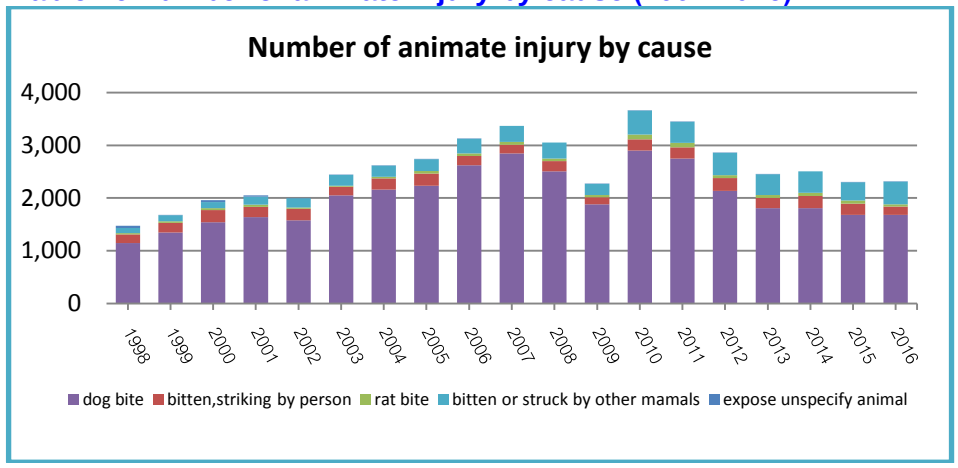
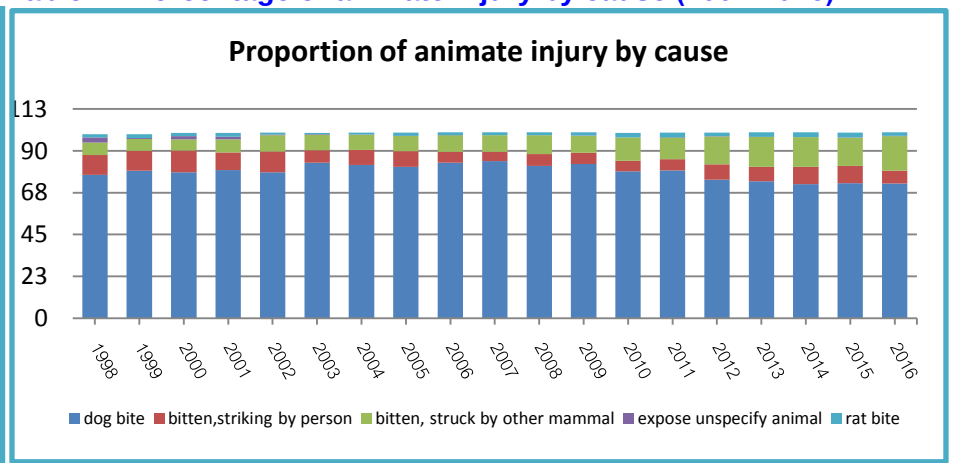


Table 47 Percentage of animate injury by cause (1997-2016)



Dog bite injury was highest and tended to be increasing. It was found that the most common cause of animate injury was dog bite

3.2.3 Inanimate injury

Table 36 Inanimate injury (1997-2016)

Occupation	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
labor	752	914	927	1,037	1,316	1,723	1,764	2,018	2,106	2,102	1,947	1,995	2,017	2,023	2,146	2,098	2,108	1,887	1,878
student	489	774	1,201	806	819	1,012	921	1,072	1,065	1,118	996	959	978	908	879	762	685	714	632
agriculture	308	328	367	362	339	319	275	198	201	187	261	317	384	339	352	301	244	184	162
officer	126	129	372	372	239	164	192	240	269	322	184	208	495	471	405	416	425	386	391
other	496	256	421	-	153	170	523	449	649	695	306	332	872	838	884	912	847	800	739
total	2,171	2,401	3,288	2,577	2,866	3,388	3,675	3,977	4,290	4,424	3,694	3,811	4,746	4,579	4,666	4,489	4,309	3,971	**3,802**
Occupation	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	**2016**
labor	34.6	38.1	28.2	40.2	45.9	50.9	48.0	50.7	49.1	47.5	52.7	52.3	42.5	44.2	46.0	46.7	48.9	47.5	49.4
student	22.5	32.2	36.5	31.3	28.6	29.9	25.1	27.0	24.8	25.3	27.0	25.2	20.6	19.8	18.8	17.0	15.9	18.0	16.6
agriculture	14.2	13.7	11.2	14.0	11.8	9.4	7.5	5.0	4.7	4.2	7.1	8.3	8.1	7.4	7.5	6.7	5.7	4.6	4.3
officer	5.8	5.4	11.3	14.4	8.3	4.8	5.2	6.0	6.3	7.3	5.0	5.5	10.4	10.3	8.7	9.3	9.9	9.7	10.3
other	22.8	10.7	12.8	0	5.3	5.0	14.2	11.3	15.1	15.7	8.3	8.7	18.4	18.3	18.9	20.3	19.7	20.1	19.4

Figure 48 Number of inanimate injury by occupation (1997-2016)

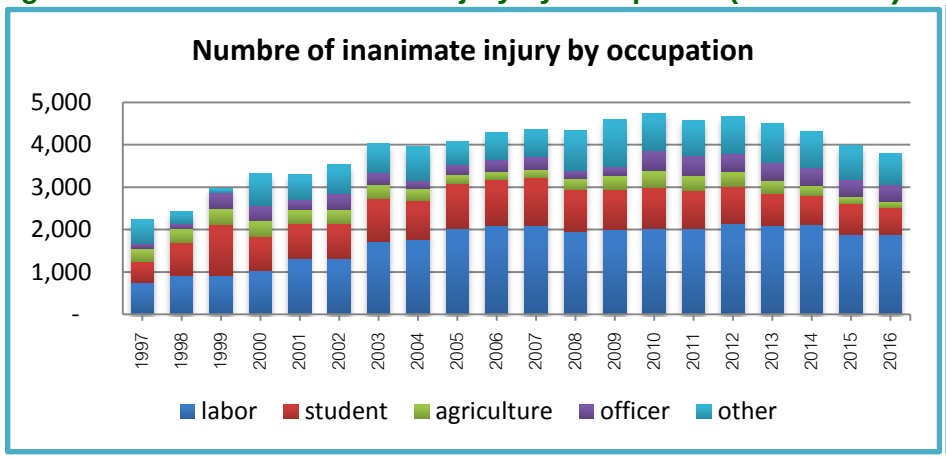
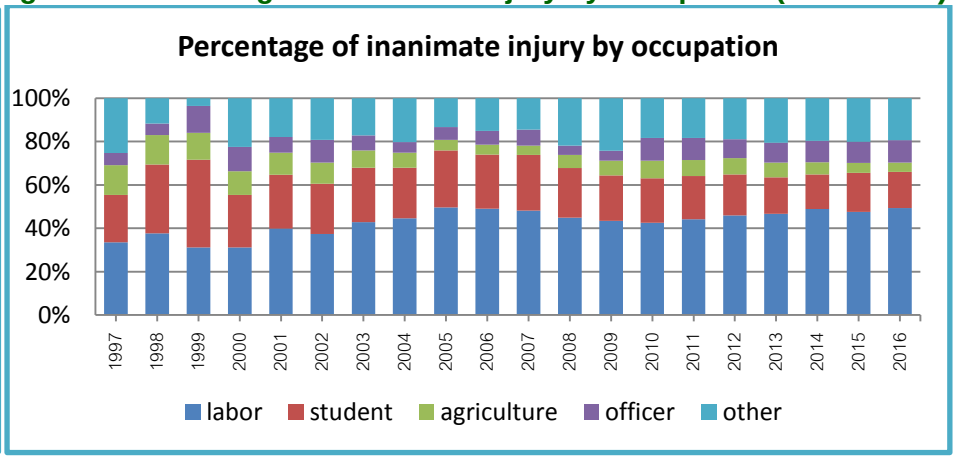


Figure 49 Percentage of inanimate injury by occupation (1997-2016)

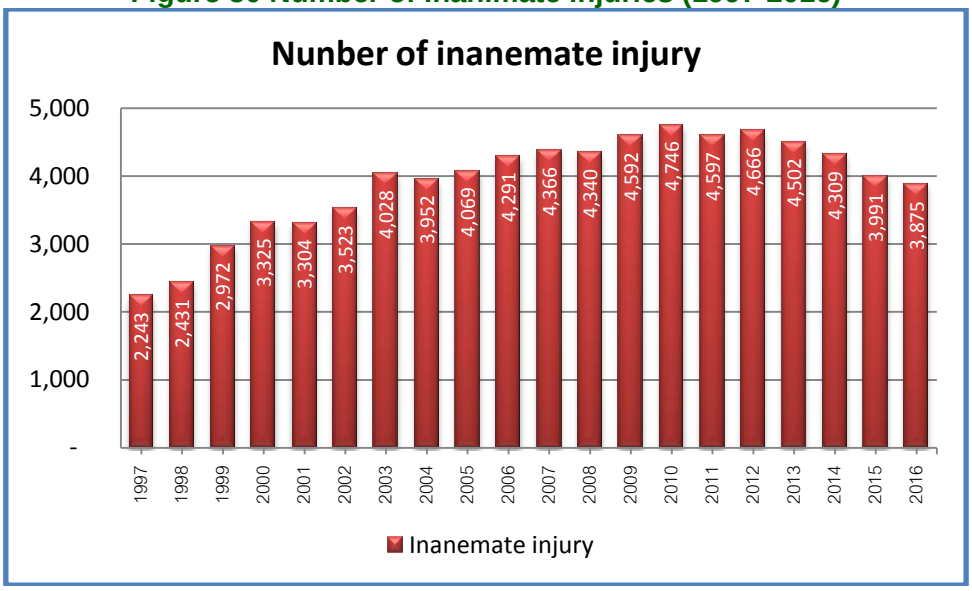


The cause of inanimate injuries was mainly related to the occupation. It could be found that the labors were the highest risk group who had more exposure than the other occupation.

Table 37 Time distribution of inanimate injury (1997-2016)

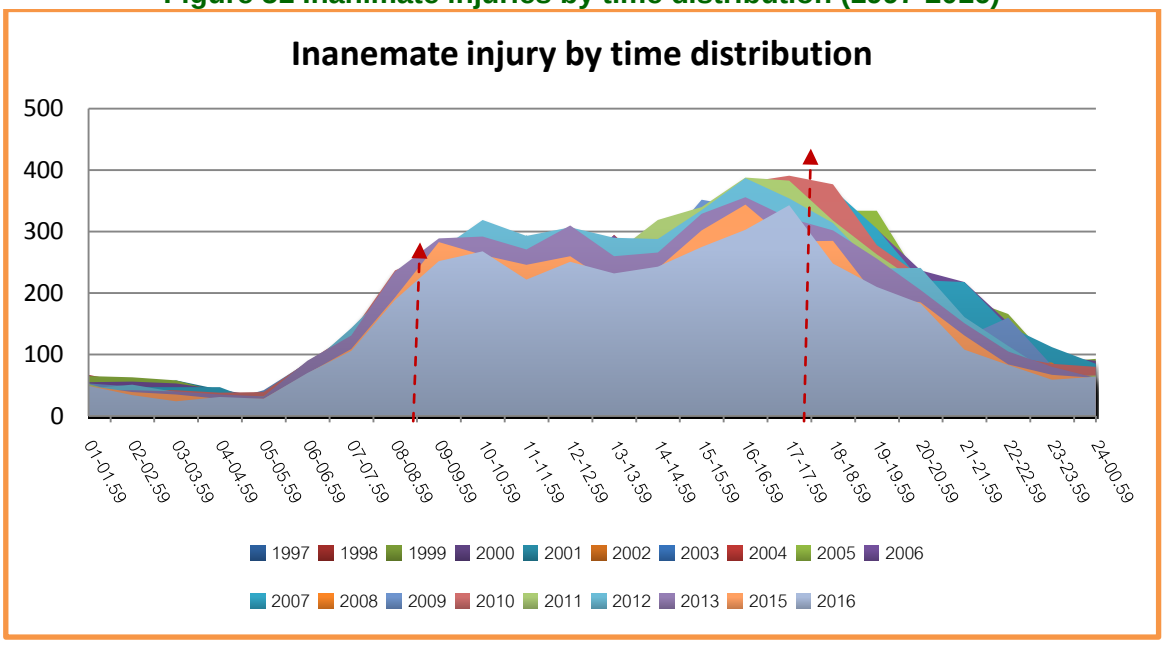
Time	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
01-01.59	35	38	46	59	42	53	48	67	65	55	52	49	53	41	52	45	41	40	49	49
02-02.59	40	23	28	42	46	43	35	53	63	56	47	48	48	43	34	51	42	25	39	34
03-03.59	30	20	28	41	58	32	42	32	58	53	47	37	35	42	36	39	40	34	35	24
04-04.59	21	21	26	35	43	36	34	39	39	43	47	35	22	38	30	31	35	20	28	31
05-05.59	16	18	28	19	25	22	25	25	32	31	20	31	42	39	32	29	32	38	28	28
06-06.59	17	27	25	22	33	27	18	24	33	25	32	82	87	88	85	80	90	86	69	70
07-07.59	48	46	53	45	55	65	50	63	64	84	72	137	119	135	111	143	131	128	109	106
08-08.59	62	68	90	95	71	87	68	111	99	123	123	216	225	237	214	213	235	217	193	189
09-09.59	110	112	151	132	135	160	148	192	192	187	203	238	264	266	277	269	289	276	283	252
10-10.59	109	121	179	191	178	197	149	230	223	247	206	267	289	287	306	319	292	293	262	268
11-11.59	135	148	183	193	205	191	156	255	250	256	294	246	293	290	260	293	271	264	246	222
12-12.59	144	119	167	185	207	209	167	211	243	244	237	306	290	281	285	307	310	291	260	251
13-13.59	147	181	222	241	247	240	180	295	289	294	284	269	274	280	264	290	260	235	213	232
14-14.59	119	113	139	218	163	223	173	229	261	222	258	276	268	282	319	288	266	255	240	243
15-15.59	108	167	182	214	184	207	149	237	247	226	285	303	352	326	340	335	329	303	302	275
16-16.59	146	203	240	267	259	273	210	262	300	362	361	347	339	380	388	387	356	362	344	303
17-17.59	183	170	233	251	249	286	239	333	185	352	342	369	348	391	383	354	322	346	284	343
18-18.59	164	177	238	276	269	271	238	308	334	333	369	291	329	377	318	314	302	301	285	248
19-19.59	148	199	201	258	248	254	177	290	334	304	305	207	260	278	263	240	256	232	193	210
20-20.59	136	116	159	162	177	188	137	208	220	237	221	222	214	228	215	241	205	197	185	183
21-21.59	126	139	140	137	158	186	135	200	192	218	218	145	128	154	149	161	151	134	131	108
22-22.59	101	91	89	106	125	119	92	141	166	152	146	93	160	98	106	114	105	107	84	83
23-23.59	52	65	72	78	70	87	77	90	87	97	112	87	82	85	64	69	80	60	67	59
24-00.59	46	49	53	58	57	67	61	57	93	90	85	39	71	80	66	54	62	65	62	64
total	2,243	2,431	2,972	3,325	3,304	3,523	2,808	3,952	4,069	4,291	4,366	4,340	4,592	4,746	4,597	4,666	4,502	4,309	3,991	3,875

Figure 50 Number of Inanimate injuries (1997-2016)



It was shown that inanimate injuries tended to be slightly increased 1997 to 2012 and then was decreased 2013 to 2016.

Figure 51 Inanimate injuries by time distribution (1997-2016)



It was shown that the highest incidence of inanimate injuries occurred during 07.00 a.m. to 07.00 p.m.

3.2.4 Falling

Table 38 Falls injury by age distribution (1997-2016)

Age	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
<10	669	709	741	855	738	810	862	885	831	844	849	795	828	773	774	710	707	698	668
10-19	419	469	462	491	504	554	594	615	656	644	661	656	608	609	545	446	436	495	424
20-29	208	234	234	261	286	354	343	374	410	380	440	411	477	484	471	442	413	411	451
30-39	178	212	231	258	299	280	346	315	372	362	362	434	432	459	508	389	497	462	455
40-49	138	193	205	251	258	328	347	335	370	391	406	406	460	523	550	469	504	501	454
50-59	103	140	154	152	187	230	335	263	278	320	356	399	432	491	434	479	467	480	513
60-69	101	116	118	162	147	187	216	211	244	277	293	288	324	368	322	366	383	421	402
≥70	95	120	108	150	159	206	245	313	305	316	416	346	456	542	503	592	545	590	568
total	1,911	2,193	2,253	2,580	2,578	2,949	3,288	3,311	3,466	3,534	3,783	3,735	4,017	4,249	4,107	3,893	3,952	4,058	3,935
%	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
<10	35.0	32.3	32.9	33.1	28.6	27.5	26.2	26.7	24.0	23.9	22.4	21.3	20.6	18.2	18.8	18.2	17.9	17.2	17.0
10-19	21.9	21.4	20.5	19.0	19.6	18.8	18.1	18.6	18.9	18.2	17.5	17.6	15.1	14.3	13.3	11.5	11.0	12.2	10.8
20-29	10.9	10.7	10.4	10.1	11.1	12.0	10.4	11.3	11.8	10.8	11.6	11.0	11.9	11.4	11.5	11.4	10.5	10.1	11.5
30-39	9.3	9.7	10.3	10.0	11.6	9.5	10.5	9.5	10.7	10.2	9.6	11.6	10.8	10.8	12.4	10.0	12.6	11.4	11.6
40-49	7.2	8.8	9.1	9.7	10.0	11.1	10.6	10.1	10.7	11.1	10.7	10.9	11.5	12.3	13.4	12.0	12.8	12.3	11.5
50-59	5.4	6.4	6.8	5.9	7.3	7.8	10.2	7.9	8.0	9.1	9.4	10.7	10.8	11.6	10.6	12.3	11.8	11.8	13.0
60-69	5.3	5.3	5.2	6.3	5.7	6.3	6.6	6.4	7.0	7.8	7.7	7.7	8.1	8.7	7.8	9.4	9.7	10.4	10.2
≥70	5.0	5.5	4.8	5.8	6.2	7.0	7.5	9.5	8.8	8.9	11.0	9.3	11.4	12.8	12.2	15.2	13.8	14.5	14.4

Figure 52 Number of fall injury by age group (1997-2016)

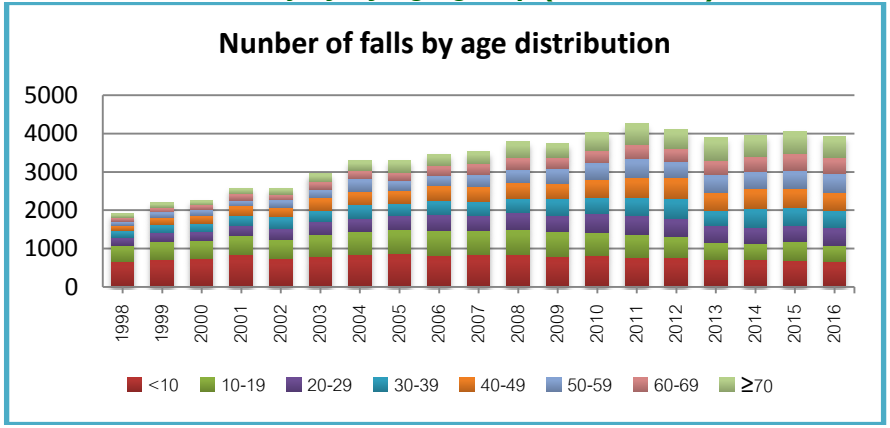
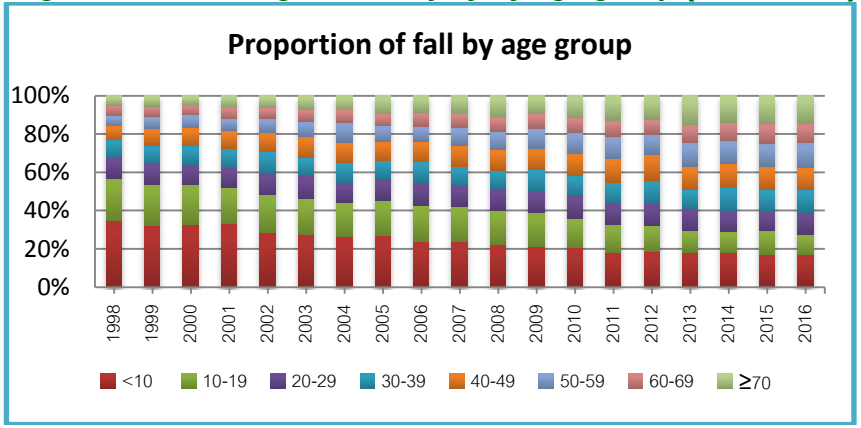


Figure 53 Percentage of fall injury by age group (1997-2016)

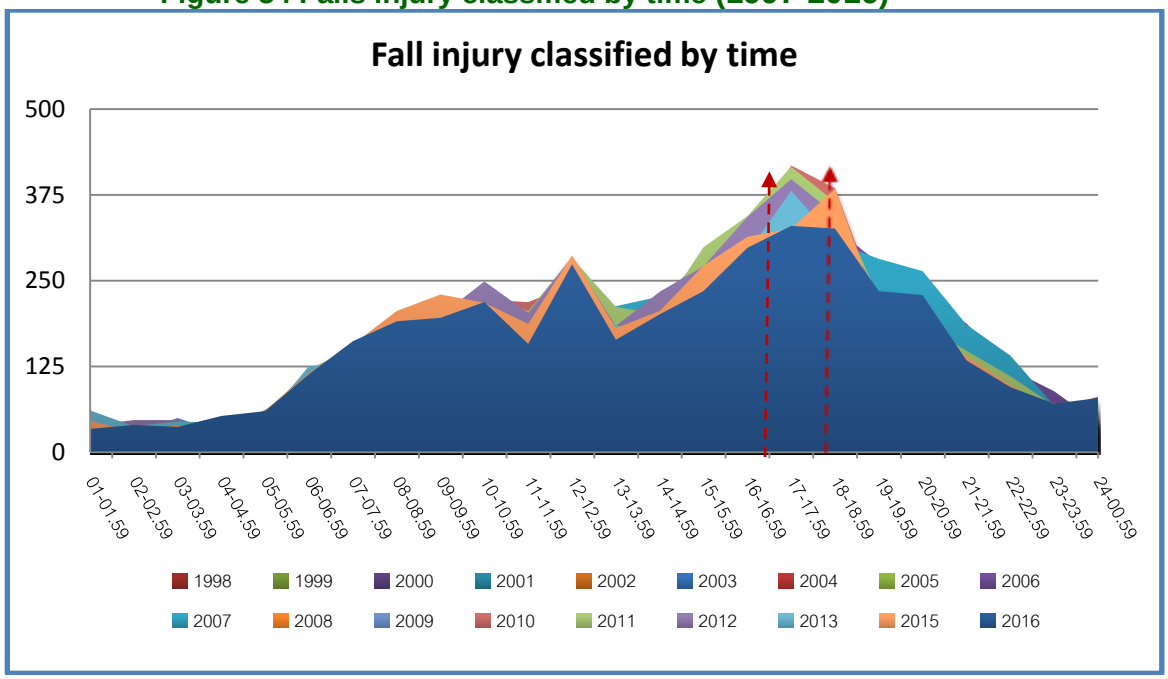


The percentage of fall injury below 9 years old group and 10-19 years old group tended to be decreased while the other group of patients tended to be slightly increased.

Table 39 Falls injury by time distribution (1997-2016)

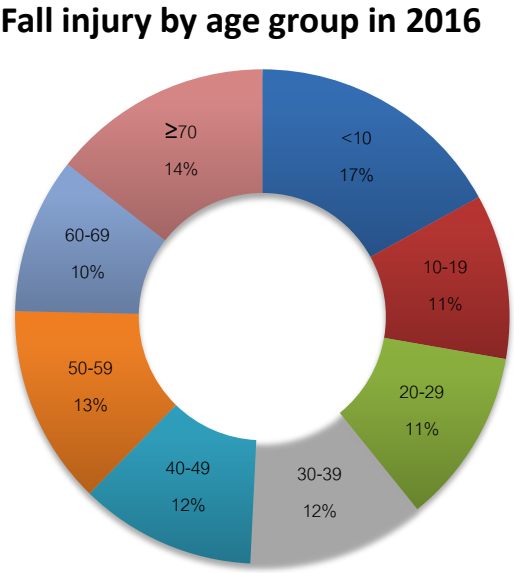
Time	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
01-01.59	8	16	31	20	32	28	35	42	46	48	48	37	36	44	42	39	61	40	46	34
02-02.59	3	13	14	22	16	23	25	23	32	29	30	41	28	37	44	47	38	42	30	40
03-03.59	3	8	18	11	14	19	17	24	20	28	28	32	50	38	44	47	45	35	39	37
04-04.59	2	4	17	10	10	16	18	20	13	29	22	34	28	29	35	30	43	33	40	53
05-05.59	4	2	12	17	13	13	18	13	16	16	15	47	44	62	56	43	48	69	61	60
06-06.59	8	17	17	17	12	23	22	21	24	27	36	93	78	103	121	112	126	113	116	114
07-07.59	5	26	36	41	42	50	53	60	41	67	69	129	115	132	152	126	128	124	157	162
08-08.59	21	64	88	78	89	80	88	113	110	123	102	162	156	181	194	175	194	172	206	191
09-09.59	20	65	86	94	119	111	148	161	160	148	171	191	171	216	200	199	224	213	230	196
10-10.59	21	81	100	117	138	139	137	155	159	193	166	207	183	222	226	249	216	228	218	219
11-11.59	19	87	131	107	140	122	143	172	176	192	199	197	182	219	206	203	187	170	187	158
12-12.59	26	104	115	127	154	147	146	189	184	219	182	246	250	244	283	285	255	267	287	274
13-13.59	26	93	122	124	143	135	147	176	205	183	213	199	186	174	212	184	185	178	181	164
14-14.59	20	97	104	114	145	147	160	185	199	180	227	198	219	194	201	234	174	178	206	201
15-15.59	32	123	148	146	165	174	188	190	240	212	205	259	287	257	299	271	261	252	272	235
16-16.59	38	106	169	158	182	184	203	214	226	225	251	333	292	304	344	343	291	322	314	298
17-17.59	30	139	169	193	210	213	268	257	260	286	274	384	403	418	416	398	381	355	326	330
18-18.59	29	136	202	204	252	219	257	281	296	326	306	336	373	385	365	347	310	383	384	326
19-19.59	29	114	192	197	202	205	248	245	272	276	282	193	214	213	227	228	211	216	206	235
20-20.59	24	109	134	163	189	186	227	216	231	237	264	154	192	177	187	220	183	191	186	229
21-21.59	20	83	107	142	134	130	182	188	171	170	186	106	105	142	148	118	134	148	140	134
22-22.59	5	46	93	78	88	95	118	117	113	121	141	82	105	82	111	84	89	88	98	95
23-23.59	7	34	51	42	46	64	54	75	69	89	68	72	65	63	68	62	48	69	61	71
24-00.59	18	26	35	33	45	55	45	49	48	43	51	51	44	81	68	63	61	66	67	79
total	418	1,593	2,191	2,255	2,580	2,578	2,947	3,186	3,311	3,467	3,536	3,783	3,806	4,017	4,249	4,107	3,893	3,952	4,058	3,935

Figure 54 Falls injury classified by time (1997-2016)



Fall injury had highest incidence during 5.00-6.00 pm.

Figure 55 Falls injury classified by age group in 2016



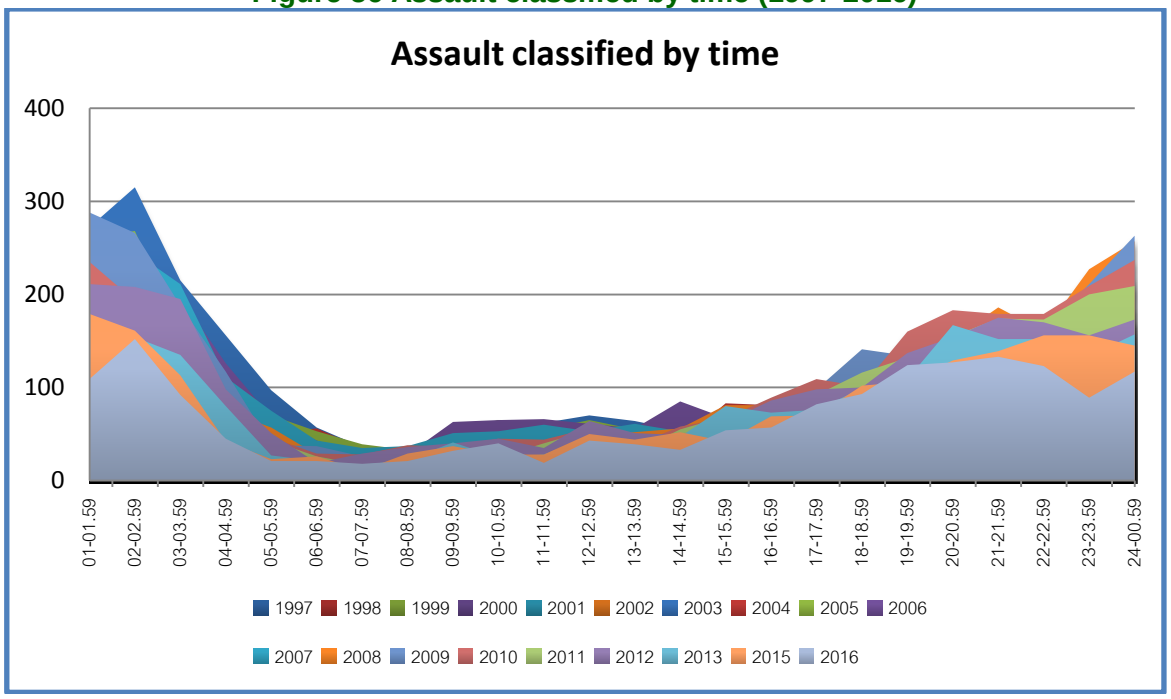
It was shown that age group below 10 year had highest of fall injuries.

3.2.5 Self harm and assault

Table 40 Assault by time (1997-2016)

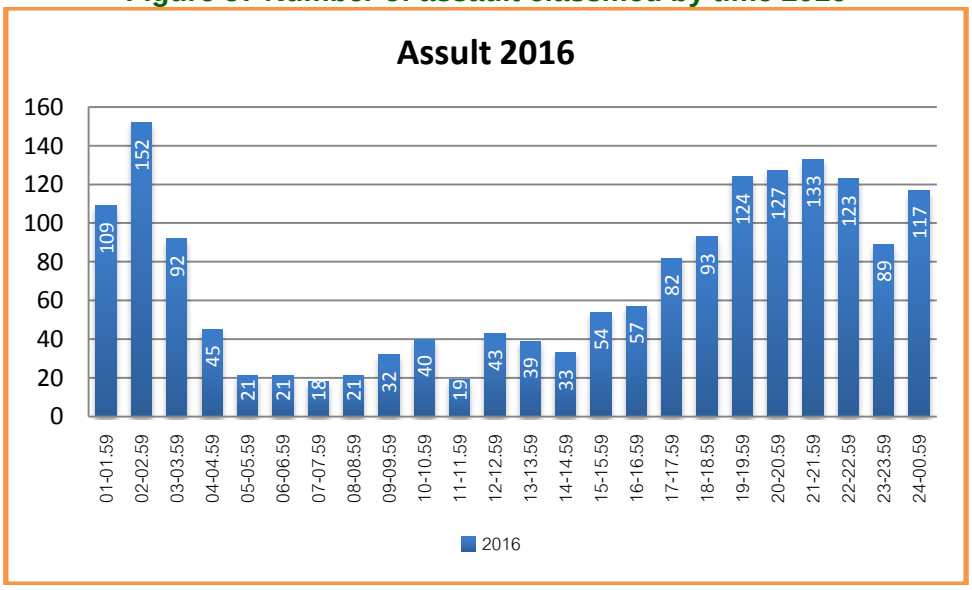
Time	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
01-01.59	12	63	90	114	126	147	272	258	260	246	214	253	288	235	204	211	161	145	179	109
02-02.59	9	54	72	119	103	136	315	252	268	252	245	261	266	193	191	208	154	145	161	152
03-03.59	14	51	69	92	109	102	215	171	158	197	211	186	188	193	156	195	135	136	113	92
04-04.59	4	35	54	78	65	80	156	124	94	126	111	75	117	92	60	98	80	57	42	45
05-05.59	5	25	48	57	45	67	97	51	70	68	75	57	38	46	43	51	27	30	23	21
06-06.59	7	36	34	31	31	45	57	56	53	43	43	28	37	29	26	19	21	18	26	21
07-07.59	5	17	24	29	24	29	36	35	39	28	35	27	26	28	17	29	17	29	11	18
08-08.59	9	17	33	18	34	32	34	34	33	28	37	26	30	38	33	36	22	25	29	21
09-09.59	4	26	27	25	31	33	45	45	53	63	51	24	37	36	29	40	41	36	37	32
10-10.59	5	20	47	37	35	36	65	55	65	65	53	35	35	45	25	45	25	30	28	40
11-11.59	8	30	34	38	39	46	62	58	55	66	60	34	41	44	40	35	28	33	28	19
12-12.59	10	31	39	52	46	56	70	59	65	61	53	48	51	56	54	64	47	40	50	43
13-13.59	4	30	42	23	45	44	64	48	55	56	61	52	45	38	31	51	40	30	44	39
14-14.59	13	27	38	51	42	52	54	41	52	85	53	56	50	58	55	49	47	35	52	33
15-15.59	7	25	32	41	49	63	61	83	73	67	55	81	74	67	69	63	80	51	42	54
16-16.59	8	28	48	45	59	54	59	81	52	69	81	81	80	89	76	86	73	58	69	57
17-17.59	10	40	52	69	37	41	72	81	70	87	77	85	98	109	92	98	76	80	70	82
18-18.59	11	27	41	52	59	55	87	75	77	89	72	122	141	101	116	100	99	96	102	93
19-19.59	11	46	74	69	73	100	115	113	105	102	117	139	134	160	132	137	109	130	106	124
20-20.59	12	55	85	77	89	88	134	131		124	117	152	154	183	155	154	167	172	129	127
21-21.59	19	56	93	74	114	113	141	128	125	154	155	186	175	179	174	175	152	143	139	133
22-22.59	13	66	90	102	128	101	177	158	145	154	131	160	162	179	173	170	152	155	156	123
23-23.59	19	57	101	106	101	137	195	155	176	137	166	227	211	209	200	156	134	133	156	89
24-00.59	25	75	102	135	125	117	186	174	168	161	220	257	263	237	209	173	157	161	145	117
total	244	937	1,369	1,534	1,609	1,774	2,769	2,466	2,311	2,528	2,493	2,652	2,741	2,644	2360	2443	2044	1,968	1,937	1,684

Figure 56 Assault classified by time (1997-2016)



The assault time was mostly at night, while its peak at 01.00-04.00 am. at the most then at 11.00-12.00 pm.

Figure 57 Number of assault classified by time 2016

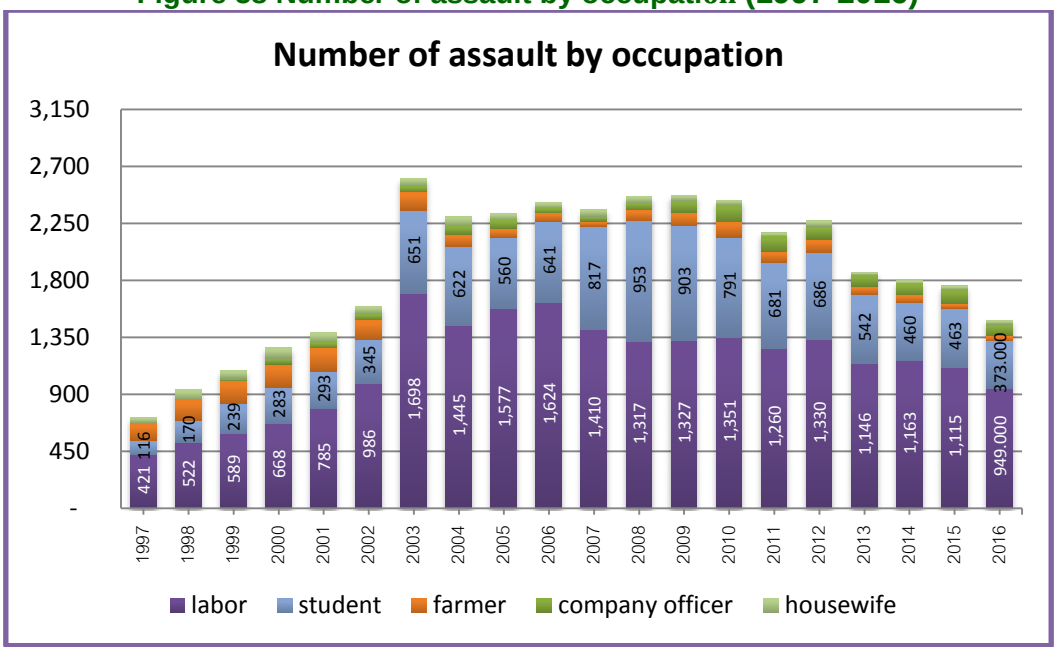


The assault time was mostly at night, while its peak at 0.00-04.00 am at the most then at 11.00-12.00 pm.

Table 41 Number of assault by occupations (1997-2016)

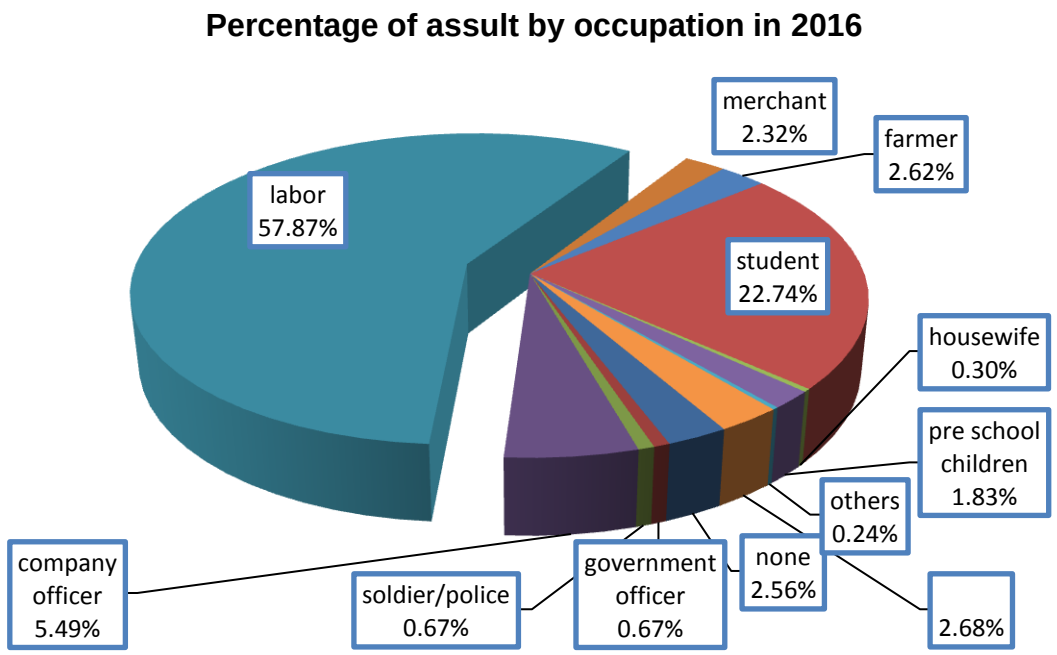
Occupation	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
None	-	25	41	36	38	26	15	10	8	10	3	10	13	17	34	41	31	28	40	42
Government officer	20	24	34	36	23	22	19	24	24	20	26	34	30	28	23	24	13	14	22	11
Soldier/Police	20	19	32	29	22	32	48	41	21	29	15	31	31	31	21	22	19	13	10	11
Company officer	-	4	15	45	47	47	49	67	71	40	37	54	94	133	121	103	93	91	113	90
Labor	421	522	589	668	785	986	1,698	1,445	1,577	1,624	1,410	1,317	1,327	1,351	1,260	1,330	1,146	1,163	1,115	949
Merchant	53	66	68	80	98	69	46	49	30	31	35	51	58	64	62	50	51	59	48	38
Farmer	138	164	180	187	190	158	150	97	70	68	41	88	105	122	88	109	63	62	38	43
Student	116	170	239	283	293	345	651	622	560	641	817	953	903	791	681	686	542	460	463	373
Priest	4	10	8	5	6	5	5	5	6	8	9	9	10	6	4	5	2	1	3	5
Lawyer	-	-	1	-	-	1	-	-	-	1	-	1	-	1	-	1	1	-		-
Actor/artist	1	-	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-		1
Fisherman	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-		-
Driver	-	-	4	4	1	-	-	-	-	-	-	-	-	-	-	-	-	-		-
Craftsman	-	1	-	3	-	1	2	-	-	-	-	-	1	-	-	1	-	-	1	-
Housewife	43	76	64	83	71	60	59	72	53	41	55	53	44	35	24	41	18	21	27	30
Prisoner	-	-	-	3	-	1	-	-	-	-	1	1	4	3	1	-	-	-		-
Preschool children	-	-	-	9	1	3	8	19	3	6	6	5	9	6	4	3	5	7	4	4
Others	40	62	92	62	34	17	19	16	10	12	37	16	23	46	47	27	56	45	49	44
Total	**856**	**1,143**	**1,369**	**1,534**	**1,609**	**1,774**	**2,769**	**2,467**	**2,433**	**2,531**	**2,493**	**2,623**	**2,652**	**2,634**	**2,370**	**2,443**	**2,040**	**1,964**	1,933	1,641

Figure 58 Number of assault by occupation (1997-2016)



The number of assault was highest in labor group. The student tended to increase the incidence of assault.

Figure 59 Percentage of assault by occupation in 2016



Percentage of assault in 2014 was highest in labor group (57.8 %). The student was the second (22.74%).

Table 42 Assault classified by type (1997-2016)

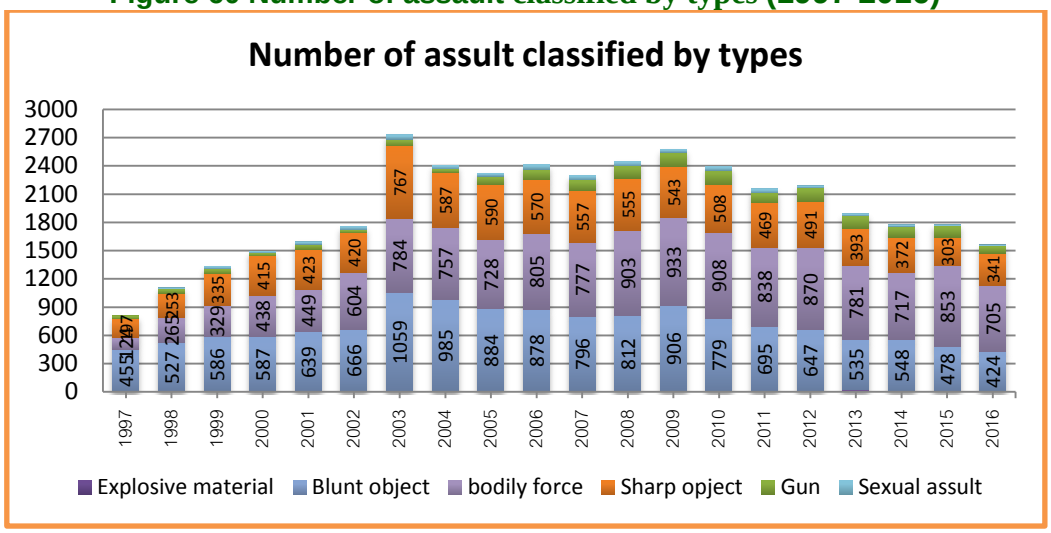
Type of assault	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Poisoning	1	1	3	5	3	2	2	1	3	1	4	4	3	7	3	3	1	2	5	4
Hanging	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
Gun	30	49	56	36	58	34	74	40	89	111	116	133	154	155	111	151	141	117	122	79
Explosive material	0	0	4	3	0	0	1	0	1	1	8	0	9	4	4	11	23	5	7	3
File and flames	0	3	7	0	5	0	0	1	3	2	3	1	0	3	2	3	3	3	3	1
Sharp object	197	253	335	415	423	420	767	587	590	570	557	555	543	508	469	491	393	372	303	341
Blunt object	455	527	586	587	639	666	1059	985	884	878	796	812	906	779	695	647	535	548	478	424
Pushing or placing victim	0	2	9	3	2	2	8	3	0	0	2	0	1	1	0	0	1	0	0	0
Crashing of motor vehicle	0	0	0	4	3	0	1	0	0	0	0	1	0	0	1	2	3	2	0	2
bodily force	124	265	329	438	449	604	784	757	728	805	777	903	933	908	838	870	781	717	853	705
Sexual assault	0	12	24	16	23	35	43	40	31	47	45	43	32	37	38	18	20	15	12	10
Other	49	27	19	26	18	11	30	54	109	111	178	192	192	242	201	247	141	187	153	115
total	856	1,139	1,372	1,534	1,623	1,774	2,769	2,468	2,438	2,526	2,487	2,644	2,773	2,644	2,362	2,443	2,042	1,968	1,937	1,684

Assault was classified by types based on ICD 10. The assault by blunt object was highest causes and trended to be increasing every year.

Table 43 Deaths of assault classified by type (1997-2016)

Type of assault	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Poisoning	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0
Gun	1	10	14	5	5	4	11	3	11	10	5	7	4	9	2	8	8	5	7	4
Sharp object	3	3	5	6	5	8	12	9	6	7	5	8	8	8	2	6	6	6	8	3
Blunt object	3	2	5	5	7	6	10	8	8	4	5	8	8	6	7	9	2	5	5	2
bodily force	0	2	2	1	1	2	2	1	2	1	2	2	2	4	0	3	2	2	5	1
Other	0	1	0	0		0	0	1	1	1	4	8	4	5	5	15	5	13	6	4
total	7	18	27	17	18	20	35	22	28	23	21	33	26	32	16	42	23	31	32	14

Figure 60 Number of assault classified by types (1997-2016)



The assault by blunt object was highest in 1997-2007 and assault by bodily force was highest in 2008-2016.The trended of assault by bodily force was increasing year by year.

Figure 61 Number of death by assault types (1997-2016)

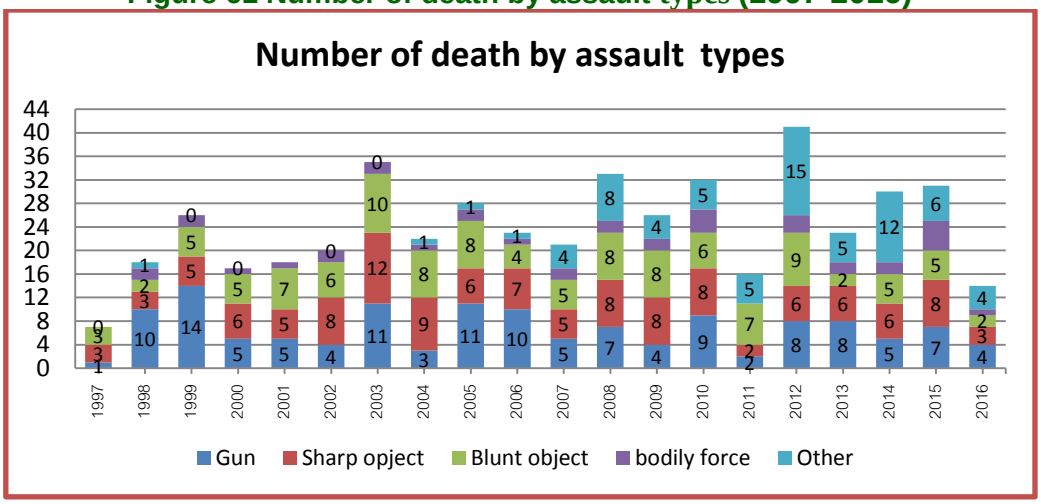
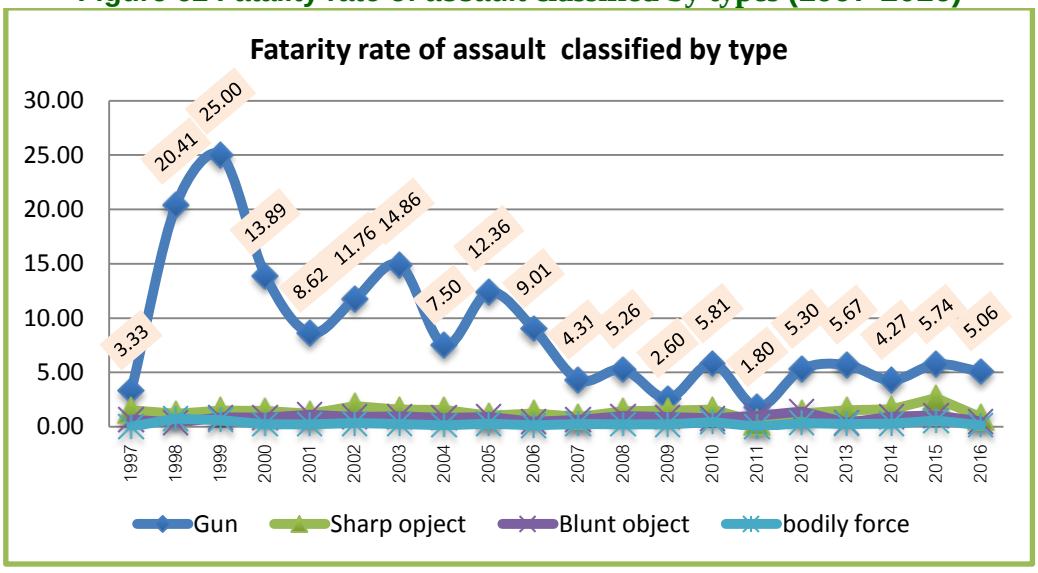


Figure 62 Fatality rate of assault classified by types (1997-2016)

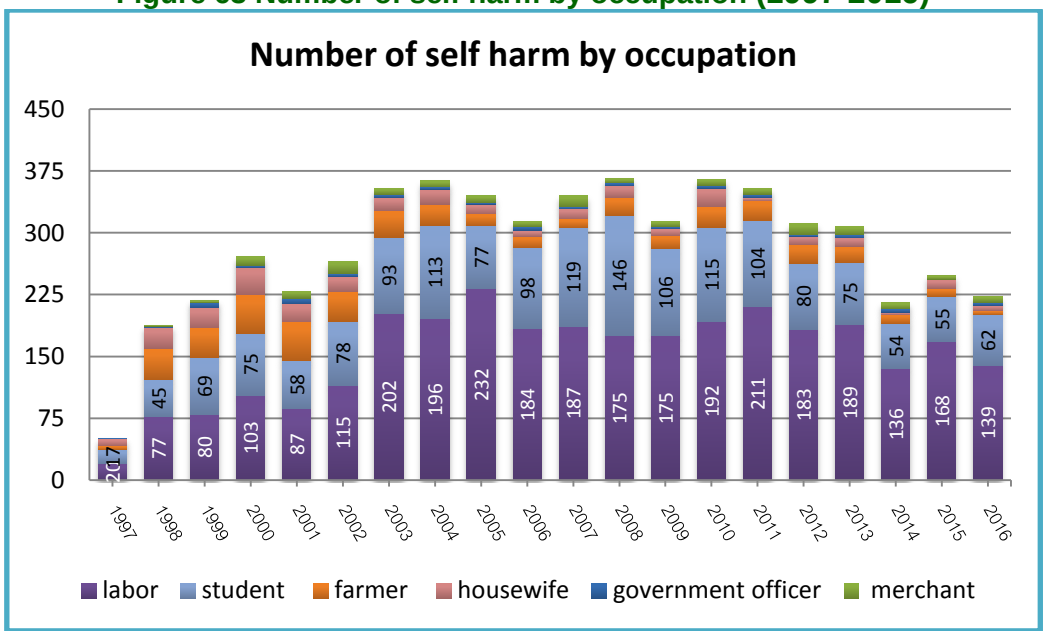


Fatality rate of assault by gun was highest. The trended of assault by gun was decreasing year by year.

Table 44 Self harm classified by occupations (1997-2016)

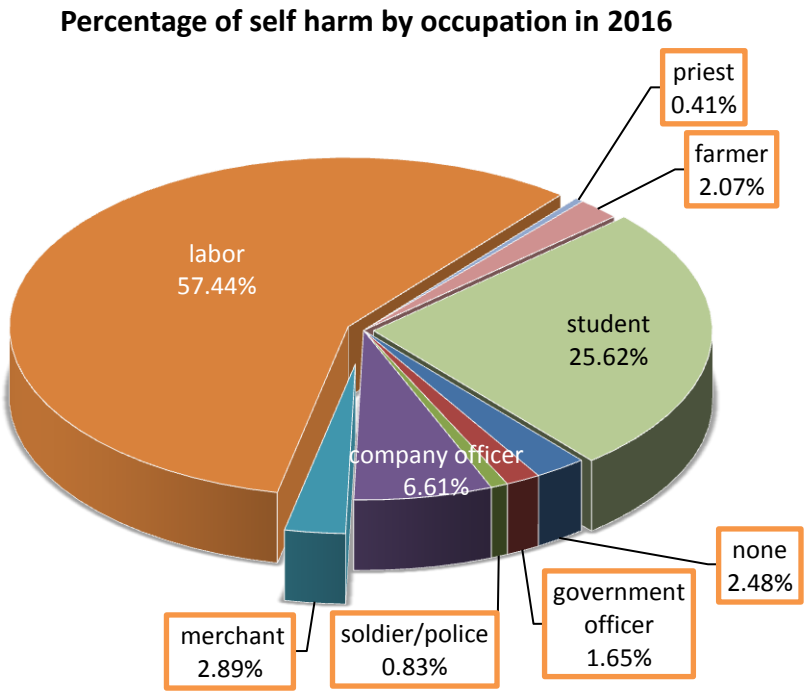
Occupation	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
none	0	11	15	16	6	12	2	4	8	1	1	2	2	6	4	5	3	9	8	6
government officer	1	2	7	3	7	4	4	3	2	5	3	4	3	4	4	2	4	4	1	4
soldier/police	1	3	5	5	1	0	2	5	1	1	2	4	3	3	4	3	2	1	1	2
company officer	0	1	0	1	0	1	0	0	0	0	1	9	0	19	12	15	0	11	17	16
merchant	0	1	2	10	8	14	7	7	8	6	13	5	6	7	7	13	10	7	4	7
labor	20	77	80	103	87	115	202	196	232	184	187	175	175	192	211	183	189	136	168	139
priest	4	15	13	17	13	12	8	8	2	2	6	3	7	3	1	4	1	1	2	1
farmer	5	38	36	47	47	36	32	26	14	14	11	22	16	25	24	23	20	11	10	5
student	17	45	69	75	58	78	93	113	77	98	119	146	106	115	104	80	75	54	55	62
lawyer	0	0	1	3	0	3	1	3	2	3	3	0	2	0	0	0	0	0	0	0
actor/artist	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
fisherman	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
driver	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
craftsman	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
prisoner	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0
housewife	8	25	24	33	22	18	16	18	12	7	12	14	8	22	4	10	10	3	10	6
preschool children	0	0	3	2	0	1	0	0	2	2	0	0	0	0	0	0	0	0	0	0
others	0	0	0	0	0	0	0	5	0	2	1	2	1	1	1	6	9	6	12	1
Total	57	219	255	318	250	294	367	388	360	325	359	387	329	397	376	344	323	244	288	249

Figure 63 Number of self harm by occupation (1997-2016)



The number of self harm was highest in labor group. The student tended to increase the incidence of self harm.

Figure 64 Percentage of self harm by occupation in 2016



Percentage of self harm in 2016 was highest in labor group (57.44 %). The student was the second (25.62%).

Table 45 Number of self harm classified by types (1997-2016)

Type of self harm	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Poisoning	23	135	190	245	211	217	256	255	227	198	239	277	241	288	253	221	205	162	168	162
Hanging	3	4	13	10	7	11	9	8	13	14	17	12	14	25	22	21	30	16	33	21
Drowning	0	0	0	1	0	0	1	1	1	0	1	1	1	1	3	1	1	0	0	0
Gun	3	5	3	3	5	4	7	2	4	4	1	2	5	5	5	5	2	2	2	2
Explosive material	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0
File and flames	0	0	1	0	0	1	1	1	0	2	1	0	3	0	2	1	3	1	0	0
Sharp object	26	74	35	55	29	43	81	100	75	86	81	86	63	55	67	69	63	58	67	50
Blunt object	1	7	11	8	11	6	10	13	33	19	15	9	20	23	18	16	18	4	9	10
Jumping	1	1	7	5	3	2	4	10	4	1	3	3	7	5	8	7	5	0	6	7
others	2	9	13	7	4	14	5	0	6	1	7	2	3	4	3	3	3	0	3	2
total	59	236	273	334	270	298	374	390	363	325	366	392	357	406	381	344	331	244	288	254

Figure 65 Number of self harm classified by types 1997-2016

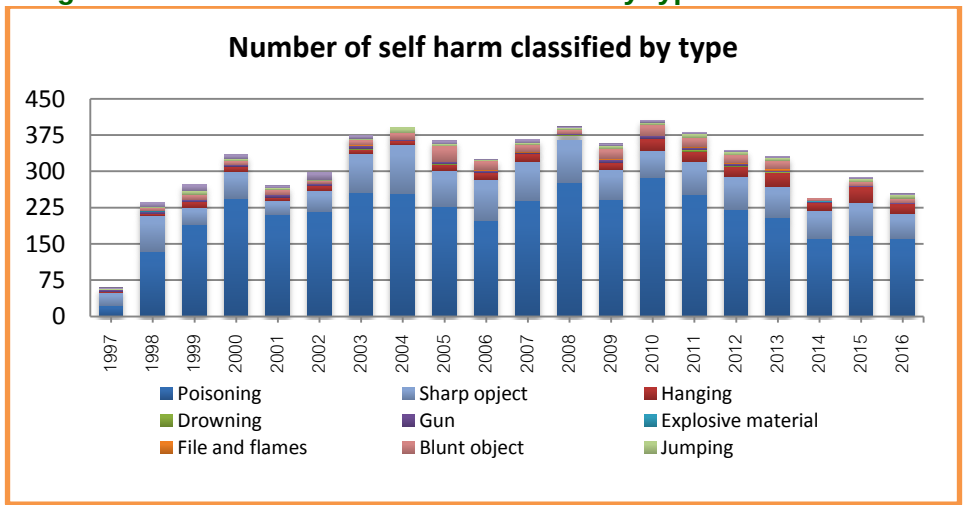
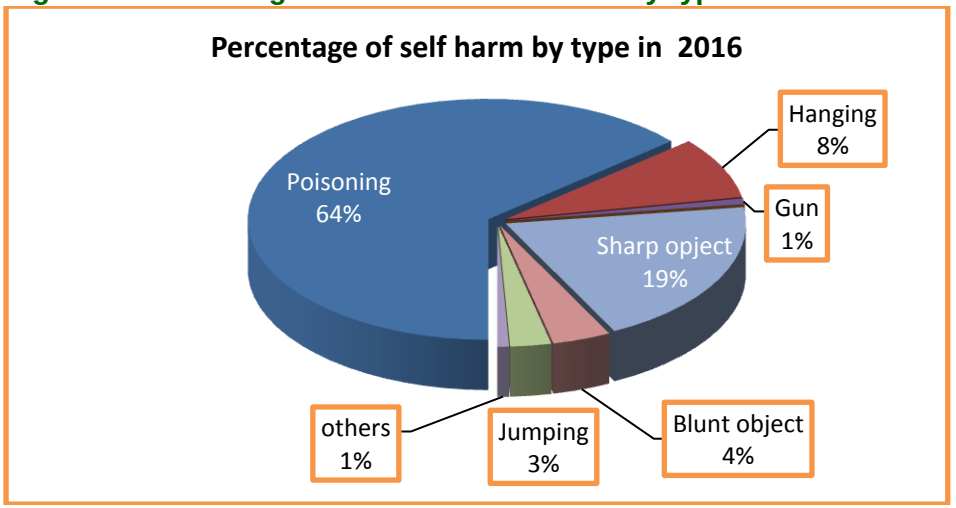


Figure 66 Percentage of self harm classified by types 2016



The self harm by poisoning was highest and self harm by sharp object was second. The trended of self harm was increasing year by year.

Table 46 Death of Self harm classified by types (1997-2016)

Type of self harm	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Poisoning	0	5	9	12	9	8	4	7	5	2	5	4	3	7	5	7	7	9	11	7
Hanging	0	1	3	0	1	3	4	1	5	4	7	2	3	8	7	7	9	2	10	5
Drowning	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Gun	0	1	1	1	2	1	1	0	1	0	0	1	1	1	2	1	0	2	1	0
Explosive material	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
File and flames	0	0	1	0	0	1	0	0	0	0	0	0	1	0	1	1	2	0	0	0
Sharp opject	0	1	1	0	0	1	0	0	0	0	1	1	0	0	2	0	0	0	0	0
Blunt object	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jumping	0	0	0	0	1	0	0	0	1	0	1	0	2	3	1	2	0	0	0	0
others	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
total	**0**	**8**	**15**	**14**	**13**	**14**	**10**	**8**	**12**	**6**	**14**	**8**	**10**	**19**	**19**	**18**	**18**	**13**	22	12

Table 47 Fatality rate of Self harm classified by types (1997-2016)

Type of self harm	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Poisoning	0	3.7	4.7	4.9	4.3	3.7	1.6	2.7	2.2	1.0	2.1	1.4	1.2	2.4	2.0	3.2	3.4	5.6	6.5	4.3
Hanging	0	25.0	23.1	0.0	14.3	27.3	44.4	12.5	38.5	28.6	41.2	16.7	21.4	32.0	31.8	33.3	30.0	12.5	30.3	23.8
Drowning	0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gun	0	20.0	33.3	33.3	40.0	0.0	14.3	0.0	25.0	0.0	0.0	50.0	20.0	20.0	40.0	20.0	0.0	100	50.0	0.0
Explosive material	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
File and flames	0	0.0	100.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	50.0	100.0	66.7	0.0	0.0	0.0
Sharp opject	0	1.4	2.9	0.0	0.0	2.3	0.0	0.0	0.0	0.0	1.2	1.2	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0
Blunt object	0	0.0	0.0	12.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Jumping	0	0.0	0.0	0.0	33.3	0.0	0.0	0.0	25.0	0.0	33.3	0.0	28.6	60.0	12.5	28.6	0.0	0.0	0.0	0.0
others	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.3	0.0	0.0	0.0	0.0	0.0
total	0	3.4	5.5	4.2	4.8	4.7	2.7	2.1	3.3	1.8	3.8	2.0	2.8	4.7	5.0	5.2	5.4	5.3	7.6	4.7

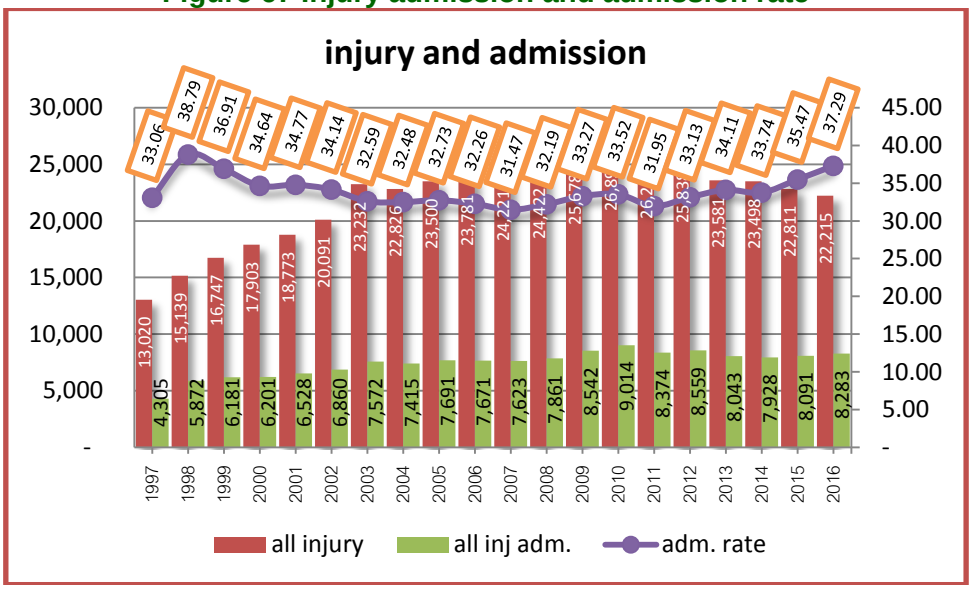
4. Hospital information

4.1 Admission rate by referral system (1997-2016)

Table 48 Injuries and admission by referral system (1997-2016)

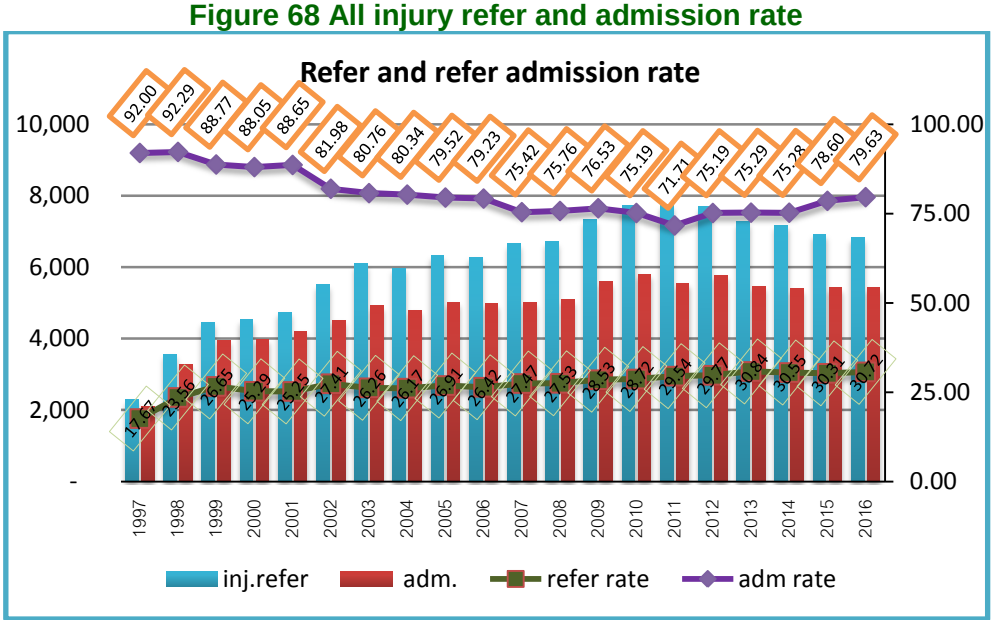
Year	all injury	all inj adm.	adm. rate	Refer & admission			
				inj & referred		refer & admission	
				inj. refer	refer rate	refer adm.	refer adm rate
1997	13,020	4,305	33.06	2,300	17.67	2,116	92.00
1998	15,139	5,872	38.79	3,567	23.56	3,292	92.29
1999	16,747	6,181	36.91	4,463	26.65	3,962	88.77
2000	17,903	6,201	34.64	4,528	25.29	3,987	88.05
2001	18,773	6,528	34.77	4,740	25.25	4,202	88.65
2002	20,091	6,860	34.14	5,506	27.41	4,514	81.98
2003	23,232	7,572	32.59	6,101	26.26	4,927	80.76
2004	22,826	7,415	32.48	5,973	26.17	4,799	80.34
2005	23,500	7,691	32.73	6,323	26.91	5,028	79.52
2006	23,781	7,671	32.26	6,284	26.42	4,979	79.23
2007	24,221	7,623	31.47	6,653	27.47	5,018	75.42
2008	24,422	7,861	32.19	6,724	27.53	5,094	75.76
2009	25,678	8,542	33.27	7,325	28.53	5,606	76.53
2010	26,891	9,014	33.52	7,724	28.72	5,808	75.19
2011	26,206	8,374	31.95	7,740	29.54	5,550	71.71
2012	25,838	8,559	33.13	7,691	29.77	5,783	75.19
2013	23,581	8,043	34.11	7,273	30.84	5,476	75.29
2014	23,498	7,928	33.74	7,179	30.55	5,404	75.28
2015	22,811	8,091	35.47	6,915	30.31	5,435	78.60
2016	22,215	8,283	37.29	6,824	30.72	5,434	79.63

Figure 67 Injury admission and admission rate



The numbers of injuries were increasing every year. And the numbers of traumatic admission were also slightly increasing.

Figure 68 All injury refer and admission rate



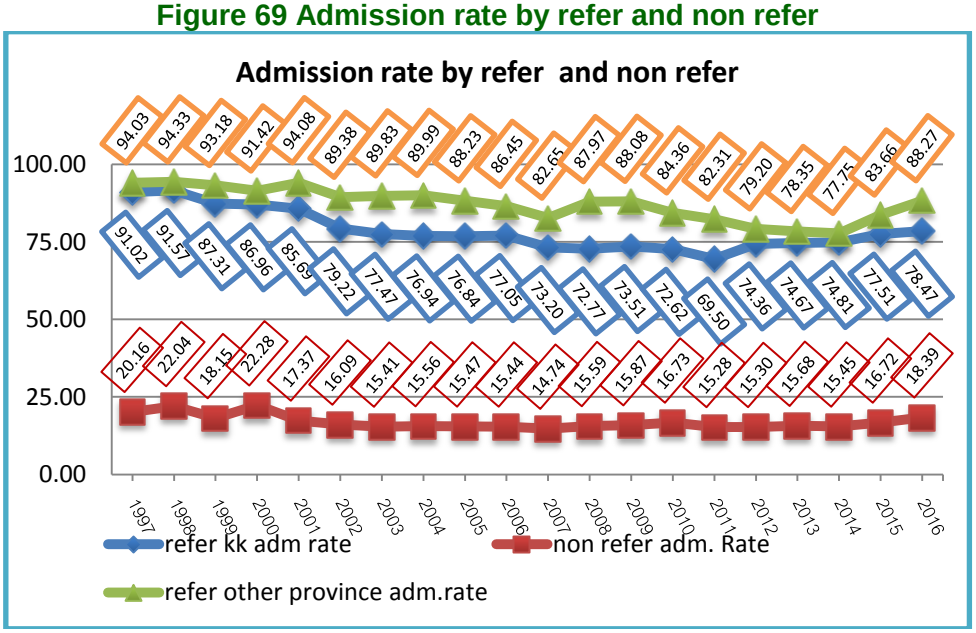
The number of injuries referral was increasing every year. The injuries referral admission rate was slightly decrease. Focusing on the admission of the referral, it was found that the proportion of the referral admission when comparing with the total admission were very high. This meant that most of the traumatic referred were admissions 70-90 percentage.

Table 49 Admission rate by referral system (1997-2016)

Year	in Khon Kaen						other province		
	refer in kk.	refer kk. adm.	refer kk. adm rate	non refer	non refer adm.	non refer adm. Rate	refer	refer adm.	refer adm. rate
1997	1,693	1,541	91.02	10,740	2,165	20.16	637	599	94.03
1998	2,632	2,410	91.57	11,513	2,537	22.04	935	882	94.33
1999	3,348	2,923	87.31	12,241	2,222	18.15	1,115	1,039	93.18
2000	3,421	2,975	86.96	14,482	3,226	22.28	1,107	1,012	91.42
2001	3,474	2,977	85.69	14,101	2,450	17.37	1,266	1,191	94.08
2002	4,009	3,176	79.22	14,585	2,346	16.09	1,497	1,338	89.38
2003	4,478	3,469	77.47	17,167	2,645	15.41	1,623	1,458	89.83
2004	4,414	3,396	76.94	16,851	2,622	15.56	1,559	1,403	89.99
2005	4,836	3,716	76.84	17,180	2,657	15.47	1,487	1,312	88.23
2006	4,823	3,716	77.05	17,490	2,701	15.44	1,461	1,263	86.45
2007	5,085	3,722	73.20	17,534	2,585	14.74	1,568	1,296	82.65
2008	5,402	3,931	72.77	17,647	2,751	15.59	1,322	1,163	87.97
2009	5,807	4,269	73.51	18,781	2,980	15.87	1,518	1,337	88.08
2010	6,030	4,379	72.62	19,166	3,206	16.73	1,694	1,429	84.36
2011	6,406	4,452	69.50	18,464	2,822	15.28	1,334	1,098	82.31
2012	6,374	4,740	74.36	18,147	2,776	15.30	1,317	1,043	79.20
2013	6,049	4,517	74.67	15,974	2,504	15.68	1,224	959	78.35
2014	6,033	4,513	74.81	15,975	2,468	15.45	1,146	891	77.75
2015	5,697	4,416	77.51	14,536	2,431	16.72	1,218	1,019	77.75
2016	6,014	4,719	78.47	15,039	2,765	18.39	810	715	88.27

Khon Kaen Regional Hospital is one of the Trauma Excellent Center, and referral center for the injured patients in the upper North East of Thailand. Therefore most injured patients were come by referral system from hospitals in the province and hospital in other provinces.

Figure 69 Admission rate by refer and non refer



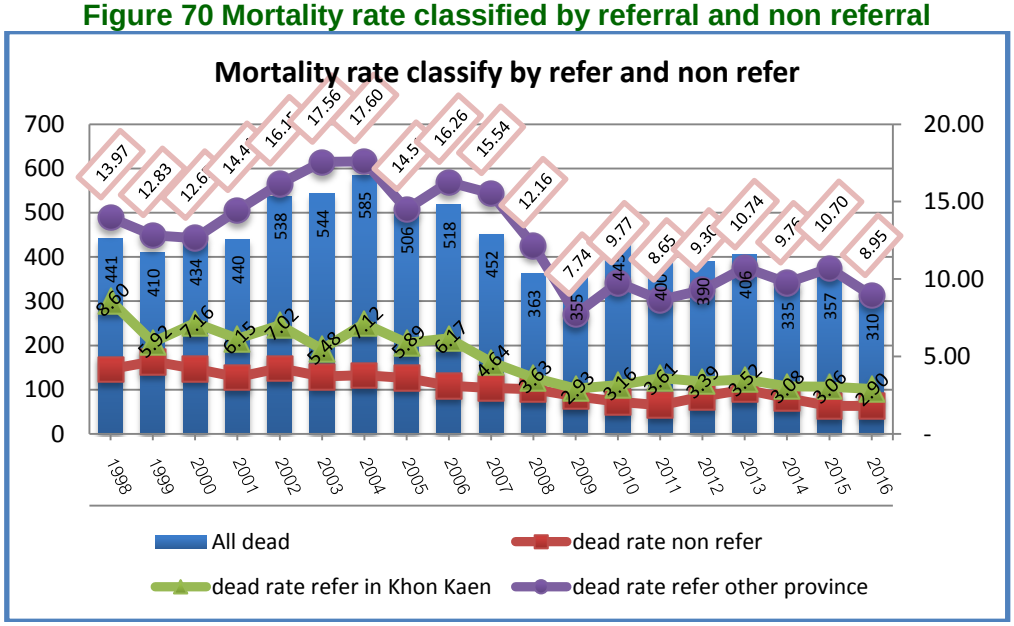
Focusing on the admission of the referral, it was found that the referral other province admission rate had the highest around 80-94 **%**. The referral in khon kaen province admission rate was the second around 70-90 **%.** And the non referral admission rate was the lowest**.**

4.2 Mortality of referral and non referral (1997-2016)

Table 50 Mortality of injury by referral and non referral (1997-2016)

year	all adm.	All dead	Khon Kaen province						other province		
			non refer			refer			refer		
			Adm. Inj.	dead	dead rate non refer	Adm. Inj.	dead	dead rate refer in KK	Adm. inj.	dead	dead rate
1998	5,872	441	2,534	106	4.18	2,443	210	8.60	895	125	13.97
1999	6,181	410	2,221	104	4.68	2,923	173	5.92	1,037	133	12.83
2000	6,201	434	2,214	93	4.20	2,975	213	7.16	1,012	128	12.65
2001	6,528	440	2,374	87	3.66	2,977	183	6.15	1,177	170	14.44
2002	6,860	538	2,353	100	4.25	3,176	223	7.02	1,331	215	16.15
2003	7,572	544	2,645	98	3.71	3,469	190	5.48	1,458	256	17.56
2004	7,415	585	2,637	100	3.79	3,397	242	7.12	1,381	243	17.60
2005	7,691	506	2,658	96	3.61	3,717	219	5.89	1,316	191	14.51
2006	7,671	518	2,699	84	3.11	3,711	229	6.17	1,261	205	16.26
2007	7,623	452	2,591	77	2.97	3,732	173	4.64	1,300	202	15.54
2008	7,861	363	2,705	78	2.88	3,938	143	3.63	1,168	142	12.16
2009	8,542	355	2,917	71	2.43	4,165	122	2.93	1,537	119	7.74
2010	9,014	445	2,975	62	2.08	4,268	135	3.16	1,771	173	9.77
2011	8,374	400	2,631	49	1.86	4,264	154	3.61	1,479	128	8.65
2012	8,559	390	2,707	103	3.80	4,697	181	3.85	1,086	103	9.48
2013	8,043	406	2,504	108	4.31	4,517	184	4.07	959	111	11.57
2014	7,928	335	2,468	80	3.24	4,513	163	3.61	891	91	10.21
2015	8,091	357	2,656	48	1.81	4,416	135	3.06	1,019	109	10.70
2016	8,238	310	2,765	50	1.81	4,719	137	2.90	715	64	8.95

Figure 70 Mortality rate classified by referral and non referral



The admission death rate of the referral from other province was highest, from hospital in Khon Kaen province was the second, and the non referral was lowest. The death rate of the referral from other province was slightly increasing while the death rate from other two groups was slightly declining.

4.3 Fatality rate and survival rate by traffic and non traffic cause

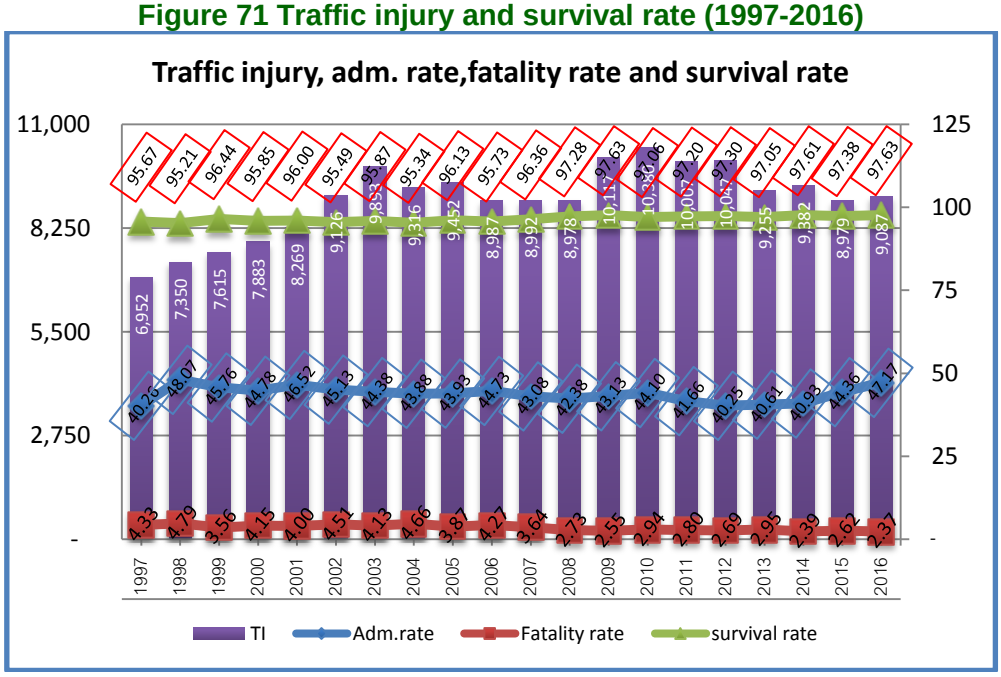
4.3.1 Traffic injury

Table 51 Traffic injury and survival rate (1997-2016)

Year	TI	Death	Fatality rate	Alive	survival rate	Adm.	Adm. rate	Adm. Dead	Fatality rate adm.	Adm. Alive	survival rate adm.
1997	6,952	301	4.33	6,651	95.67	2,799	40.26	233	8.32	2,566	91.68
1998	7,350	352	4.79	6,998	95.21	3,533	48.07	250	7.08	3,283	92.92
1999	7,615	271	3.56	7,344	96.44	3,485	45.76	214	6.14	3,271	93.86
2000	7,883	327	4.15	7,556	95.85	3,530	44.78	227	6.43	3,303	93.57
2001	8,269	331	4.00	7,938	96.00	3,847	46.52	235	6.11	3,612	93.89
2002	9,126	412	4.51	8,714	95.49	4,119	45.13	274	6.65	3,845	93.35
2003	9,893	409	4.13	9,484	95.87	4,391	44.38	282	6.42	4,109	93.58
2004	9,316	434	4.66	8,882	95.34	4,088	43.88	271	6.63	3,817	93.37
2005	9,452	366	3.87	9,086	96.13	4,152	43.93	235	5.66	3,917	94.34
2006	8,987	384	4.27	8,603	95.73	4,020	44.73	262	6.52	3,758	93.48
2007	8,992	327	3.64	8,665	96.36	3,874	43.08	241	6.22	3,633	93.78
2008	8,978	245	2.73	8,736	97.28	3,805	42.38	199	5.23	3,606	94.77
2009	10,117	258	2.55	9,877	97.63	4,363	43.13	209	4.79	4,154	95.21
2010	10,380	305	2.94	10,075	97.06	4,578	44.10	255	5.57	4,323	94.43
2011	10,007	280	2.80	9,727	97.20	4,169	41.66	229	5.49	3,940	94.51
2012	10,047	270	2.69	9,776	97.30	4,044	40.25	227	5.61	3,817	94.39
2013	9,255	273	2.95	8,982	97.05	3,758	40.61	222	5.91	3,536	94.09
2014	9,382	224	2.39	9,158	97.61	3,840	40.93	187	4.87	3,653	95.13
2015	8,979	235	2.62	8,744	97.38	3,983	44.36	195	4.90	3,788	95.10
2016	9,087	215	2.37	8,872	97.63	4,286	47.17	168	3.92	4,118	96.08

It was found that the number of admission was trended to be increased. The number of death had no significantly changed.

Figure 71 Traffic injury and survival rate (1997-2016)



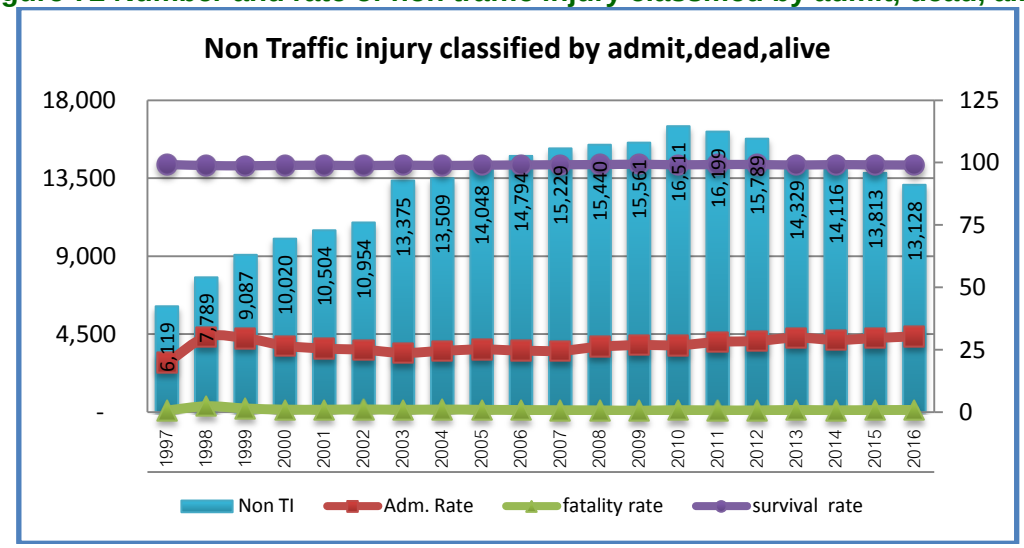
In traffic injury, it was found that the admission rate was 40-48 %. The survival rate was 95-98 **%**.The fatality rate was 2.3-4.6 % and seemed to have no significantly changed.

4.3.2 Non traffic injury

Table 52 Number of non traffic injury classified by admit, dead, alive (1997-2016)

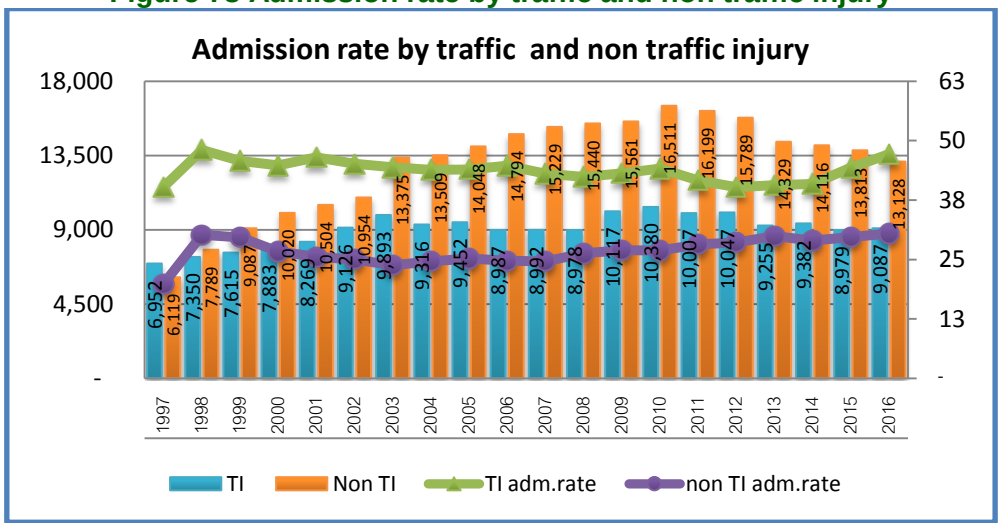
Year	TI	Death	Fatality rate	Alive	survival rate	Adm.	Adm. rate	Adm. Dead	Fatality rate adm.	Adm. Alive	survival rate adm.
1997	6,119	45	0.74	6,074	99.3	1,215	19.86	28	2.30	1,187	97.70
1998	7,789	189	2.43	7,600	98.9	2,349	30.16	59	2.51	2,290	97.49
1999	9,087	139	1.53	8,948	98.8	2,696	29.67	88	3.26	2,608	96.74
2000	10,020	107	1.07	9,913	98.9	2,671	26.66	82	3.07	2,589	96.93
2001	10,504	109	1.04	10,395	99.0	2,681	25.52	72	2.69	2,609	97.31
2002	10,954	126	1.15	10,828	98.9	2,741	25.02	89	3.25	2,652	96.75
2003	13,375	135	1.01	13,240	99.0	3,181	23.78	98	3.08	3,083	96.92
2004	13,509	151	1.12	13,358	98.9	3,325	24.61	95	2.86	3,230	97.14
2005	14,048	140	1.00	13,908	99.0	3,539	25.19	82	2.32	3,457	97.68
2006	14,794	134	0.91	14,660	99.1	3,656	24.71	79	2.16	3,577	97.84
2007	15,229	125	0.82	15,104	99.2	3,749	24.62	87	2.32	3,662	97.68
2008	15,440	108	0.76	15,323	99.2	4,058	26.28	99	2.44	3,959	97.56
2009	15,561	99	0.64	15,462	99.4	4,192	26.94	78	1.86	4,114	98.14
2010	16,511	140	0.85	16,371	99.2	4,436	26.87	118	2.66	4,318	97.34
2011	16,199	120	0.74	16,079	99.3	4,565	28.18	107	2.34	4,458	97.66
2012	15,789	119	0.75	15,670	99.2	4,513	28.58	101	2.24	4,412	97.76
2013	14,329	133	0.93	14,196	99.1	4,285	29.90	120	2.80	4,165	97.20
2014	14,116	111	0.79	14,005	99.2	4,088	28.96	100	2.45	3,988	97.55
2015	13,813	122	0.88	13,691	99.1	4,107	29.73	102	2.48	4,005	97.52
2016	13,128	95	0.72	13,033	99.3	3,995	30.43	83	2.08	3,912	97.92

Figure 72 Number and rate of non traffic injury classified by admit, dead, alive



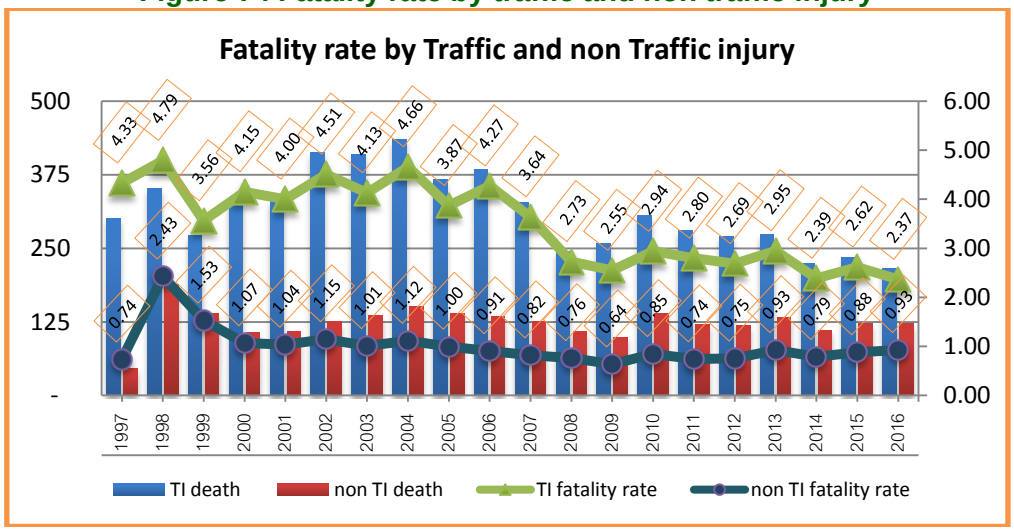
The number of non traffic injury was classified into group of admission, death, and alive. It was found that the number of admission was trended to be increasing. The number of death had no significantly changed.

Figure 73 Admission rate by traffic and non traffic injury



The traffic injury admission rate was higher than the non traffic injury admission rate near to 2 times.

Figure 74 Fatality rate by traffic and non traffic injury



The number of traffic deaths was higher than non traffic deaths for 2 times more.
The traffic fatality rate and non traffic fatality rate trended was decreasing.

4.4 Quality of care

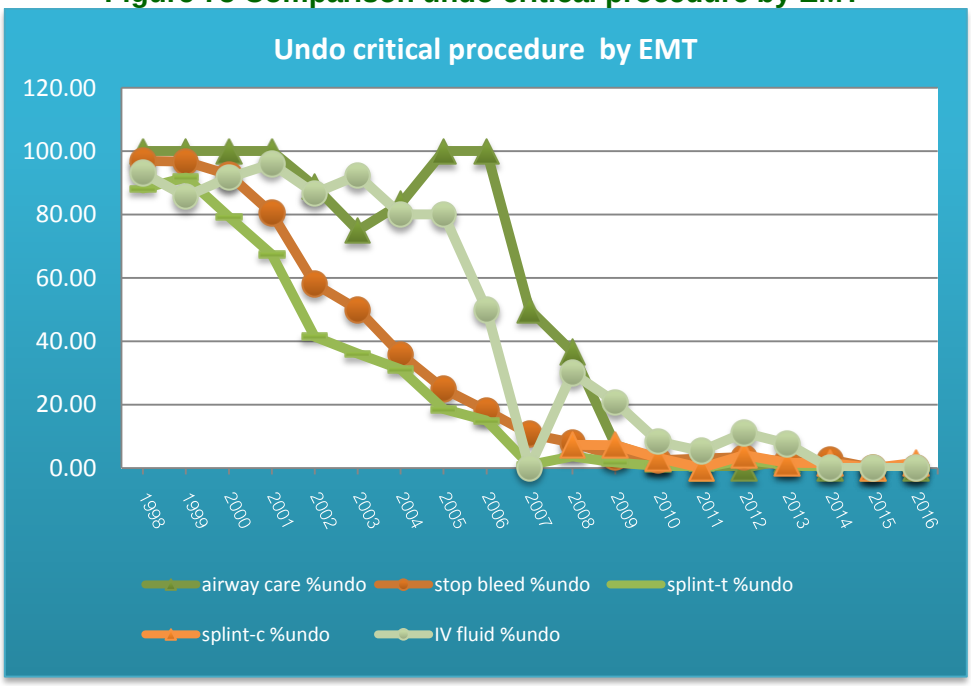
4.4.1 Critical procedure performed by EMT and volunteers

Table 53 Critical procedure performed by EMT (1997-2016)

Year	airway care			stop bleed			splint-t			splint-c			IV fluid		
	do	undo	%undo	do	undo	%undo	do	undo	%undo	do	undo	%undo	do	undo	%undo
1998	0	34	100.00	6	187	96.89	9	67	88.16	-	-	-	4	54	93.10
1999	0	1	100.00	1	29	96.67	1	11	91.67	-	-	-	1	6	85.71
2000	0	4	100.00	4	50	92.59	6	23	79.31	-	-	-	1	11	91.67
2001	0	5	100.00	18	74	80.43	14	29	67.44	-	-	-	1	24	96.00
2002	1	8	88.89	44	61	58.10	24	17	41.46	-	-	-	2	13	86.67
2003	3	9	75.00	91	91	50.00	39	22	36.07	-	-	-	1	12	92.31
2004	1	5	83.33	68	38	35.85	31	14	31.11	-	-	-	1	4	80.00
2005	0	5	100.00	93	31	25.00	57	13	18.57	-	-	-	1	4	80.00
2006	0	3	100.00	113	25	18.12	74	13	14.94	-	-	-	3	3	50.00
2007	2	2	50.00	116	14	10.77	110	1	0.90	-	-	-	2	0	0.00
2008	19	11	36.67	483	42	8.00	318	12	3.64	152	12	7.32	28	12	30.00
2009	39	3	7.14	291	11	3.64	226	4	1.74	116	9	7.20	46	12	20.69
2010	34	1	2.86	202	5	2.42	158	1	0.63	91	3	3.19	44	4	8.33
2011	34	0	0.00	166	5	2.92	123	0	0.00	58	0	0.00	35	2	5.41
2012	26	0	0.00	170	6	3.41	115	3	2.54	70	3	4.11	32	4	11.11
2013	37	1	2.63	158	3	1.86	104	1	0.95	59	1	1.67	24	2	7.69
2014	32	0	0.00	150	4	2.60	105	0	0.00	63	1	1.56	34	0	0.00
2015	25	0	0.00	152	0	0.00	138	0	0.00	71	0	0.00	30	0	0.00
2016	25	0	0.00	120	0	0.00	100	0	0.00	59	1	1.67	27	0	0.00

Emergency Medical Service (EMS) is one of the important components of trauma care which needs to be monitored for the quality of its service. The EMS station can be categorized into two levels as following; 1) Advance station consisted of doctor, nurse and Emergency Medical Technician (EMT) who were trained for 2 years 2) Basic station, consisted of first responders or volunteers who were trained for 110 hours. Therefore, the trend of undo critical procedures could be used to detect how efficient the mission of pre-hospital care was. As shown in next Table, the 4 critical procedures including respiratory care; stop bleeding, splint/ slap and intravenous fluid were monitored.

Figure 75 Comparison undo critical procedure by EMT

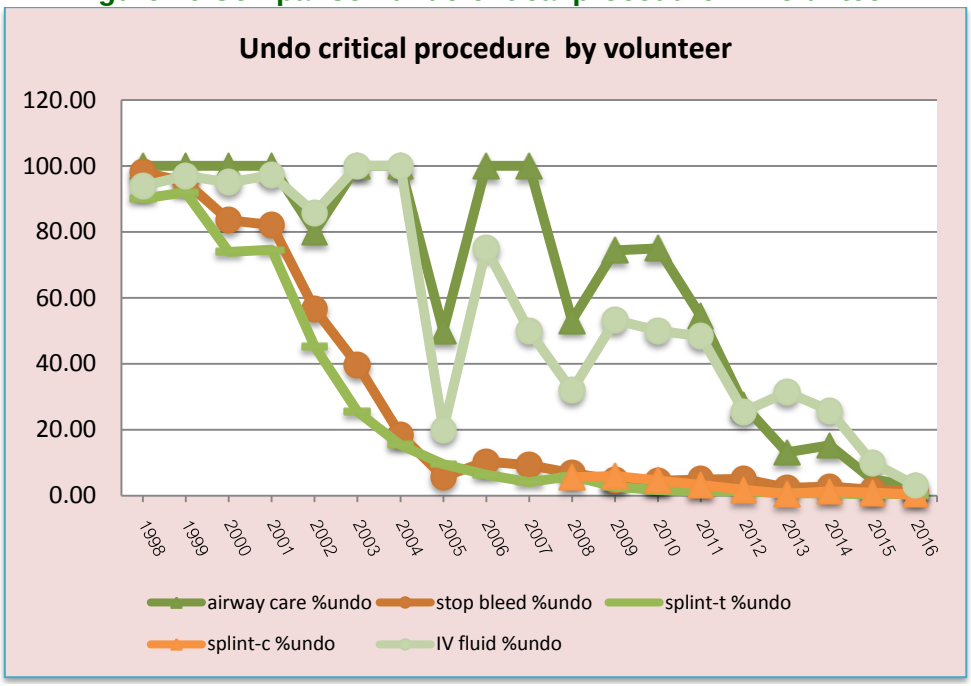


The trend of undo critical procedures was decreasing especially in case of EMT care whose experienced advance life support team and full option of advance equipments.

Table 54 Critical procedure performed by Volunteers (1997-2016)

Year	airway care			stop bleed			splint-t			splint-c			IV fluid		
	do	undo	%undo	do	undo	%undo	do	undo	%undo	do	undo	%undo	do	undo	%undo
1998	0	35	100.00	4	204	98.08	7	64	90.14	-	-	-	3	46	93.88
1999	0	15	100.00	9	177	95.16	4	46	92.00	-	-	-	1	32	96.97
2000	0	10	100.00	21	106	83.46	12	34	73.91	-	-	-	1	19	95.00
2001	0	21	100.00	25	114	82.01	15	44	74.58	-	-	-	1	35	97.22
2002	2	8	80.00	56	73	56.59	23	19	45.24	-	-	-	3	18	85.71
2003	0	8	100.00	93	61	39.61	44	15	25.42	-	-	-	0	9	100.00
2004	0	2	100.00	66	15	18.52	22	4	15.38	-	-	-	0	2	100.00
2005	2	2	50.00	165	10	5.71	85	9	9.57	-	-	-	4	1	20.00
2006	0	4	100.00	183	21	10.29	133	9	6.34	-	-	-	1	3	75.00
2007	0	5	100.00	205	21	9.29	140	6	4.11	-	-	-	3	3	50.00
2008	15	17	53.13	845	62	6.84	541	34	5.91	253	15	5.60	32	15	31.91
2009	11	32	74.42	1,424	71	4.75	969	26	2.61	503	32	5.98	29	33	53.23
2010	10	30	75.00	1,464	69	4.50	1,138	19	1.64	518	25	4.60	33	33	50.00
2011	26	31	54.39	1,652	85	4.89	1,335	18	1.33	606	20	3.19	30	28	48.28
2012	53	20	27.40	1,585	85	5.09	1,158	15	1.28	563	10	1.75	44	15	25.42
2013	53	8	13.11	1,596	39	2.39	1,138	8	0.70	539	3	0.55	35	16	31.37
2014	50	9	15.25	1,416	40	2.75	1,182	9	0.76	552	7	1.25	23	8	25.81
2015	59	3	4.84	1,509	27	1.76	1,076	3	0.28	549	5	0.90	36	4	10.0
2016	63	2	3.08	1,570	22	1.38	1,182	1	0.08	604	2	0.33	31	1	3.13

Figure 76 Comparison undo critical procedure in Volunteer



When compare the percentage of undo critical procedure to the volunteer care, it was more percentage of undo critical procedure due to lacking of equipments depend on the economic condition of Local Administration Organization.

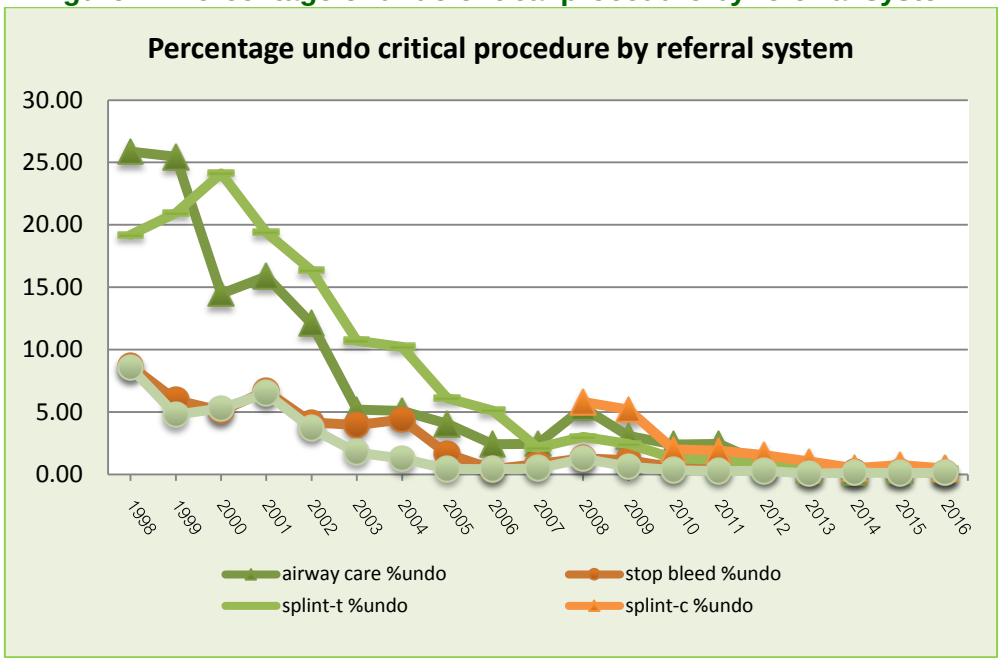
4.4.2 Critical procedure performed during the referral

Table 55 Critical procedure performed by referral system (1997-2016)

Year	airway care			stop bleed			splint-t			splint-c			IV fluid		
	do	undo	%undo	do	undo	%undo	do	undo	%undo	do	undo	%undo	do	undo	%undo
1998	507	177	25.88	1,374	131	8.70	1,225	291	19.20				1,596	149	8.54
1999	366	125	25.46	1,796	114	5.97	1,366	362	20.95				1,771	89	4.78
2000	567	96	14.48	1,846	99	5.09	1,437	457	24.13				1,880	105	5.29
2001	472	89	15.86	1,848	132	6.67	1,588	382	19.39				1,882	131	6.51
2002	647	89	12.09	2,005	87	4.16	1,708	334	16.36				2,119	81	3.68
2003	622	34	5.18	2,261	93	3.95	1,899	228	10.72				2,345	42	1.76
2004	596	32	5.10	2,222	102	4.39	1,950	222	10.22				2,324	30	1.27
2005	663	28	4.05	2,495	42	1.66	2,292	149	6.10				2,529	11	0.43
2006	730	18	2.41	2,548	11	0.43	2,352	127	5.12				2,618	11	0.42
2007	597	15	2.45	2,663	22	0.82	2,608	57	2.14				2,730	13	0.47
2008	1,184	67	5.36	3,345	44	1.30	3,134	97	3.00	1,187	73	5.79	3,772	48	1.26
2009	1,445	46	3.09	3,663	42	1.13	3,327	83	2.43	1,318	72	5.18	4,359	27	0.62
2010	1,624	40	2.40	3,973	23	0.58	3,783	49	1.28	1,567	32	2.00	4,500	15	0.33
2011	1,670	42	2.45	3,854	22	0.57	3,510	41	1.15	1,395	27	1.90	4,317	11	0.25
2012	1,621	14	0.86	3,963	18	0.45	3,448	26	0.75	1,343	21	1.54	4,501	13	0.29
2013	1,461	5	0.34	3,716	7	0.19	3,047	21	0.68	1,153	12	1.03	4,475	3	0.07
2014	1,565	3	0.19	3,693	8	0.22	2,980	17	0.57	1,192	6	0.50	4,643	6	0.13
2015	1,599	5	0.31	3,669	7	0.19	2,822	10	0.35	1,332	10	0.75	4,729	5	0.11
2016	1,586	7	0.44	3,606	5	0.14	2,877	11	0.38	1,478	7	0.47	4,695	6	0.13

In the referral system, the 5 critical procedures were also applied to monitor the quality of care.

Figure 77 Percentage of undo critical procedure by referral system



It was found that, the undo critical procedure was continuously decreasing. While the trend of all pitfalls was reducing; the respiratory care was shown to have least defect.

4.5 Severity of injury

Trauma project monitor for quality improvement in Trauma care

Table 56 KPI for quality improvement in trauma care (All injury) 2006-2016

Key performance indicator	Mean	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
MR of PS>0.75	<0.5	3.80	3.11	1.97	1.41	0.61	0.54	0.61	0.56	0.48	0.49	0.48
MR of ISS ≥15	<20	31.63	27.44	31.37	24.49	30.56	27.80	26.61	28.21	23.1	22.36	11.47
MR of RTS ≥5	<0.5	2.35	2.02	1.42	0.95	0.46	0.41	0.38	0.49	0.38	0.38	0.34
MR of all injury	<10	6.77	5.90	4.68	3.61	1.65	1.52	1.51	1.70	1.43	1.56	1.4
MR of HI which GCS >10	<0.5	0.69	0.49	0.46	0.98	1.71	1.31	1.22	1.46	0.72	1.34	0.99

Figure 78 KPI for quality improvement in trauma care (All injury) 2006-2016

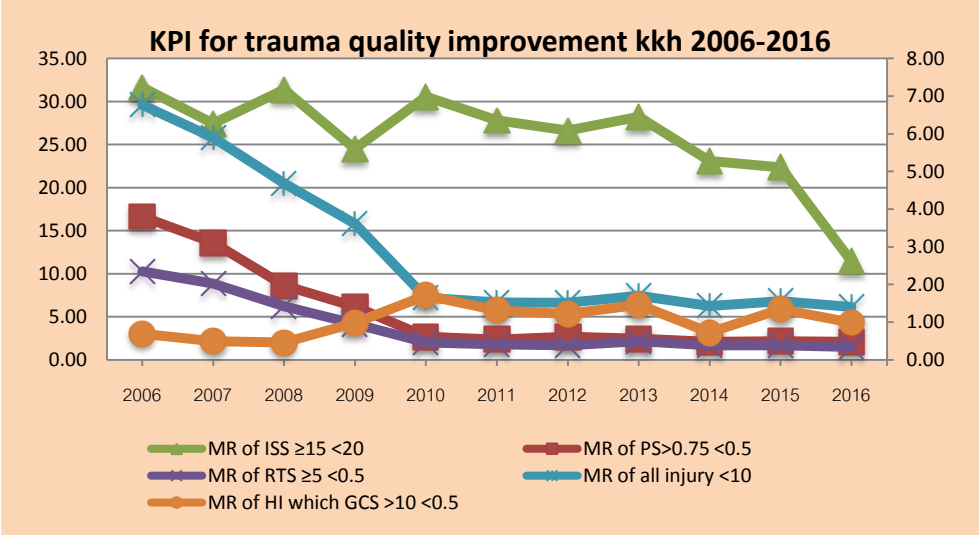


Table 57 KPI for quality improvement in trauma care (Admission) 2006-2016

Key performance indicator	Mean	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
MR of PS>0.75	<0.5	3.80	3.11	1.67	1.36	1.74	1.74	1.85	1.60	1.40	1.41	1.26
MR of ISS ≥15	<20	31.63	27.44	27.12	23.37	27.10	24.96	20.04	24.90	20.38	19.07	13.02
MR of RTS ≥5	<0.5	2.35	2.02	1.19	1.01	1.26	0.66	1.13	1.43	1.14	1.11	0.89
MR of all injury	<10	6.77	5.90	3.89	3.40	4.05	3.96	4.58	4.26	3.62	3.67	3.03
MR of HI GCS >10	<0.5	0.69	0.49	1.83	1.37	1.80	2.27	1.73	2.78	1.37	1.35	0.99

Figure 79 KPI for quality improvement in admission trauma care 2006-2016

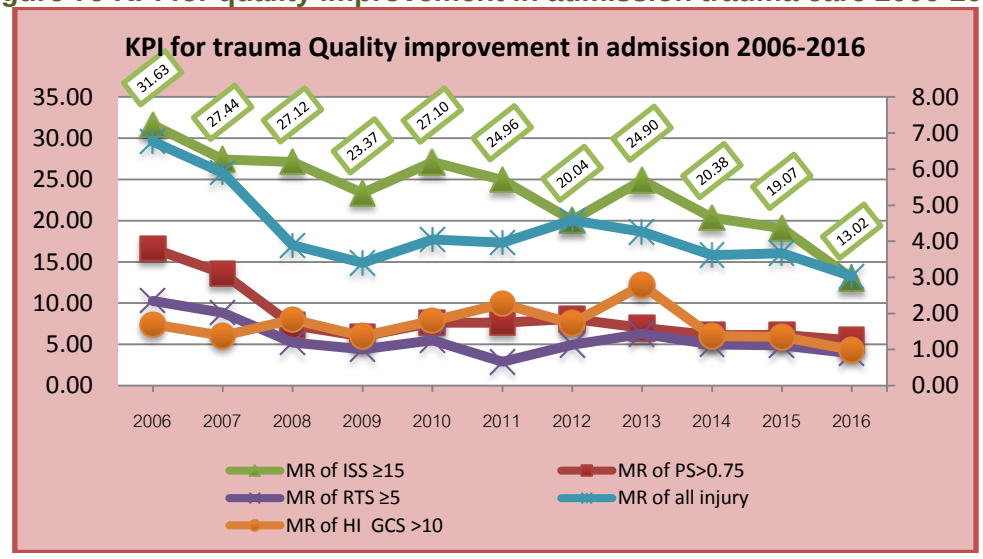
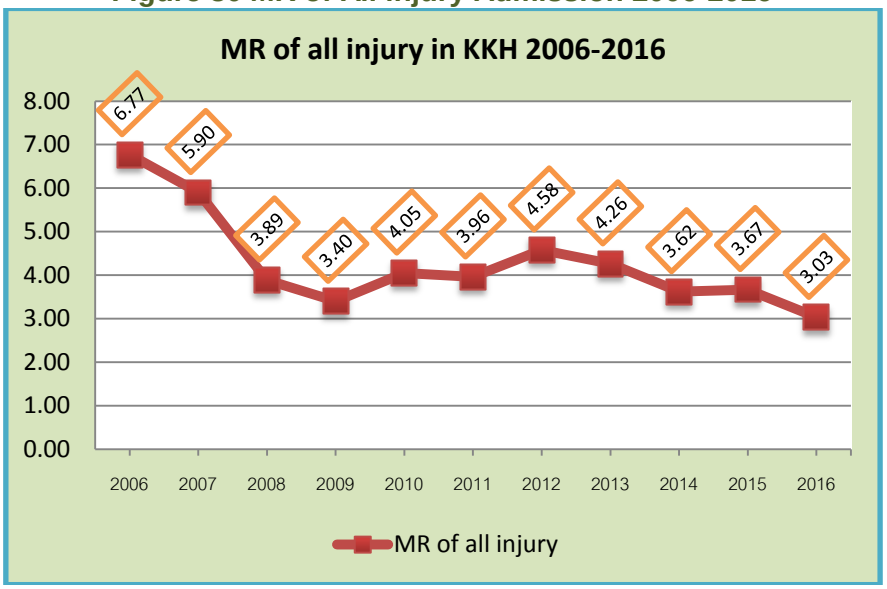
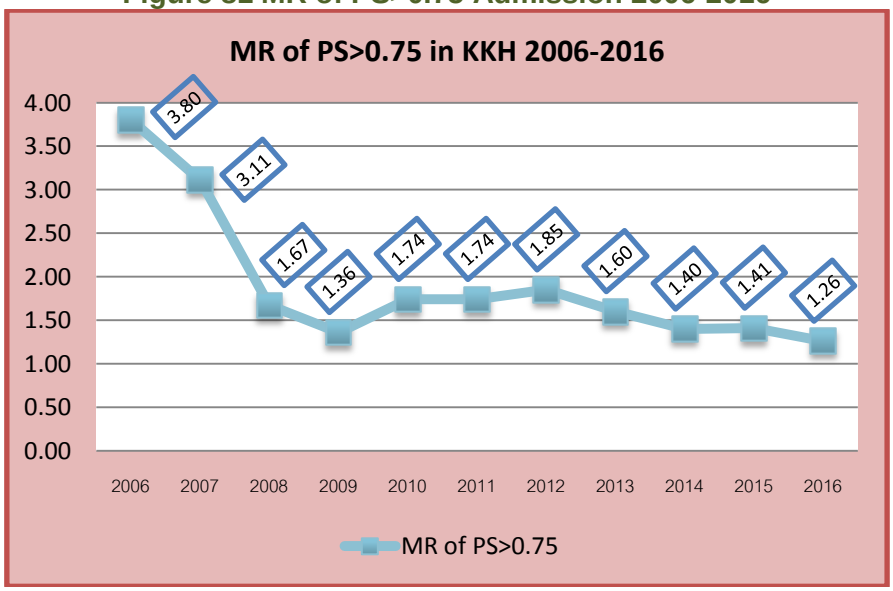


Figure 80 MR of All injury Admission 2006-2016



The Mortality rate of all injury was decreasing year by year.

Figure 81 MR of PS>0.75 Admission 2006-2016

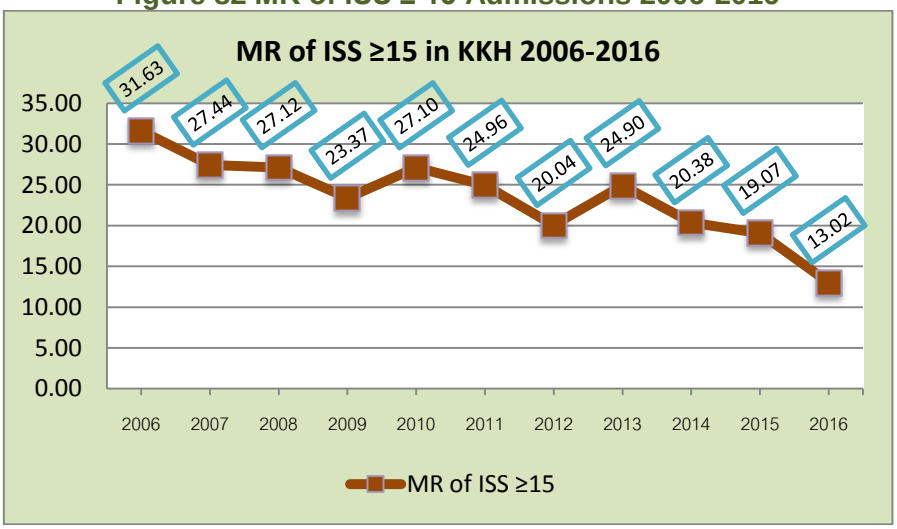


Knowing the probability of survival score (Ps score) enables the health service provider to group the patient according to the severity of injury and to evaluate the result of treatment as follows:

Patient who has Ps>0.75 has opportunity of survival more than 75%. If the patient in this group dies, the death of this case is preventable death resulting from the pitfall of treatment. (Witaya Chadbunchachai, 1998)

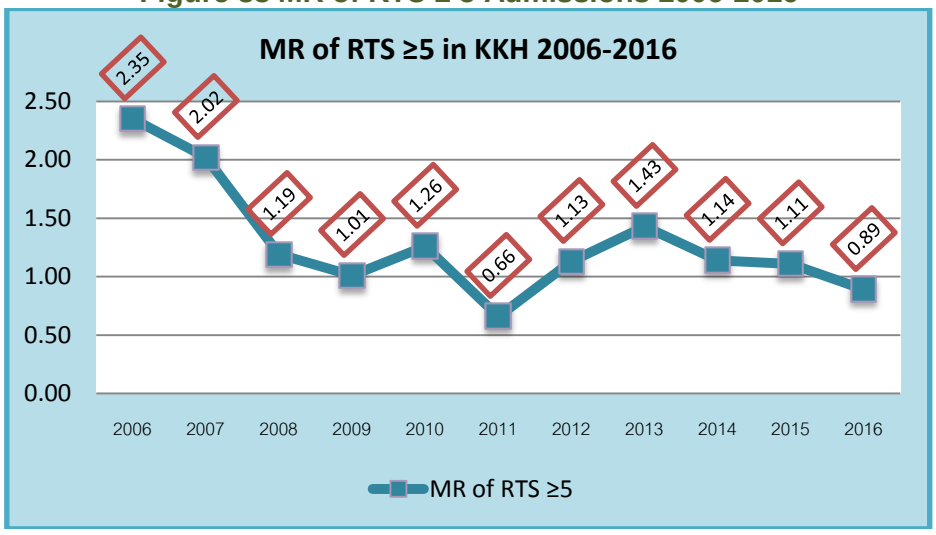
Therefore the Ps >0.75 was applied to assess how quality of care in hospital is. And from the figure; it was shown the preventable death was reducing significantly every year.

Figure 82 MR of ISS ≥ 15 Admissions 2006-2016



The Injury Severity Score (ISS) is an anatomical scoring system that provides an overall score for patients with multiple injuries. Each injury is assigned an Abbreviated Injury Scale (AIS) score, allocated to one of six body regions (Head, Face, Chest, Abdomen, Extremities (including Pelvis), External). Only the highest AIS score in each body region is used. The 3 most severely injured body regions have their score squared and added together to produce the ISS score. The anatomic measures of injury severity score is a method for describing patients with multiple injuries and evaluating emergency care. (http://emedicine.medscape.com/article/434076-overview)From the figure, it was indicated the decreasing the mortality rate of the patient who had got injury with a major trauma (ISS > 15) in Khon Kaen Regional Hospital since 2006

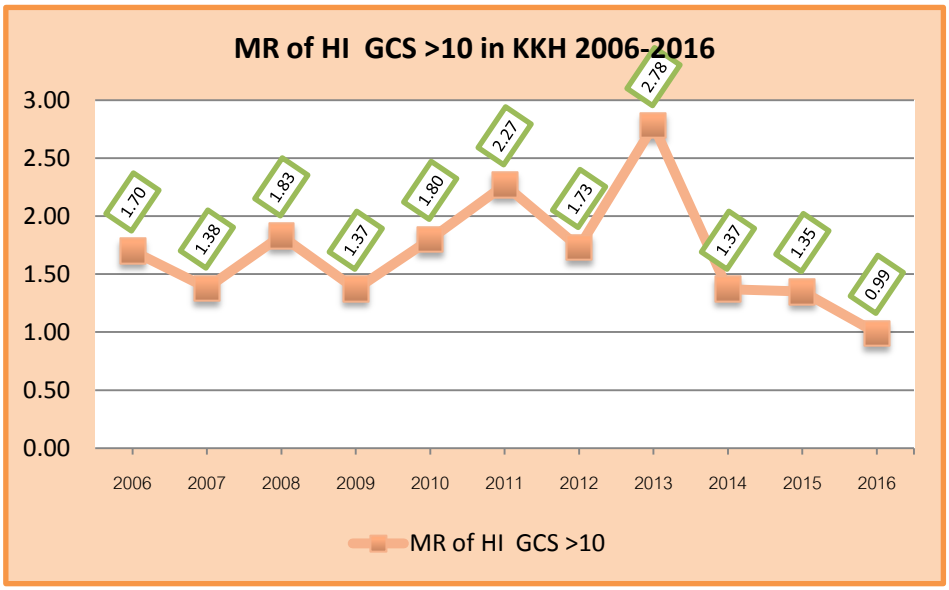
Figure 83 MR of RTS ≥ 5 Admissions 2006-2016



The Revised Trauma Score (RTS) is one of the more common physiologic scores. It uses 3 specific physiologic parameters, as follows: (1) Glasgow Coma Scale (GCS), (2) systolic blood pressure (SBP), and (3) respiratory rate (RR).An RTS of less than 11 is used to indicate the need for transport to a designated trauma center. The coded form of the RTS is used more frequently for quality assurance and outcome prediction. The coded RTS is calculated as follows, in which SBPc, RRc, and GCSc represent the coded values of each variable:

RTSc = 0.9368 GCSc + 0.7326 SBPc + 0.2908RRc (http://emedicine.medscape.com/article/434076-print)From this figure, the decreasing the mortality rate of the patient with a RTS score more than 5 in Khon Kaen Regional Hospital since 2006.

Figure 84 MR of HI which GCS > 10 Admissions 2006-2016



It was point out the group of patient who needed to close monitor due to high mortality rate was the group of injury with Head and Glass glow Coma Score more than 10.

4.6 GIS based for monitoring the injury prevention program in Khon Kaen Municipality

Khon Kaen is the commerce and political center of Northeastern Thailand, located in the heart of northeast region of Thailand (Isaan). In the last several years, construction has restarted within the city, including the widening of Mitaprahp Road on the West side of Khon Kaen (Highway 2 Bangkok-Nong Khai). The present population of the city is around 170,000.

Khon Kaen municipality, the urban boundary area in Muang District ,Khon Kaen province.Since these places tend to be overly commercialized and also it was the center of education in the region, therefore the transportation was effect by these growing.

Khon Kaen Regional Hospital is the tertiary care for Trauma and Critical Care who take a responsible for all victims in Khon Kaen province and also the network hospital. By using the Geographic Information System(GIS) which was develop since 1998 to do data collection of the traffic injuries location in Khon Kaen Municipality and monitor and evaluation the injury prevention program in Khon Kaen municipality.

The data analysis by using the GIS data based was shown as following;

Table 58 Top Ten ranking of Intersection Accident in Khon Kaen municipality 2007-2016

Intersection	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
mitraparp-sricharn	19	33	59	53	64	47	45	45	40	28
mitraparp-laonadee	38	26	30	46	33	39	45	21	24	28
mitraparp-maliwan-prachasamosorn	20	16	20	20	32	24	20	16	13	23
sricharn-chatapadung	30	11	17	30	30	25	24	26	20	21
Sricharn-teparak-tedsabarn roundabout	16	24	18	27	27	21	14	19	16	17
Sricharn-namuang	23	13	24	24	12	17	10	16	4	17
mitraparp-barnkok	17	23	26	49	33	38	42	27	17	15
train station roundabout	17	14	21	42	24	25	25	21	10	12
prachasamosorn-chatapadung	10	12	15	21	14	20	16	17	10	11
Prachasamosorn-bakarm	22	19	23	28	16	23	14	16	10	2
other	420	383	427	462	419	358	306	299	235	241
total	632	574	680	757	704	637	561	492	391	413

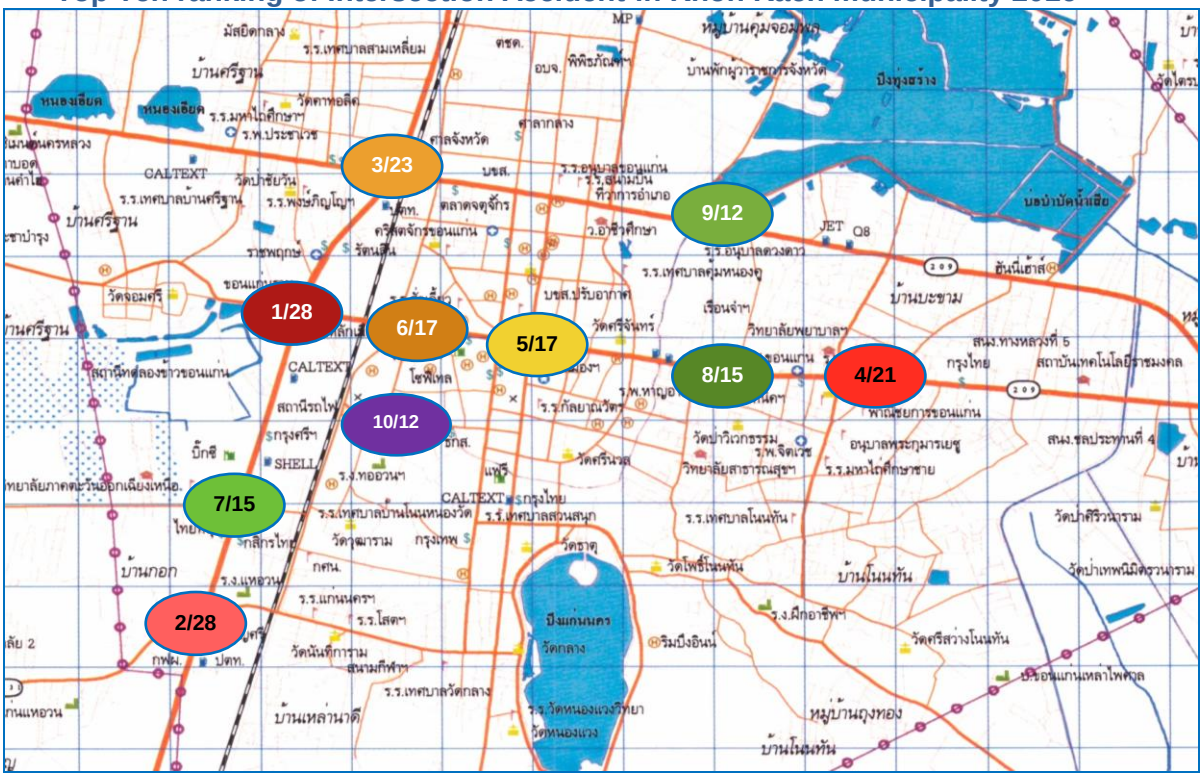
Table 59 Ranking of intersection Accidents in Khon Kaen municipality 2016

No.	Intersection	Number of injury
1	Mittraphap - LhaoNadee	28
2	Mittraphap - Sreechan	28
3	Mittraphap - Maliwan - PrachaSamosorn	23
4	Sreechan - ChataPhadung	21
5	Sreechan - NhaMuang	17
6	Sreechan - Thepharak - Thetsaban Roundabout	17
7	Mittraphap - Bankok	15
8	Sreechan - Anamai	15
9	PrachaSamosorn - LhangMuang	12
10	Railway Station Roundabout	12
11	PrachaSamosorn - ChataPhadung	11
12	KasikornTungSang - Compon	10
13	KasikornTungSang - RatKhanung	9

No.	Intersection	Number of injury
14	NhaMuang - Runrom	9
15	Sreechan - RobMuang	9
16	Highway No. 12 - KKU Gate	8
17	PrachaSamosorn - Thepharak	8
18	Robbung - Phothisarn	8
19	KlangMuang - LhaoNadee	7
20	Sreechan - LhangMuang	7
21	PrachaSamosorn - KasikornTungSang - RobMuang	6
22	PrachaSamosorn - Sreechan	6
23	RobMuang - ChuanChun	6
24	ChataPhadung - Phothisarn	5
25	NhaMuang - LhaoNadee	5
26	NikornSamran - Sreenuan	5
27	PrachaSamosorn - NhaMuang	5
28	KlangMuang - Runrom	4
29	LhaoNadee - Rotfai Rd.	4
30	Mittraphap - KKU Gate	4
31	NhaMuang - Ammart	4
32	NhaMuang - KasikornSamran - Soi Weerawan	4
33	PrachaSamosorn - KlangMuang	4
34	RobMuang - CheeThakhorn	4
35	RobMuang - Sreenuan	4
36	Runrom - Soi Runrom	4
37	Anamai - ChuanChun	3
38	KasikornTungSang - SoonRatchakarn	3
39	LhangMuang - Ammart	3
40	LhaoNadee - Robbung	3
41	NhaMuang - NhaSoonRatchakarn	3
42	RobMuang - Ammart	3
43	Runrom - PrachaSamran	3
44	Sreechan - KlangMuang	3
45	BanNongwat - Rail Track	2
46	ChataPhadung - Kanlaya	2
47	KlangMuang - ChuanChun	2
48	KlangMuang - NhaSoonRatchakarn	2
49	KlangMuang - NikornSamran	2
50	KlangMuang - Phimphasut	2
51	LhangMuang - NhaSoonRatchakarn	2
52	NhaMuang - ChuanChun	2
53	NhaMuang - NikornSamran	2
54	NhaMuang - Phimphasut	2
55	Rotfai Rd. - Bankok	2
56	Thepharak - NhaSoonRatchakarn	2
57	Wat Wutharam - Wutharam Rd.	2
58	ChataPhadung - Chaiyapruk	1
59	KasikornTungSang - LhangSoonRatchakarn	1
60	KasikornTungSang - NhaSoonRatchakarn	1

No.	Intersection	Number of injury
61	KlangMuang - CheeThakhorn	1
62	KlangMuang - LhangSoonRatchakarn	1
63	LhangMuang - CheeThakhorn	1
64	LhangMuang - RunCit	1
65	NhaMuang - LhangSoonRatchakarn	1
66	NhaMuang - SoonRatchakarn	1
67	PrachaSamosorn - Rail Track	1
68	Robbung - Chimplee	1
69	Robbung - Sreethat	1
70	RobMuang - SamakkheeUthit	1
71	Thepharak - LhangSoonRatchakarn	1
72	Thepharak - Soi HarPhrutchika	1
	Total	413

Top Ten ranking of Intersection Accident in Khon Kaen municipality 2016



Even the traffic accident was the dynamic change, though it was shown the same trend of traffic injury year by year.
Top Ten ranking road Intersection accident in Khon Kaen municipality in 2016 Number one was Intersection of mitraparp-sricharn and number two was Intersection of mitraparp-laonadee.

Table 60 Top Ten ranking Road Section Accident in Khon Kaen municipality 2007 – 2016

Road section	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Sricharn Rd. anamai to chatapadung	48	38	56	64	48	61	68	76	66	68
Sricharn Rd. kwaengkantang to klongchonlapratarn	41	25	30	49	43	61	36	40	43	56
Prachasamosorn Rd. chalermprakiat to chatapadung	36	37	42	47	55	53	47	55	54	42
na-muang Rd. nikornsumran to raunjit	26	24	29	20	20	30	26	21	21	39
Sricharn Rd. teparak to na-muang	27	20	21	37	24	29	35	14	40	35
Chatapadung Rd. chaiyapruk to kanlaya	41	21	19	38	42	48	42	31	26	29
Sricharn Rd. chatapadung to kwaengkantang	32	19	21	47	26	36	26	26	39	25
Sricharn Rd. klongchonlapratarn to parchasamosorn	16	16	25	49	23	31	26	20	13	25
Barnkok Rd. mitraparp to bound of municipality	39	38	47	47	58	45	42	38	29	22
Laonadee Rd. wat nantikaram to na-muang	30	27	18	31	28	33	22	26	26	19
other	914	885	1,034	1,037	1,128	903	852	844	476	572
total	1,250	1,150	1,340	1,466	1,495	1,330	1,222	1,191	833	932

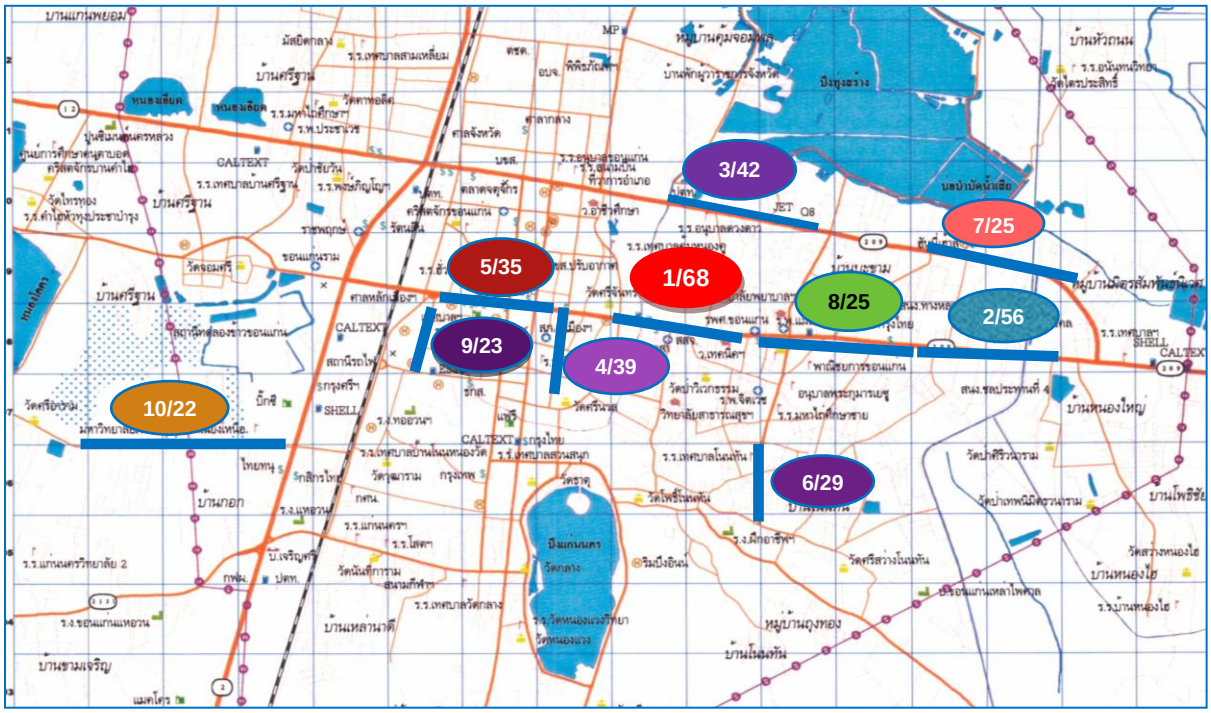
Table 61 Ranking Road Section Accident in Khon Kaen municipality 2016

No.	Road Section	Number of injury
1	Anamai to ChataPhadung	68
2	Khon Kaen DOH to KhlongChonlaprathan	56
3	KhlongRongMuang to ChataPhadung	42
4	NikornSamran to RunChit	39
5	Thepharak to NhaMuang	35
6	Chaiyapruk to Kanlaya	29
7	Bakham to KhlongChonlaprathan	25
8	ChataPhadung to Khon Kaen DOH	25
9	PrachaSamran to Soi Runrom	23
10	Mittaphap to Municipality Border	22
11	NhaMuang to KlangMuang	20
12	Cheethakhorn to Sreechan	19
13	WatNanthikaram to NhaMuang	19
14	Mittaphap to Rail Track	18
15	RopMuang to KhlongRongMuang	18
16	Sreechan to Ammart	18
17	PrachaSamosorn to Municipality Border	17
18	LhangMuang to RopMuang	16
19	Comphon to RopbungTungsang (West)	15

No.	Road Section	Number of injury
20	Phimphasut to PrachaSamosorn	15
21	WatSreethat to WatNhongwang	15
22	Rotfai Rd. to WatNanthikaram	14
23	Chuanchun to Cheethakhorn	13
24	Ropbung to Anamai	13
25	KKU to WatpaChaiyawan	12
26	NhaSoonRatchakarn to SoonRatchakarn	12
27	Ropbung (East) to Wat Sreethat	12
28	To NikornSamran to Phothisan	12
29	Experimental Paddy Field to Mittaphap	11
30	KhlongChonlaprathan to PrachaSamosorn	11
31	LhaoNadee to KasikornSamran	11
32	ChataPhadung to Bakham	10
33	Water Supply Factory to WatNhongwang	10
34	Ban Kok to Sreechan	9
35	Sreechan to Sangchan	9
36	Comphon to RatKhanung	8
37	LhangMuang to KasikornTungSang	8
38	LhaoNaDee to Ban Kok	8
39	Railway Station to NhongWat	8
40	KlangMuang to LhangMuang	7
41	NhongKung DOH to Sreenakharin H.	7
42	SoonRatchakarn to LhangSoonRatchakarn	7
43	Sreechan to SamLheam	7
44	RopMuang to Anamai	6
45	Sreechan to Runrom	6
46	Sreenakharin H. to KKU	6
47	Kanlaya to Business School	5
48	KasikornSamran to WatThat	5
49	KasikornTungsang to RopbungTungsang	5
50	PrachaSamosorn to NhaSoonRatchakarn	5
51	RatKhanung to KasikornTungsang 1	5
52	Sreechan 17 to Sreechan 15	5
53	To BanPhai to Macro	5
54	WatpaChaiyawan to SamLheam	5
55	KhlongChonlaprathan to Sreechan	4
56	Weerawan to LhaoNadee	4
57	Anamai 4 to Wetchayan	3
58	DarunSamran to Railway Station	3
59	Fishing Research Center to Comphon	3
60	KasikornSamran to NikornSamran	3
61	NikornSamran to RopMuang	3
62	Sangchan to PrachaSamosorn	3
63	Sreenuan to Chuanchun	3
64	WatNonechai to WatNonechai	3
65	Ammart to Phimphasut	2
66	Ammart to SamakkheeUthit	2

No.	Road Section	Number of injury
67	Chittawet Junction to Watpa WiwakeTham	2
68	ComSree to Maliwan 9	2
69	Kheha to Water Supply Factory	2
70	KlangMuang to KasikornTungsang	2
71	LhangSoonRatchakarn to NhongKung DOH	2
72	Macro to LhaoNaDee	2
73	Maliwan to Sreemarat 1	2
74	Mingmit to TetsabanBanSreethan School	2
75	Mittaphap to Maliwan 3	2
76	SamLheam to LhangSoonRatchakarn	2
77	Sreechan to Chittawate	2
78	Sreemit to Experimental Paddy Field	2
79	WatWhutharam to NhaMuang	2
80	Ammart to NhaMuang	1
81	Anamai to Phothisan 23	1
82	Ban Sreethan to Mingmit	1
83	Business School to Sreechan	1
84	ChataPhadung to Phothisan 15	1
85	Others	34
	Total	932

Top Ten ranking Road Section Accident in Khon Kaen municipality 2016



Top Ten ranking road section accident in Khon Kaen municipality in 2016 Number one was Sricharn Rd. anamai to chatapadung and number two was Sricharn Rd. kwaengkantang to klongchonlapratarn.

TRAUMA & CRITICAL CARE CENTER

KKH