27 YEARS ANNIVERSARY

TRAUMA REGISTRY

1997 – 2023




KHON KAEN REGIONAL HOSPITAL

TRAUMA AND CRITICAL CARE CENTER

WHO COLLABORATING CENTRE FOR INJURY PREVENTION AND SAFETY PROMOTION

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Executive Summary Table of Injury Surveillance 1997-2023

No. & %	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
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	22,757	24,207	24,025	21,361	18,752	19,637	20940
Male (%)	72.7	71.6	70.3	70	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	64.72	62.5	62.94	62.93	62.55	60	59.00
Female (%)	27.3	28.4	29.7	30	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	35.28	37.5	37.06	37.07	37.45	40	41.00
Occupation (%)	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
labor	36.08	30.65	29.19	27.72	30.96	37.38	43.3	43	46	47	43	38.77	38.8	38.37	39.31	41.2	42.27	44.09	44.36	42.88	43.49	44.08	44.29	45.10	47.53	47.33	50
student	23	21.52	28.67	28.73	29.09	27.11	27.8	29	29	30	31	31.2	29.3	27.99	26.83	26.2	23.09	22.69	23.98	23.76	23.55	21.25	20.54	19.98	17.86	20.46	20.36
farmer	16.84	13.89	12.42	13.13	12.54	9.94	7.3	6	5	4	4	5.7	6	6.66	6.55	6.4	5.63	4.75	4.01	3.7	3.05	2.47	2.72	2.17	2.10	1.53	0.96
housewife	5.11	6.1	5.31	5.95	5.55	5.38	5.2	5	6	5	5	7.3	5.8	2.77	2.09	2.2	2.5	2.8	2.08	2.86	2.18	2.58	2.93	3.11	1.39	1.27	1.11
others	5.36	18.1	15.02	10.38	8.76	9.28	8.7	9	7	8	10	8	10.7	13.14	14.32	13.8	15.4	14.2	14.36	15.72	16.16	16.43	16.76	19.73	21.62	19.13	23.89
merchant	6.75	3.74	3.24	4.17	4.01	2.63	1.7	2	1	1	1	1.8	1.9	2.25	2.19	2.1	2.1	2.2	2.06	1.96	1.83	1.94	1.8	1.51	1.42	1.22	0.87
police-soldier	2.07	1.32	1.36	1.13	1.31	1.24	1.3	1	1	1	1	0.89	0.8	0.83	0.76	0.8	0.9	0.8	7.91	0.75	0.65	0.63	0.67	0.51	0.51	0.38	0.39
priest/monk	0.96	0.66	0.73	0.65	0.67	0.52	0	0	0	0	1	0.7	0.5	0.47	0.38	0.5	0.5	0.4	0.8	0.4	0.65	0.63	0.67	0.14	0.14	0.30	0.29
officer	3.84	4.03	4.05	8.13	7.12	6.51	4.4	5	5	4	4	5.75	6.2	7.5	7.6	6.9	7.6	8.1	0.44	7.97	8.62	10.45	10.08	7.84	7.30	8.38	6.48
Age (%)	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
>0-15	21	23	24	23	23	21	16	21	21	23	21	20.5	18.9	20.78	20.38	19.5	18.46	15	17.35	16.6	15.22	16.54	13.23	14.13	13.33	13.13	13.33
>15-30	46	43	41	42	40	44	45	41	40	39	38	38.1	38.2	36.73	35.03	35	33.75	34.6	33.65	34.15	33.76	31.52	31.92	31.57	30.23	32.58	32.56
>30-45	22	21	21	20	22	20	20	21	21	20	21	20.8	21.9	21.42	21.41	21.6	22.18	22.9	21.99	21.48	21	20.82	21.18	21.34	21.9	20.59	13.74
>45-60	8	9	9	10	10	10	13	11	12	12	13	12.9	13.4	13.51	14.63	15.1	15.79	16.6	16.44	16.87	17.57	18.34	18.42	18.69	19.51	17.8	24.86
>60	3	4	5	5	5	5	6	6	6	6	7	7.6	7.6	7.56	8.55	8.7	9.82	10.8	10.56	10.87	12.45	12.79	15.25	14.26	15.01	14.7	15.51
cause	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
% of traffic injury	53.19	48.55	45.59	44.03	44.05	45.45	42.52	40.81	40.22	37.79	37.12	36.77	39.4	38.6	38.19	38.88	39.23	39.93	39.44	40.9	41.48	37.77	40.66	40.53	39.38	40.79	37.29
% of non traffic injury	46.81	51.45	54.41	55.97	55.95	54.55	57.48	59.19	59.78	62.21	62.88	63.23	60.6	61.4	61.81	61.12	60.77	60.07	60.56	59.1	58.52	62.23	59.34	59.46	60.62	59.21	62.70
No. of fall	1308	1923	2193	2255	2580	2578	2946	3188	3311	3470	3536	3780	3812	4017	4249	4107	3893	3952	4058	3932	3968	4223	4,526	4,247	3,953	3,957	4,625
No. of self harm	59	236	273	334	262	298	374	390	363	325	366	392	350	406	381	344	330	244	288	254	257	274	307	330	360	428	436
No. of assault	857	1143	1369	1534	1609	1774	2769	2467	2433	2530	2493	2652	2741	2644	2362	2443	2044	1968	1937	1684	1586	1414	1,394	1,196	1,122	1,105	1,204
Hospital information	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
% admission TI	40.26	48.07	45.76	44.78	46.52	45.13	44.38	43.88	43.93	44.73	43.08	42.29	42.95	44.1	41.66	40.25	40.6	40.93	44.36	47.17	48.23	50.81	55.49	54.31	47.84	53.416	47.59
%admission non TI	19.86	30.16	29.67	26.66	25.52	25.02	23.78	24.61	25.19	24.71	24.62	26.28	26.81	26.87	28.18	28.58	23.02	28.96	29.73	30.43	30.74	30.39	36.15	37.27	52.16	36.078	52.41
MR of TI	4.33	4.79	3.56	4.15	4	4.51	4.13	4.66	3.87	4.27	3.64	2.73	2.55	2.94	2.8	2.26	2.95	2.39	2.62	2.37	1.96	2.06	2.16	2.29	2.11	2.1	1.6
MR of non TI	0.74	2.43	1.53	1.07	1.04	1.15	1.01	1.12	1	0.91	0.82	0.76	0.63	0.85	0.74	0.75	0.6	0.79	0.88	0.72	0.61	0.65	0.74	0.82	0.97	0.81	1.21
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	6,675	6,847	7,294	6,192	5,593	4,448	4235
referral rate	17.6	23.88	26.72	25.3	25.04	27.36	26.24	25.62	26.91	26.43	27.52	27.59	27.73	28.57	29.31	29.77	30.83	30.55	30.31	30.72	29.33	28.29	30.36	28.98	29.83	22.66	20.22
Admission rate refer in KK	91.02	91.57	87.31	86.96	85.69	79.22	77.47	76.94	76.84	77.05	73.2	72.77	73.51	72.62	69.5	74.36	82.49	74.81	77.51	78.47	79.3	78.83	82.48	83.92	85.54	83.01	83.04
Admission rate refer other province	94.03	94.33	93.18	91.42	94.08	89.38	89.83	89.99	88.23	86.45	82.65	87.97	88.08	84.36	82.31	79.2	78.35	77.75	83.66	88.27	88.41	78.83	90	87.91	95.4	83	91
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	5,348	5,444	6,055	5,210	4,806	3,651	3512
referral admission rate	92	92.29	88.77	88.05	88.65	81.98	80.76	80.34	79.52	79.23	75.42	75.76	76.53	75.19	71.71	75.19	75.29	75.28	78.6	79.63	80.12	79.51	83.01	84.14	85.93	83.18	82.92
non referred admission rate	20.16	22.04	18.15	22.28	17.13	16.09	15.41	15.56	15.47	15.44	14.74	15.59	15.87	16.73	15.28	15.3	15.68	15.46	16.72	18.39	20.44	21.71	26.91	27.87	29.99	33.43	30.33
MR of non refer in KK province	5.89	4.18	4.68	4.2	3.66	4.25	3.71	3.79	3.61	3.11	2.96	2.88	2.43	2.08	1.86	3.8	4.31	3.24	3.06	1.81	1.52	1.14	1.31	1.39	2.22	1.81	1.69
MR of referral in KK province	8.62	8.6	5.92	7.16	6.15	7.02	5.48	7.12	5.89	6.17	4.64	3.63	2.93	3.16	3.61	3.85	4.07	3.61	3.06	2.9	2.7	3.02	1.65	2.96	3.03	3.38	3.42
MR of referral by other from KK	14.95	13.97	12.83	12.65	14.44	16.15	17.56	17.6	14.51	16.26	15.54	12.16	7.74	9.77	8.65	9.48	11.57	10.21	10.7	8.95	6.37	9.05	10.47	9.28	9.29	12.00	9.35
road users	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
% motorcycle	80.01	76	76.98	75.87	76.85	78.69	81.01	79.59	79.88	76.69	79.08	85.98	81.9	82.9	82.7	86.2	86.04	83	85.12	85.12	86.14	85.8	85.91	86.29	85.87	85.03	85.21

No. & %	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
% pedestrian	5.29	6.05	6.63	5.95	5.86	5.11	4.41	4.67	4.41	4.61	5.13	4.84	4.1	3.8	4.1	3.7	3.93	3.4	3.19	3.19	2.91	2.88	2.78	3.06	2.71	2.5	2.66
% car	0.82	1.56	1.17	1.39	1.15	1.17	1.12	1.42	0.98	1.27	1.18	1.66	1.4	1.5	2.1	1.8	2.47	2.5	2.1	2.1	2.11	2.32	2.44	2.19	2	2.6	2.75
% bicycle	2.19	3.43	3.95	4.38	4.12	3.75	3.77	4.4	4.46	4.4	4.39	4.67	3.9	3.6	3.6	3.5	3.55	3.9	3.54	3.54	3.66	3.6	3.4	3.3	4.15	3.11	3.60
% pick up	6.95	7.63	6.23	6.42	6.42	6.36	5.01	6.11	6.27	5.38	6.1	4.62	5.7	4.8	4.6	4.7	4.76	4.6	3.96	3.96	3.38	3.55	4.02	3.7	4.15	4.13	3.66
Head injury	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
MR of BR1injury; Max AIS1-3	N/A	4.2	1.3	0.6	2.1	1.9	0.4	2	3.1	2.2	2	0.2	0.7	1.6	2.7	1.3	0.3	1	1.1	0.6	0.5	0.4	0.5	0.9	1.24	0.98	1.19
MR of BR1injury; Max AIS4-6	N/A	42.71	34.19	36.36	32.64	33.96	31.23	37.59	29.87	33.79	30.82	28	59.15	48.83	34.39	30.35	36	24.73	25.23	20.79	15.54	17.98	20	18.3	16.16	16.64	12.44
MR of drunk driver	5.09	4.52	4.47	4.43	2.81	3.54	3.82	3.59	3.02	3.25	2.73	2.16	2.3	2.16	2.18	2.4	2.88	1.5	1.53	1.33	2.55	1.03	1.31	1.2	1.06	1.32	0.86
MR of non drunk driver	2.67	2.96	1.89	2.13	2.2	2.28	2.53	2.63	1.41	1.98	1.56	1.01	1.6	3.3	2.8	1.2	2.5	2	1.57	1.2	1.71	1.36	1.03	1.1	1.03	1.11	0.69
MR of drunk passenger	4.96	3.66	3.66	3.6	3.38	4.36	2.56	3.64	2.53	2.55	2.37	1.12	1.8	2.12	1.66	1.7	2.79	1.3	0.97	0.45	1.77	0.56	2.17	0.7	0.83	0	1.32
MR of non drunk passenger	2.95	3.85	2.45	2.93	2.54	3.21	2.28	3.49	2.4	2.92	2.61	1.67	1.9	2.32	2.55	1.5	1.79	2.1	1.93	1.62	1.9	1.39	1.2	1.1	0.98	1.12	0.38
MR of drunk pedestrian	3.85	8.77	6.82	5.45	10.42	9.43	5.45	13.85	0	0	0	4.17	4.9	9.52	4.26	4.5	2.5	7.7	3.03	0	3.33	0	0	0	0	3.13	0
MR of non drunk pedestrian	5.48	6.04	2.22	2.22	3.09	3.31	3.8	5.95	3.18	3.12	5.56	2.65	3.3	6.3	5.83	4	4.71	3.6	4.31	3.28	4.58	4.91	0.43	1.4	6.89	2.61	4.97
% helmet used driver injury	N/A	19.64	22.02	19.19	13.57	13.67	16.74	19.26	27.59	25.87	26.59	27.85	26.9	23.1	25.87	27.2	24.25	25.2	22.48	23.08	21.25	21.95	25.29	29.3	29.92	27.1	24.15
% helmet used passenger injury	N/A	13.24	11.76	10.04	7.33	6.49	8.16	10.74	17.13	15.44	16.35	15.84	15.7	12.46	14.8	14.4	13.19	13.8	11.88	11.65	10.99	10.14	13.48	11.7	13.28	9.78	9.56
% seatbelt used driver injury	N/A	17.71	34.04	46.24	23.02	27.16	19.87	22.94	25.98	24.82	22.63	37.69	38.2	45.79	43.18	40	39.73	43.9	43.87	48.87	50.7	50.53	41.1	58.4	61.51	46.58	50.65
Undo EMS (%)	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
airway care	82.94	88.6	82.27	59.76	57.14	14.55	30.14	23.53	26.75	19.69	20.83	19.4	21.3	14.76	19.65	10.24	7.77	4.9	4.76	3.08	0.26	0	1.54	1.16	0.44	1.18	1.40
stop bleed	73.79	78.24	73.66	70.3	68.22	52.74	51.68	45.07	51.47	34	31.55	5.9	4.39	3.64	4.36	4.7	1.86	2.53	1.69	1.38	0.65	1.77	0	0.42	0.48	0.56	0.82
splint	77.97	82.28	76.83	60.81	56.53	31.15	24.54	20.79	21.04	10.26	6.52	3.98	2.25	1.27	1.14	1.2	2.07	0.61	0.43	0	0.65	1.09	0.48	0.13	0.16	0.70	0.84
IV fluid	72.11	83.87	82.66	81.97	77.36	37.55	37.56	25.83	19.76	21.36	18.58	17.59	23.6	15.94	16.75	10.75	12.22	6.67	10	0	1.87	0	4.48	0.57	0.00	2.55	3.95
Undo referral (%)	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
airway care	32.45	25.88	25.46	14.48	15.86	12.09	5.18	5.1	4.05	2.41	2.45	5.36	3.09	2.4	2.45	0.86	0.34	0.19	0.12	0.44	0.15	3.31	0.21	0.36	0.29	0.7	0.09
stop bleed	15.82	8.7	5.97	5.09	6.67	4.16	3.95	4.39	1.66	0.43	0.82	1.3	1.13	0.58	0.57	0.45	0.19	0.22	0.19	0.14	0.03	0.15	0.08	0.06	0.26	0.31	0.35
splint/slab	27.74	19.2	20.95	23.51	19.39	16.36	10.72	10.22	6.1	5.12	2.14	3	2.43	1.28	1.15	0.75	0.68	0.57	0.75	0.38	0.11	0.22	0.25	0.08	0.08	0.29	0.27
IV fluid	10.46	8.54	4.78	5.29	6.51	3.68	1.76	1.27	0.43	0.42	0.47	1.26	0.62	0.33	0.25	0.29	0.68	0.13	0.32	0.13	0.02	0.02	0.14	0.04	0	0.13	0.18
MR by TRISS methodology	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
0-0.25	N/A	80.28	72.73	72.97	70.13	74.11	79.51	88.03	66.06	71.7	75.96	75.58	76.69	75	81.88	87.5	95.04	80.35	75	56.2	68.18	82.52	71.29	79.78	77.58	58.97	64.81
>0.25-0.50	N/A	71.74	61.06	65.83	61.67	59.87	65.71	75.68	55.21	61.27	66.12	63.54	60.58	55.12	57	41.18	57.14	58.44	64.19	50.6	37.93	57.14	40	51.51	50.94	42.31	34.48
>0.50-0.75	N/A	49.09	41.54	49.19	45.76	36.73	37.16	49.08	41.58	41.33	40	36.15	32.35	39.19	44.08	39	57.6	55.55	46.95	31.9	31.15	36.45	30.83	33.33	35.08	24.29	21.87
>0.75-1.00	N/A	3.11	1.85	2.62	2.64	2.76	2.38	2.22	2.15	2.71	2.17	1.68	0.47	0.61	0.54	0.6	0.45	0.48	0.49	0.5	0.6	0.45	0.6	0.54	1.03	1.04	0.86

Executive Summary

The data reveals that male was the majority patient, while the proportion of female has been increasing year by year. The labors and the students remained the high rank in injury. Most trauma patients were found in 15-30-year age group. Notably, the number of older adults (> 60 years old) has been rising up to nearly 16 percent recently. Non-traffic injury dominated traffic injury in term of incidence, and hospital admission; and falling was a major incidence. In contrary, Mortality from traffic injury was higher than non-traffic injury. Around 4,000 patients were referred to Khon Kaen regional hospital and over 85% were admitted. Mortality rate of referral patients was higher than non-referral patients. Mortality rate in TRISS 0.75-1 is lower than one percent, while mortality rate in TRISS 0-0.25,0.25-0.50, 0.50-0.75 is 64.81,34.48, 21.87 respectively. The overall mortality rate of patients has decreased, particularly among those with severe injuries (ISS >15), with mortality rates below 15% (according to Thailand's standard criteria). Additionally, there has been a consistent downward trend each year, reflecting improved quality of care in alignment with Trauma Quality Improvement Program (TQIP). In term of factors related traffic injury, motorcycle use was a majority vehicle in traffic injury. Alcohol drinking in the drivers and the passengers was relatively associated with higher mortality. Surprisingly, drunk pedestrian death is lower than non-drunk pedestrians. The essential management including airway, respiratory, circulation, immobilization was improved as the percent of undo essential management in both EMS and referral system has been significantly decreasing from 2012.

The challenging that showed in the data is to pay attention in geriatric population regarding falling incident as well as the mortality in the group of TRISS 0.25-0.50 and 0.50-0.75. Motorcycle riding remained the focus in term of injury prevention for traffic accident. Non-traffic injury should be focused and explore the root cause and seek for the effective injury prevention program.

I. Introduction

Since the Injury Surveillance (IS) system was first implemented at Khon Kaen Regional Hospital in 1989, it has been used to gather and report injury data annually, with the data being presented in the form of a Trauma Registry. In 1997, a national software program for the IS was introduced to standardize data collection. The annual snapshot of this data is crucial, particularly for professionals working in the areas of violence and injury prevention. The Khon Kaen team emphasizes the importance of ongoing data collection and continuous reporting, as this provides valuable insights for those managing and addressing issues related to trauma and injury.

II. Objectives

1. **To demonstrate injury trends** in Khon Kaen Province by analyzing data from the Khon Kaen Regional Hospital Injury Surveillance (IS) database, covering the period from 1997 to 2023.
2. **To create a comprehensive dataset** that supports the monitoring and evaluation of the Continuous Quality Improvement (CQI) program within the trauma care system.
3. **To provide a robust information base** for decision-makers, facilitating the development and implementation of injury prevention and control programs.
4. **To develop a tool** for studying factors contributing to mortality and morbidity, aimed at improving the overall quality of trauma care.

III. Methodology

1. Trauma Registry reports from 1997 to 2023 were collected and analyzed using data from Khon Kaen Regional Hospital.
2. The Injury Surveillance (IS) database from Khon Kaen Regional Hospital served as the primary data source.
3. A descriptive analysis approach was employed to present and interpret the findings.

27th years Trauma registry of Khon Kaen Regional Hospital

Forward

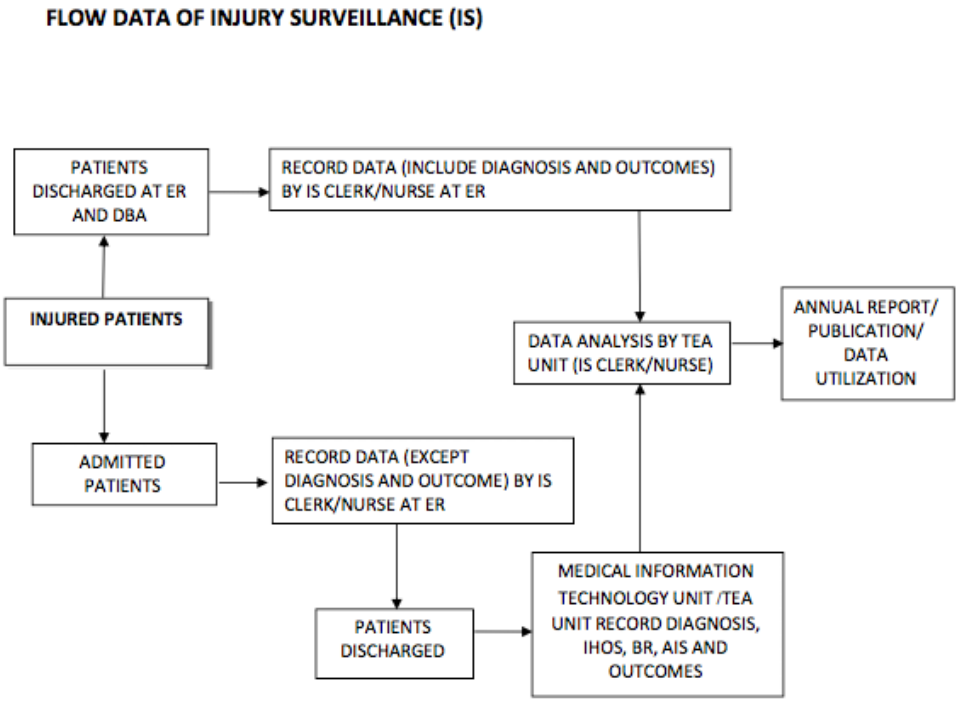
It is with great pleasure that I welcome you to the 27th Anniversary Report of the Khon Kaen Regional Hospital Trauma Registry, which has been in operation since 1997. Trauma and injury continue to claim numerous lives and inflict harm on many individuals. The incidence of injuries, leading to deaths, hospitalizations, disabilities, and significant socioeconomic losses, is steadily increasing. To effectively address these issues, a public health approach is crucial, particularly one that identifies the scope, magnitude, and priority of injury problems. This requires accurate and timely information. An Injury Surveillance (IS) system, which involves the ongoing, systematic collection, analysis, and dissemination of injury-related data, serves as an essential tool in this regard. The IS system is instrumental for policymakers, providing them with the information necessary to make informed decisions in the planning, implementation, and monitoring of injury prevention and control strategies.

Data Flow and Processing

Initial data collection is handled by the IS clerk, who uses the Injury Surveillance program (IS online or PHER Plus). Data collected in PHER Plus includes personal data, pre-hospital information, injury details, risk behaviors, locations of injury and types of vehicles involved. Hospital-based care data is recorded in the hospital's information system. The integration of these three data sources is carried out by the IS nurse in the trauma center.

The IS nurse then analyzes the integrated data and generates comprehensive tables using the reporting menu within the injury surveillance program. Quality assurance of the data is overseen by the emergency room nurses. Additionally, a quality assessment meeting is held every three months, where the quality assessment team—comprising a trauma surgeon, medical statistician, IS nurse, and trauma nurse coordinator—conducts random checks to ensure the accuracy of the data collected.

These reports are then disseminated at both provincial and national levels to support advocacy efforts and inform decision-making processes regarding injury prevention and trauma care improvements.



The utilization of the Key results from the Injury Surveillance System and Trauma Registry

- **Health Awareness Creation:** Increase public awareness about injury prevention and trauma care, focusing on the general population and trauma care centers.
- **Health Service Delivery:** Enhance the accessibility and efficiency of trauma care services, ensuring prompt and effective care for injury victims.
- **Quality Improvement:** Continuously improve the quality of care through data-driven analysis and the implementation of best practices in trauma care.
- **Behavior Change:** Encourage changes in public behavior related to injury prevention through targeted education and interventions.
- **Human Resource Development:** Develop and strengthen the capacity of healthcare providers, including training in trauma management and emergency response.
- **EMS System improvement:** Improve Emergency Medical Services (EMS) infrastructure to ensure swift and coordinated responses to trauma incidents.
- **Institutional Development:** Support the growth and capacity-building of institutions involved in trauma care, ensuring a more robust and responsive trauma care system.

Data Utilization at the Hospital Level

Data generated from the Injury Surveillance (IS) system are used to evaluate the quality of trauma care by analyzing treatment outcomes in relation to injury severity. For instance, the Probability of Survival (PS) is used as an indicator; a high PS should correspond to fewer deaths. Therefore, Ps is applied as a critical metric to assess care quality, especially in identifying preventable deaths, where patients with a high Ps might have been expected to survive but unfortunately died. Additionally, examining whether essential medical procedures were performed or omitted serves as another method to evaluate the quality of care in both EMS and referral systems.

Data Utilization at the Community Level

At the community level, the Injury Surveillance (IS) database serves as a tool to promote injury prevention from various perspectives. For example, the data can be utilized to create educational materials, such as leaflets highlighting the impact of dog bites on the community. Additionally, trends from traffic accidents in Khon Kaen Municipality are analyzed, and preventive measures are suggested based on these findings. This helps in promoting targeted community interventions aimed at reducing injury risks.

Data Utilization in Research Activity

The data from trauma registry is a big data tank for conducting many research which benefit the improvement of trauma care system in various aspects, including injury prevention, Pre-hospital care, and hospital based emergency care. The impact of research results could generate a new policy , guild line of patient care, and the primitive research for other advance research. Trauma center, Khon Kaen Regional hospital welcomes scholars in any institutions to use the data from our trauma registry to generate the valuable research.

No	Paper	Main Author	Journal or Academic in conference
1	Temporal distribution of motorcyclist injuries and risk of fatalities in relation to age, helmet use, and riding while intoxicated in Khon Kaen, Thailand	Shinji Nakahara Witaya Chadbunchachai Masao Ichikawa Nakorn Tipsuntornsak Susumu Wakai	Accident Analysis and Prevention 37 (2005) 833–842
2	The development of simple survival prediction models for blunt trauma victims treated at Asian emergency centers	Akio Kimura Shinji Nakahara Witaya Chadbunchachai	Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine 2012
3	Modification of the Trauma and Injury Severity Score (TRISS) Method Provides Better Survival Prediction in Asian Blunt Trauma Victims	Akio Kimura Witaya Chadbunchachai Shinji Nakahara	World Journal of Surgery (2012) 36:813–818 DOI 10.1007/s00268-012-1498-z
4	Impact of Helmet use on Trauma care outcome in Motorcycle Accident Patients of Khon Kaen Hospital	Tawatchai Impool Wittaya Chadbunchachai Varunchaporn Polkert	Trauma Registry in Khon Kaen Hospital
5	The Association between Duration to Operation and Mortality rate in Penetrating Trauma patients	Tawatchai Impool Pothipong Reungjui Supaporn Tansura	Trauma Registry in Khon Kaen Hospital
6	Survival Of Patients with Traumatic brain injury: Emergency Medical Service (EMS) and non-EMS transport	Varunchaporn Polker Apichat Kongsiang	National Institute for Emergency Medicine of Thailand
7	Development of an Emergency Medical Services System in Thailand: Roles of the universal health coverage and the national lead agency	Oratai Pochaisan Ratrawee Pattanarattanamolee Weerasak Pongphutta Witaya Chadbunchachai Shinji Nakahara	Emergency Medicine Australasia (2021) 33, 756–758
8	Survival of Patients with Traumatic Brain Injury in Khon Kaen Hospital During 2008-2018	Notechapun Polkert Tawatchai Impool Lertchai Charentanyarak	KKU Research Journal (Graduate Studies) Vol. 21 No. 3: July-September 2021
9	Effectiveness of automated red-light running control using closed-circuit television cameras in Thailand	Thaned Satiennam Wichuda Satiennam Pongrid Klungboonkrong Jetsada Kumphong Nattawat Rasri Piyanat Jantosut Rujchai Ung-arunyawee Watis Leelapatra Sakol Sittivichai Notechapun Polkert Natthira Daengpruan	Asia-Pacific Journal of Science and Technology: Volume: 28. Issue: 01. Article ID.: APST-28-01-14

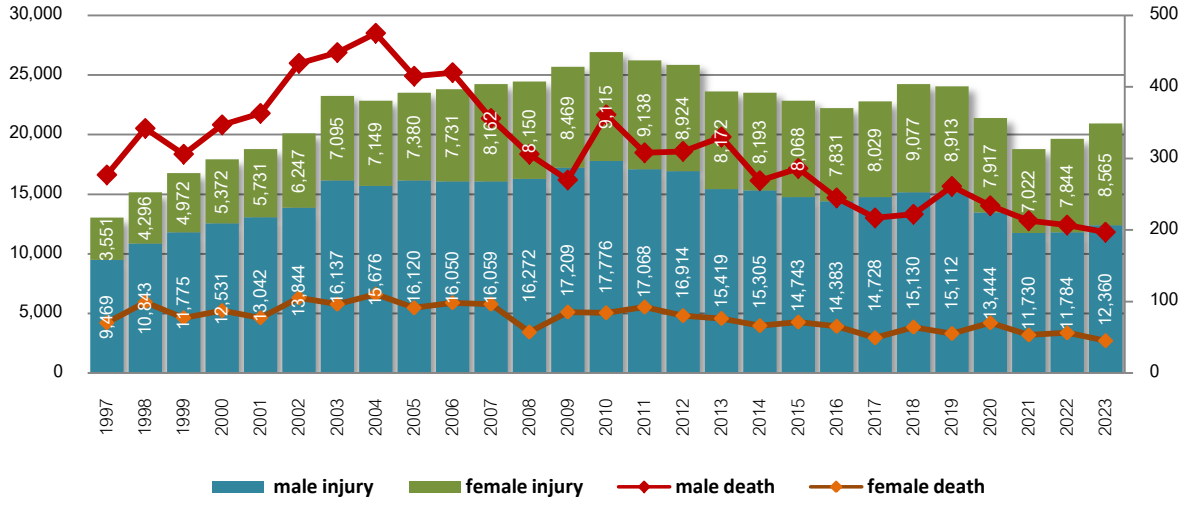
No	Paper	Main Author	Journal or Academic in conference
10	Factors Associated with Death from Motorcycle Accidents in Children and young Adults aged less than 20 years in Khon Kaen hospital, Khon Kaen Province, 2010-2019	Mongkhon Atsawaphoom Tawatchai Impool Lertchai Charerntanyarak	The Office of Disease Prevention and Control Region 7 Khon Kaen Journal
11	Setting Speed Limits of Urban Road Networks in Thailand.	Sasrikorn Kamphira Pongrid Klungboonkrong	The 28th National Convention on Civil Engineering May 24-26, 2023, Phuket, THAILAND
12	Factors Associated with Young and Teenage 24 Hours Mortality due to Traffic Accident	Dr.Nayawadee Kaweenuttayanon	Oral presentation at Provincial health-sector academic meeting 2023
13	Impact of Emergency Care in Khon Kaen Hospital, Thailand: An interrupted time series study	Papawadee Yapanan Professor Shinji Nakahara Professor Shinichi Tokuno	Thesis in Master program
14	Spatial Distribution and Cluster Analysis of Road Traffic Accidents in Khon Kaen Municipality, Thailand	Tippayanate, N. Impool, T Sujayanont, P Muttitanon, W Chemin, Y. H Som-ard, J	International Journal of Geoinformatics 2024
15	Yielding behavior of motorcycle riders at unsignalized T-intersections	Pitchakorn Tannarat Thaned Satiennam Wichuda Satiennam Tat Satiennam Eakkarin Surin-ud Natthira Daengpruan	The 29th National Convention on Civil Engineering Chiang Mai, THAILAND
16	Accuracy of Trauma Injury Severity Score (TRISS) in Khon Kaen Hospital	Jutitep Charoenkwan Tawatchai Impool	Trauma Registry in Khon Kaen Hospital
17	Temporal Analysis of Road Traffic Accidents at Major Intersections in Khon Kaen Province, Thailand: A Time Series Investigation from 2012 to 2021	Tippayanate, N. Impool, T Sujayanont, P Muttitanon, W Chemin, Y. H Som-ard, J	International Journal of Geo informatics 2024
18	Identification of Traffic Accident Hotspots, Incidence and Severe Injury Associated Factors by Using Geographic Information System and Trauma Registry,NaiMuang Sub district, Muang Khon Kaen District, Khon Kaen Province	Sekson Suwunnapang M.D. Tawatchai Impool M.D. Suthida Chancharas Natthira Daengpruan Suwit Suphawirotloet Manthana Mitchai	The Office of Disease Prevention and Control Region 8 UdonThani Journal
19	Multiple Logistic Regression Model for Assessing the Risk Factors of Traffic Accidents: Khon Kaen Model	Sujayanont, P Impool, T Muttitanon, W Chemin, Y. H Som-ard, J Tippayanate, N.	Digital Health and Informatics Innovations for Sustainable Health Care Systems

No	Paper	Main Author	Journal or Academic in conference
20	Road traffic safety for older adults: an emerging public health challenge in Thailand	Dr.Rattiya Banju-Ngam Masao Ichikawa Dr.Ratrawee Pattanarattanamolee Shinji Nakahara	Banju-Ngam R, et al. Inj Prev 2024;0:1-4. doi:10.1136/ ip-2024-045241
21	The effect of time during interhospital transfer on mortality rate in severe trauma patients	Pharanyu Jaroenwanit Warit Werawatakul Ploytip Jansiriyotin	Congress of The Royal College of Surgeons of Thailand

IV. Result
I. Demographic Data
I.I. Injuries and Deaths by Gender
Table 1 Number of Injuries and Deaths by Gender (1997-2023)

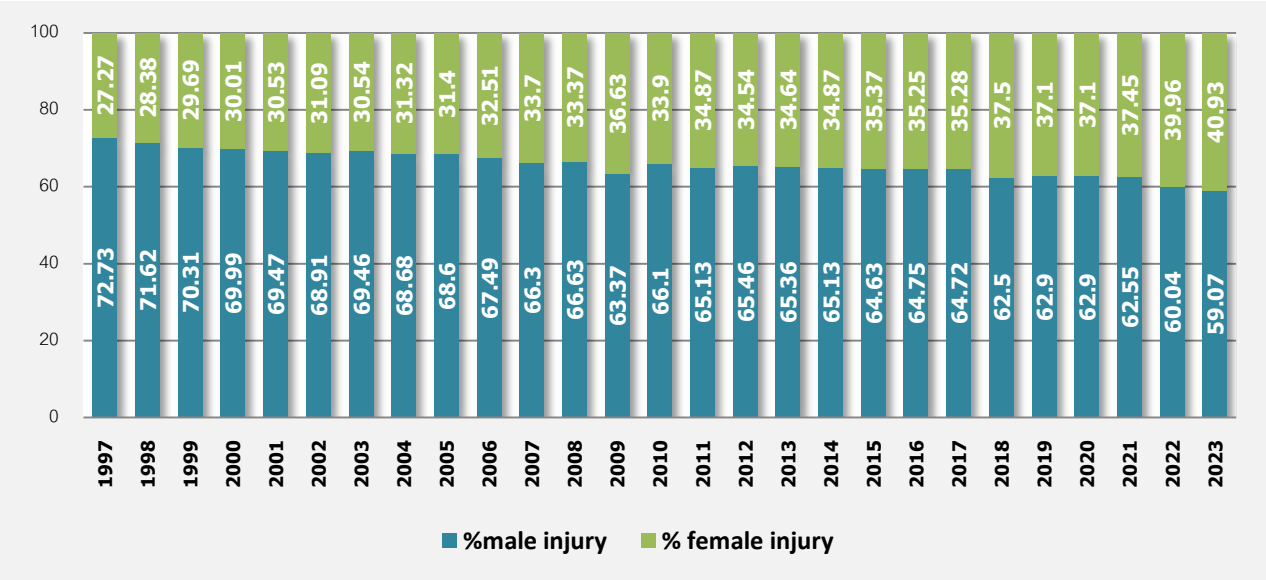
Year	injury			dead				% injury		% dead	
	male	female	total injury	male	female	total dead	% dead	male	female	male	female
1997	9,469	3,551	13,020	277	70	347	2.67	72.73	27.27	2.93	1.97
1998	10,843	4,296	15,139	342	99	441	2.91	71.62	28.38	3.15	2.3
1999	11,775	4,972	16,747	306	77	383	2.29	70.31	29.69	2.6	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	68.6	31.4	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	66.3	33.7	2.22	1.18
2008	16,272	8,150	24,422	306	57	363	1.49	66.63	33.37	1.88	0.7
2009	17,209	8,469	25,678	270	85	355	1.38	63.37	36.63	1.57	1
2010	17,776	9,115	26,891	361	84	445	1.65	66.1	33.9	2.03	0.92
2011	17,068	9,138	26,206	308	92	400	1.53	65.13	34.87	1.8	1.01
2012	16,914	8,924	25,838	310	80	390	1.51	65.46	34.54	1.83	0.9
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	1.4	64.75	35.25	1.7	0.83
2017	14,728	8,029	22,757	217	49	266	1.17	64.72	35.28	1.47	0.61
2018	15,130	9,077	24,207	222	64	286	1.18	62.5	37.5	1.47	0.71
2019	15,112	8,913	24,025	261	55	316	1.32	62.9	37.1	1.73	0.62
2020	13,444	7,917	21,361	234	70	304	1.42	62.9	37.1	1.74	0.88
2021	11,730	7,022	18,752	213	53	266	1.42	62.55	37.45	1.82	0.75
2022	11,784	7,844	19,628	207	56	263	1.34	60.04	39.96	1.76	0.71
2023	12,360	8,565	20,925	197	45	242	0.94	59.07	40.93	0.94	0.22

Figure 1 Number of injuries and deaths by gender (1997-2023)



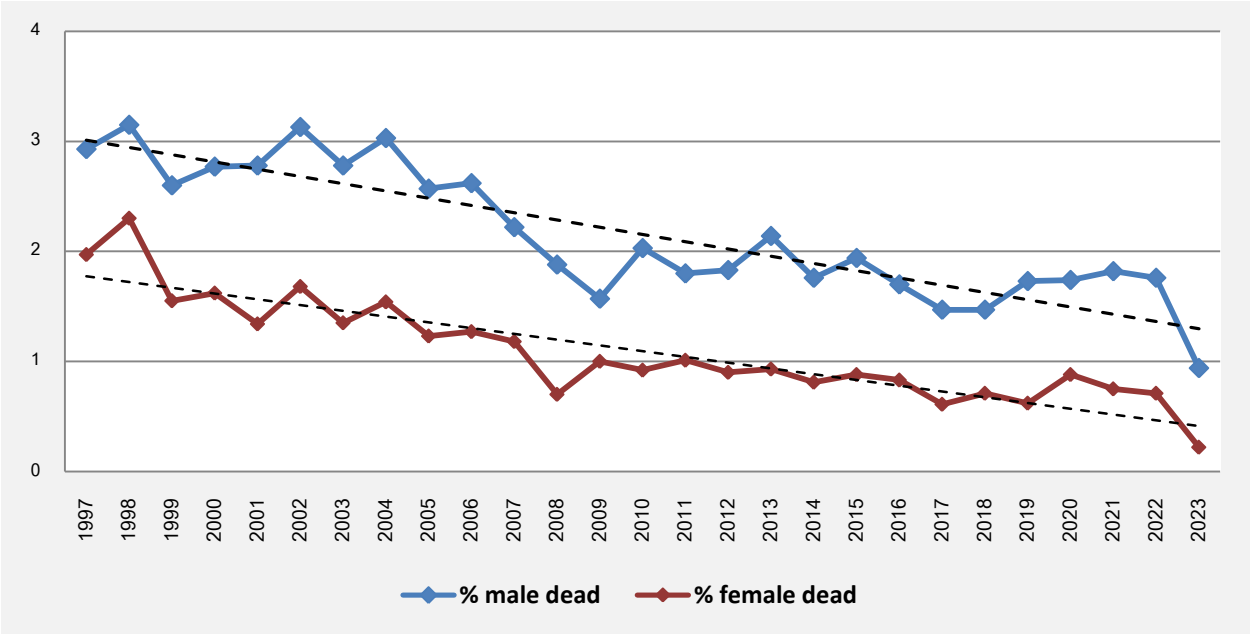
Injuries and deaths both in male and female were increasing from 1997 to 2010, since then the number of injury and deaths were quite similar in each year. but since 2019 were decreasing

Figure2 Proportion of injury by gender (1997-2023)



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

Figure 3 Mortality rate by gender (1997-2023)



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

1.2 Injuries and Deaths by age

Table 2 Number and percentage of injuries and deaths by age-group distribution (1997-2023)

Year	> 0-15				> 15-30				> 30-45				> 45-60				> 60			
	injuries	%	deaths	%	injuries	%	deaths	%	injuries	%	deaths	%	injuries	%	deaths	%	injuries	%	deaths	%
1997	2,676	21	35	11	5,849	46	156	47	2,807	22	79	24	1,001	8	33	10	444	3	26	8
1998	3,474	23	42	10	6,352	43	185	42	3,249	21	104	24	1,383	9	72	16	666	4	35	8
1999	3,979	24	38	10	6,933	41	145	38	3,539	21	107	28	1,496	9	57	15	755	5	36	9
2000	4,104	23	42	10	7,674	42	182	42	3,533	20	108	25	1,785	10	66	15	807	5	36	8
2001	4,301	23	42	10	7,592	40	175	39	4,074	22	117	27	1,909	10	68	15	897	5	38	9
2002	4,204	21	50	9	8,772	44	220	41	4,082	20	133	25	2,086	10	86	16	947	5	49	9
2003	1,243	16	56	10	3,393	45	228	42	1,551	20	123	23	975	13	83	15	487	6	54	10
2004	4,861	21	55	9	9,246	41	212	37	4,766	21	148	25	2,616	11	117	20	1,336	6	53	9
2005	4,961	21	39	8	9,400	40	194	39	5,003	21	118	23	2,712	12	88	17	1,424	6	67	13
2006	5,709	23	52	10	9,258	39	189	36	4,980	20	118	23	2,896	12	87	17	1,568	6	72	14
2007	5,135	21	31	7	9,164	38	143	32	5,098	21	115	25	3,044	13	91	20	1,780	7	71	16
2008	5,013	20.5	34	9.4	9,306	38.1	116	32	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	9,180	35	113	28.3	5,610	21.4	88	22	3,833	14.6	92	23	2,241	8.6	71	17.8
2012	5,043	19.5	28	7.2	9,050	35	129	33.1	5,593	21.6	105	26.9	3,894	15.1	82	21	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	13	3.9	8,122	34.6	77	23	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	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
2017	3,463	15.2	10	3.8	7,682	33.8	65	24.4	4,780	21	59	22.2	3,998	17.6	72	27.1	2,834	12.5	60	22.6
2018	4,003	16.5	19	6.6	7,630	31.5	53	18.5	5,039	20.8	65	22.7	4,440	18.3	73	25.5	3,095	12.8	76	26.6
2019	3,178	13.2	11	3.5	7,669	31.9	51	16.1	5,088	21.2	80	25.3	4,425	18.4	89	28.2	3,665	15.3	85	26.9
2020	3,019	14.2	10	3.3	6,744	31.6	59	19.4	4,558	21.4	60	19.8	3,993	18.7	84	27.7	3,045	14.3	91	30
2021	2,500	13.33	14	5.26	5,668	30.23	38	14.29	4,107	21.91	46	17.29	3,659	19.52	80	30.08	2,815	15.01	88	33.08
2022	2,577	13.13	14	5.32	6,395	32.58	50	19.01	4,041	20.59	35	13.31	3,493	17.80	82	31.18	2,886	14.70	81	30.80
2023	2,738	13.33	10	4.13	6,688	32.56	48	19.83	2,823	13.74	40	16.53	5,106	24.86	67	27.69	3,187	15.51	73	30.17

The injuries in age group between 15-30 were the most vulnerable. The deaths rate in age group between 15-30werethe most vulnerable in 2023

Table 3 Percentage of injuries and deaths by age-group distribution (1997-2023)

Injuries	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
>0-15	21	23	24	23	23	21	16	21	21	23	21	20.5	18.9	20.8	20.4	19.5	18.5	15	17.4	16.6	15.2	16.5	13.2	14.2	13.33	13.13	13.33
>15-30	46	43	41	42	40	44	45	41	40	39	38	38.1	38.2	36.7	35	35	33.7	34.6	33.7	34.1	33.8	31.5	31.9	31.6	30.23	32.58	32.56
>30-45	22	21	21	20	22	20	20	21	21	20	21	20.8	21.9	21.4	21.4	21.6	22.2	22.9	22	21.5	21	20.8	21.2	21.4	21.91	20.59	13.74
>45-60	8	9	9	10	10	10	13	11	12	12	13	12.9	13.4	13.5	14.6	15.1	15.8	16.6	16.4	16.9	17.6	18.3	18.4	18.7	19.52	17.8	24.86
>60	3	4	5	5	5	5	6	6	6	6	7	7.6	7.6	7.6	8.6	8.7	9.8	10.8	10.6	10.9	12.5	12.8	15.3	14.3	15.01	14.7	15.51
Death	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
>0-15	11	10	10	10	10	9	10	9	8	10	7	9.4	9.5	8.3	9	7.2	6.2	3.9	7.3	5.8	3.8	6.6	3.5	3.3	5.26	5.32	4.13
>15-30	47	42	38	42	39	41	42	37	39	36	32	32	37.5	29.4	28.3	33.1	29.6	23	20.7	26.5	24.4	18.5	16.1	19.4	14.3	19	19.8
>30-45	24	24	28	25	27	25	23	25	23	23	25	28.9	25.4	27.4	22	26.9	26.6	29.6	25.1	21.3	22.2	22.7	25.3	19.8	17.3	13.3	16.5
>45-60	10	16	15	15	15	16	15	20	17	17	20	16.3	17.7	20.9	23	21	21.9	25.1	25.4	25.2	27.1	25.5	28.2	27.7	30.1	31.2	27.7
>60	8	8	9	8	9	9	10	9	13	14	16	13.5	9.9	13.9	17.8	11.8	15.8	18.5	21.5	21.3	22.6	26.6	26.9	30	33.1	30.8	30.2

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

The victims whose age15-30 years old was indicated the most vulnerable group by the fatality rate in1997 to 2013but in 2014 age 30-45 years old were the most and tended to be decreased.

Figure 4 Percentage of injuries by age-group distribution (1997-2023)

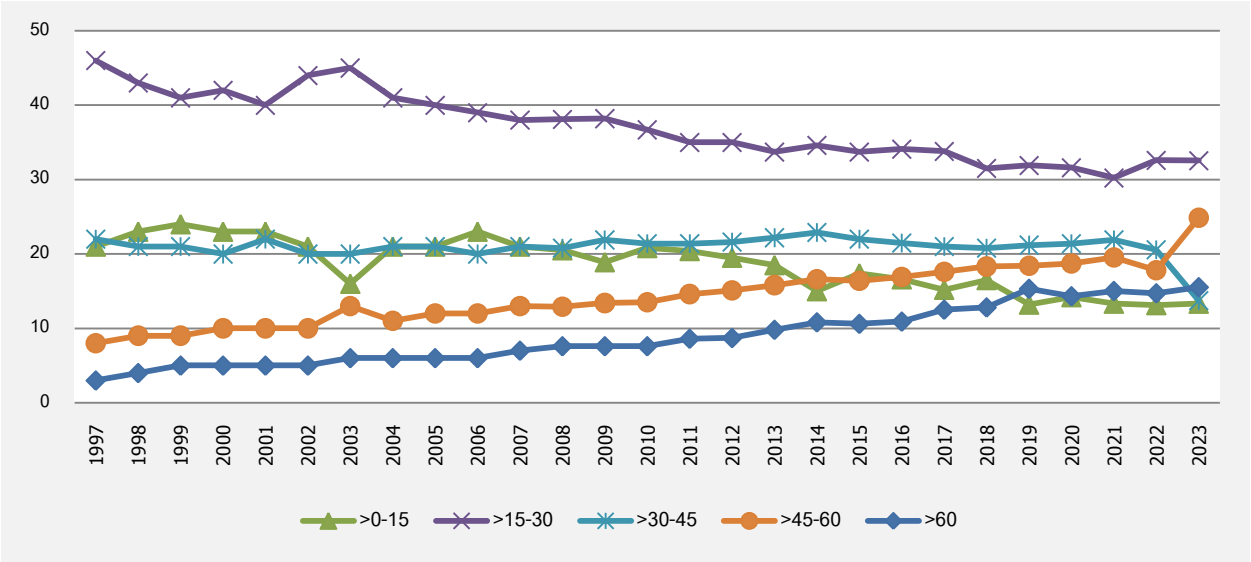


Figure 5 Percentage of deaths by age-group distribution (1997-2023)

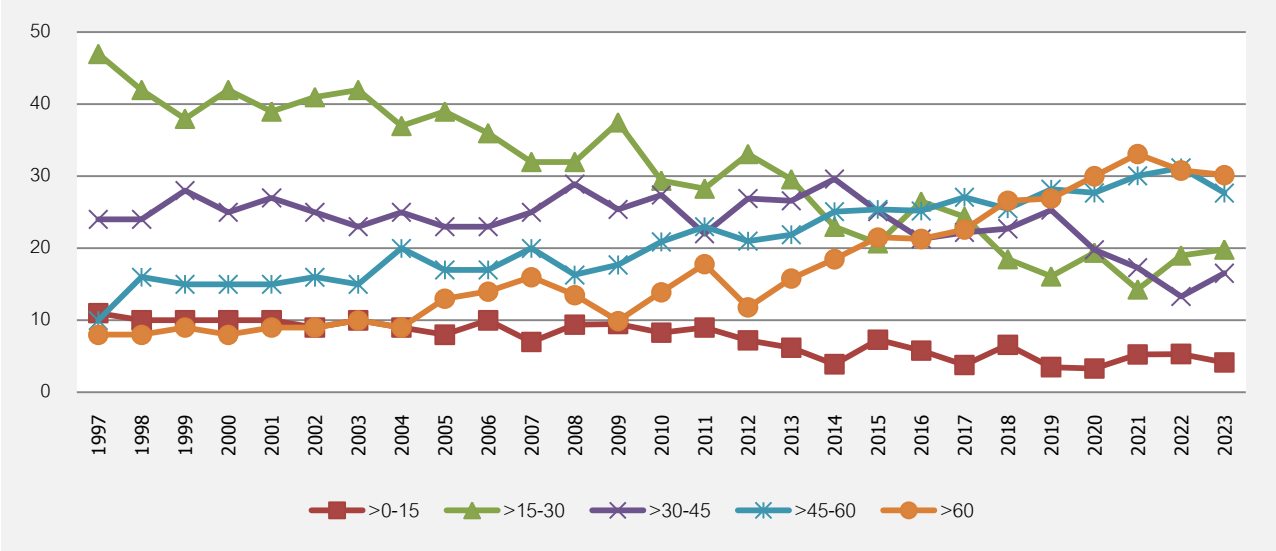
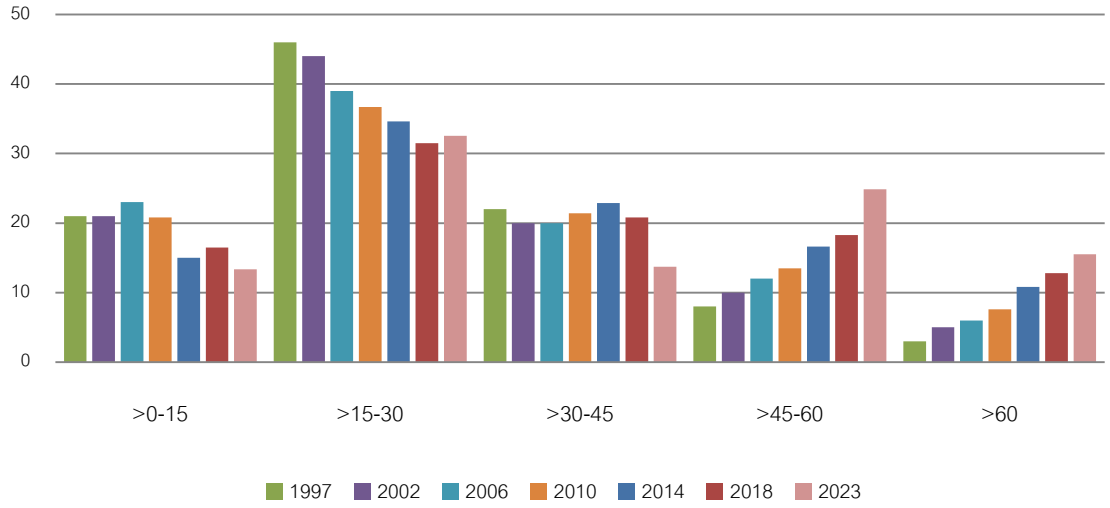
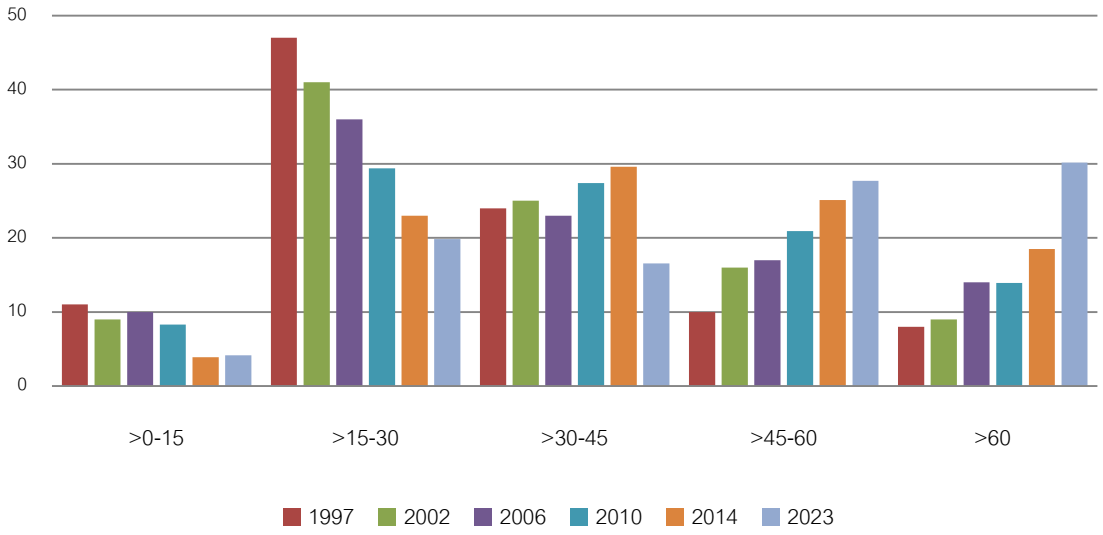


Figure 6 Injuries by age-group distribution every 5 years



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 5 years



The age group between15-30 years old were the most vulnerable group but tended to be decreased.

1.3 Injuries by occupations

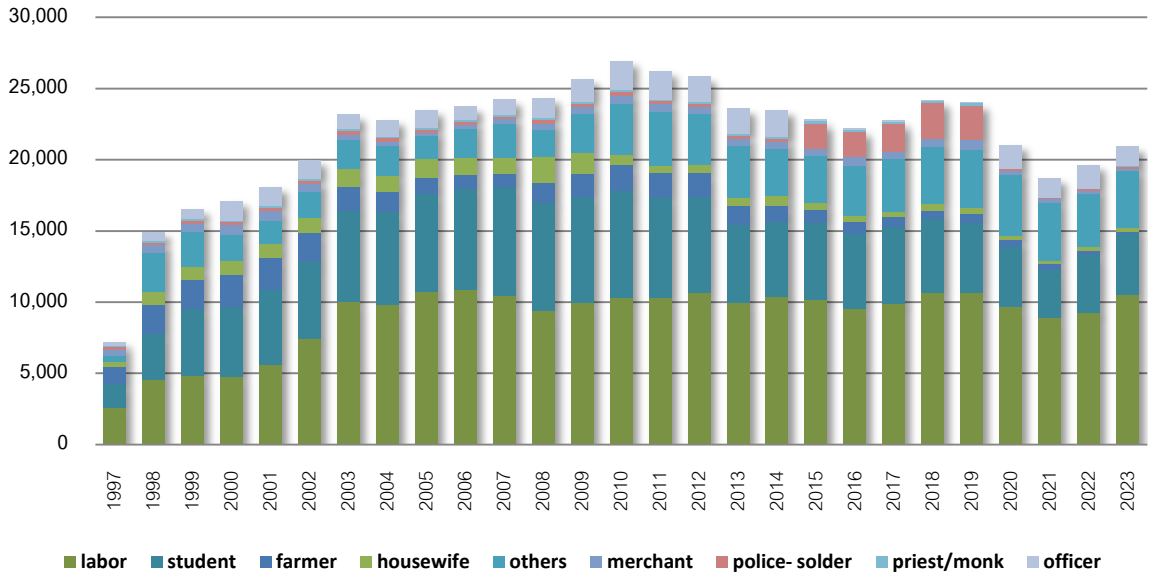
Table 4 Number of injuries by occupation (1997-2023)

Occupation	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
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	9,898	10,671	10,640	9,645	8,912	9,295	10,504
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	5,359	5,144	4,935	4,267	3,349	4,017	4,259
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	693	597	654	464	394	301	201
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	416	469	433	315	260	250	234
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	3,678	3,977	4,027	4,214	4,055	3,756	4,016
merchant	485	557	535	714	723	524	396	342	210	262	290	436	489	606	575	531	506	505	471	635	496	624	704	322	267	239	183
police-solder	149	197	224	193	237	248	293	256	193	251	184	216	216	224	198	200	201	182	1,804	1,770	1,962	2,530	2,422	109	95	75	83
priest/monk	69	98	121	112	121	104	86	91	100	99	124	169	118	127	100	117	118	104	182	167	147	153	162	29	27	58	62
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	108	42	48	1674	1368	1646	1369
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	22,757	24,207	24,025	21,361	18,754	19,637	20,911

Table 5 Percentage of injuries by occupation (1997-2023)

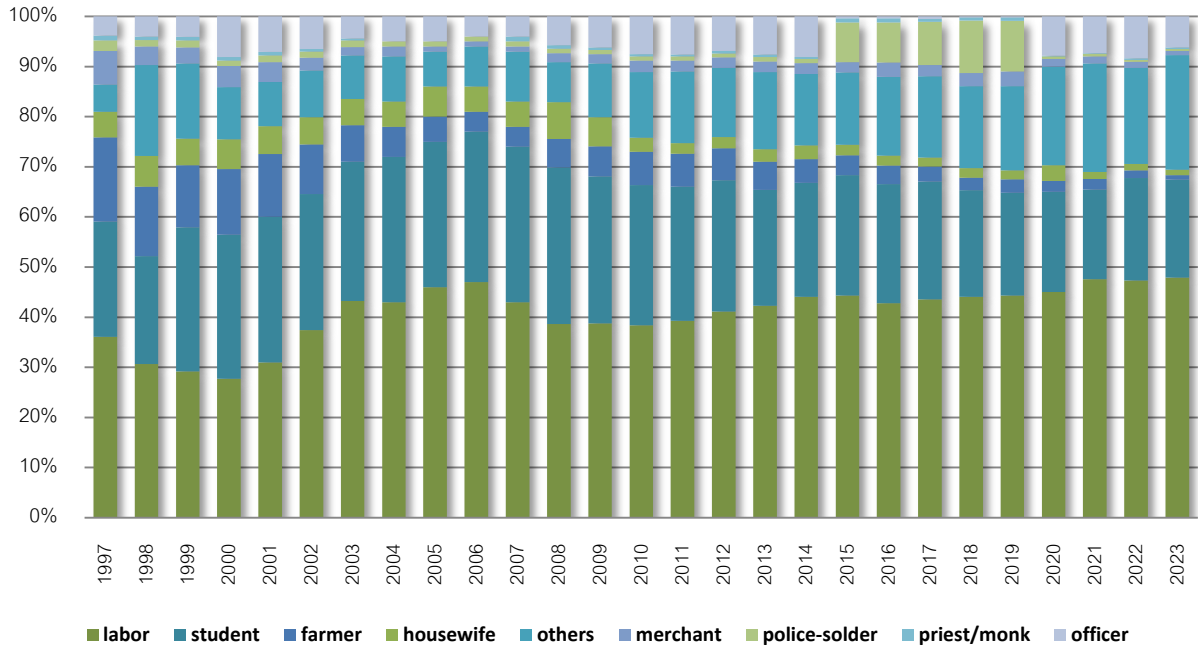
Occupation	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
labor	36.1	30.6	29.2	27.7	31	37.4	43.3	43	46	47	43	38.6	38.8	38.4	39.3	41.2	42.3	44.1	44.4	42.9	43.5	44.1	44.3	45.1	47.53	47.33	50.00
student	23	21.5	28.7	28.7	29.1	27.1	27.8	29	29	30	31	31.2	29.3	28	26.8	26.2	23.1	22.7	24	23.8	23.5	21.3	20.5	19.98	17.86	20.46	20.36
farmer	16.8	13.9	12.4	13.1	12.5	9.9	7.3	6	5	4	4	5.7	6	6.7	6.6	6.4	5.6	4.7	4	3.7	3	2.5	2.7	2.17	2.10	1.53	0.96
housewife	5.1	6.1	5.3	5.9	5.6	5.4	5.2	5	6	5	5	7.3	5.8	2.8	2.1	2.2	2.5	2.8	2.1	2	1.8	1.9	1.8	3.11	1.39	1.27	1.11
others	5.4	18.1	15	10.4	8.8	9.3	8.7	9	7	8	10	8	10.7	13.1	14.3	13.8	15.4	14.2	14.4	15.7	16.2	16.4	16.8	19.73	21.62	19.13	23.89
merchant	6.7	3.7	3.2	4.2	4	2.6	1.7	2	1	1	1	1.8	1.9	2.3	2.2	2.1	2.1	2.2	2.1	2.9	2.2	2.6	2.9	1.51	1.42	1.22	0.87
police-solder	2.1	1.3	1.4	1.1	1.3	1.2	1.3	1	1	1	1	0.9	0.8	0.8	0.8	0.8	0.9	0.8	7.9	8	8.6	10.5	10.1	0.51	0.51	0.38	0.39
priest/monk	1	0.7	0.7	0.7	0.7	0.5	0.4	0	0	0	1	0.7	0.5	0.5	0.4	0.5	0.5	0.4	0.8	0.8	0.6	0.6	0.7	0.14	0.14	0.30	0.29
officer	3.8	4	4.1	8.1	7.1	6.5	4.4	5	5	4	4	5.7	6.2	7.5	7.6	6.9	7.6	8.1	0.4	0.4	0.5	0.2	0.2	7.84	7.30	8.38	6.48

Figure 8 Number of injuries by occupation (1997-2023)



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

Figure 9 Percentage of injuries by occupation (1997-2023)



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

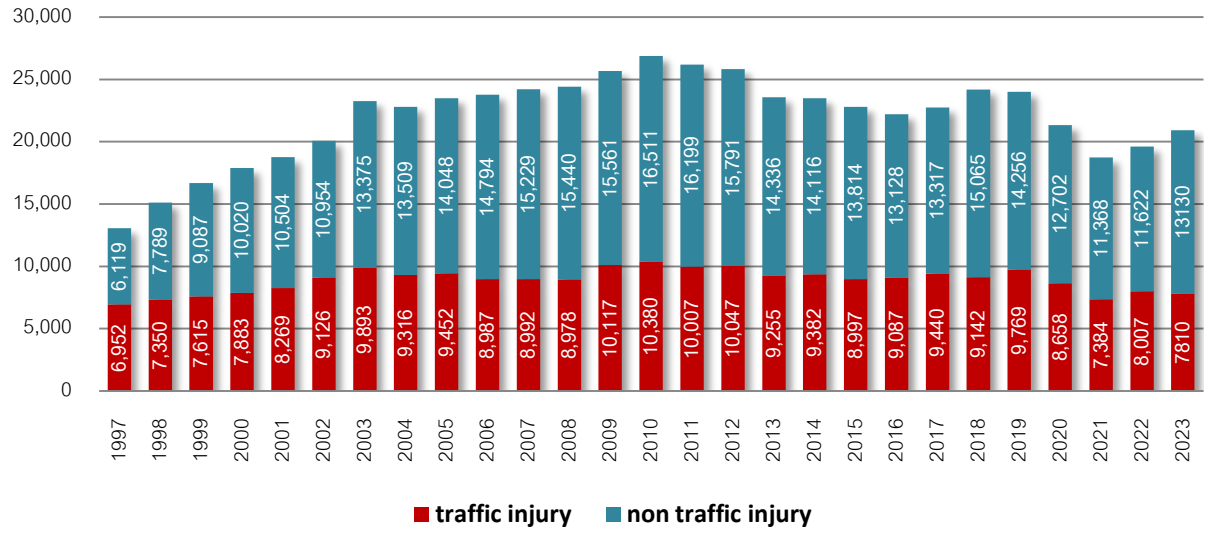
1.4 Cause of Injuries

Table 6 Number of injuries by causes (1997-2023)

year	traffic injury	% traffic injury	non traffic injury	% non traffic injury	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	39.4	15,561	60.6	25,678
2010	10,380	38.6	16,511	61.4	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	40.9	13,128	59.1	22,215
2017	9,440	41.48	13,317	58.52	22,757
2018	9,142	37.77	15,065	62.23	24,207
2019	9,769	40.66	14,256	59.34	24,025
2020	8,658	40.6	12,702	59.5	21,361
2021	7,384	39.37	11,368	60.62	18,754
2022	8,007	40.79	11,622	59.21	19,628
2023	7,810	62.70	13,130	37.29	20,940

The number of non-traffic injuries in 1997- 2018 were increasing and more than traffic injury since1998. but since 2019 tended to be decreased.

Figure 10 Number of injuries by cause (1997-2023)



The number of non-traffic injuries more than traffic injury since 1998.

1.4.1. Deaths by cause

Table 7 Number of deaths by cause and location (1997-2023)

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
2017	0	47	138	185	0	6	75	81
2018	0	44	144	188	0	8	90	98
2019	0	45	166	211	0	18	87	105
2020	2	53	144	199	1	14	90	105
2021	0	39	117	156	0	11	99	110
2022	0	34	134	168	2	17	75	94
2023	0	43	94	138	3	22	79	104

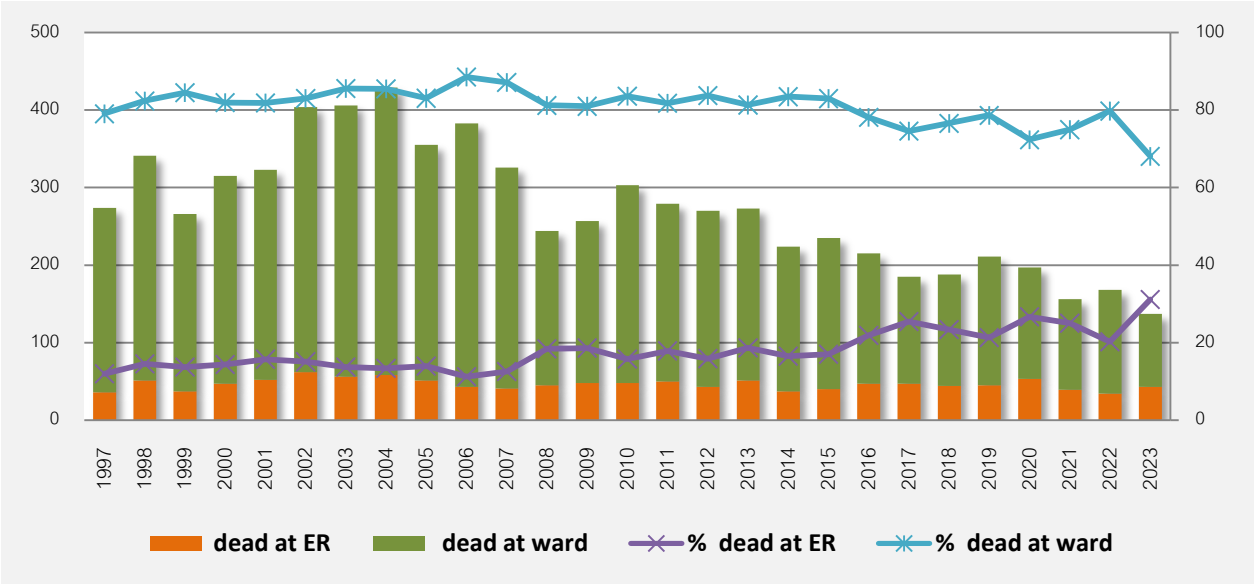
When concerning the type of death, there were classified into 3 places consisted of 1: Dead Before Arrival(DBA), 2: Death at Emergency Room and 3: Death at ward. Even though the number of death of traffic cause was higher than non traffic cause.

Table 8 Percentage of deaths by causes and location (1997-2023)

Year	Traffic cause			Non traffic cause		
	%DBA	% at ER	%at ward	%DBA	%at ER	%at ward
1997	8.97	11.96	79.07	20	8.89	71.11
1998	3.13	14.49	82.39	2.12	4.76	93.12
1999	1.85	13.65	84.5	0.72	10.79	88.49
2000	3.67	14.37	81.96	5.61	6.54	87.85
2001	2.42	15.71	81.87	5.5	13.76	80.73
2002	1.94	15.05	83.01	2.38	14.29	83.33
2003	0.73	13.69	85.57	1.48	11.85	86.67
2004	1.15	13.36	85.48	3.31	5.96	90.73
2005	3.01	13.93	83.06	2.14	11.43	86.43
2006	0.26	11.2	88.54	2.24	9.7	88.06
2007	0.31	12.54	87.16	3.2	4.8	92
2008	0.41	18.37	81.22	0	12.04	97.22
2009	0.39	18.6	81.01	5.05	12.12	82.83
2010	0.66	15.74	83.61	2.14	12.86	85
2011	0.36	17.86	81.79	3.33	6.67	90
2012	0.37	15.87	83.76	0	14.29	85.71
2013	0	18.68	81.32	0.75	9.02	90.23
2014	0	16.52	83.48	0	9.91	90.09
2015	0	17.02	82.98	0	16.39	83.61
2016	0	21.86	78.14	0	11.7	88.3
2017	0	25.41	74.59	0	7.41	92.59
2018	0	23.4	76.6	0	8.16	91.84
2019	0	21.33	78.67	0	17.14	82.86
2020	1	26.7	72.4	1	13.4	85.8
2021	0	25	75	0	10	90
2022	0	20.24	79.76	2.13	18	79.79
2023	0	31.15	68.11	2.12	21.15	75.96

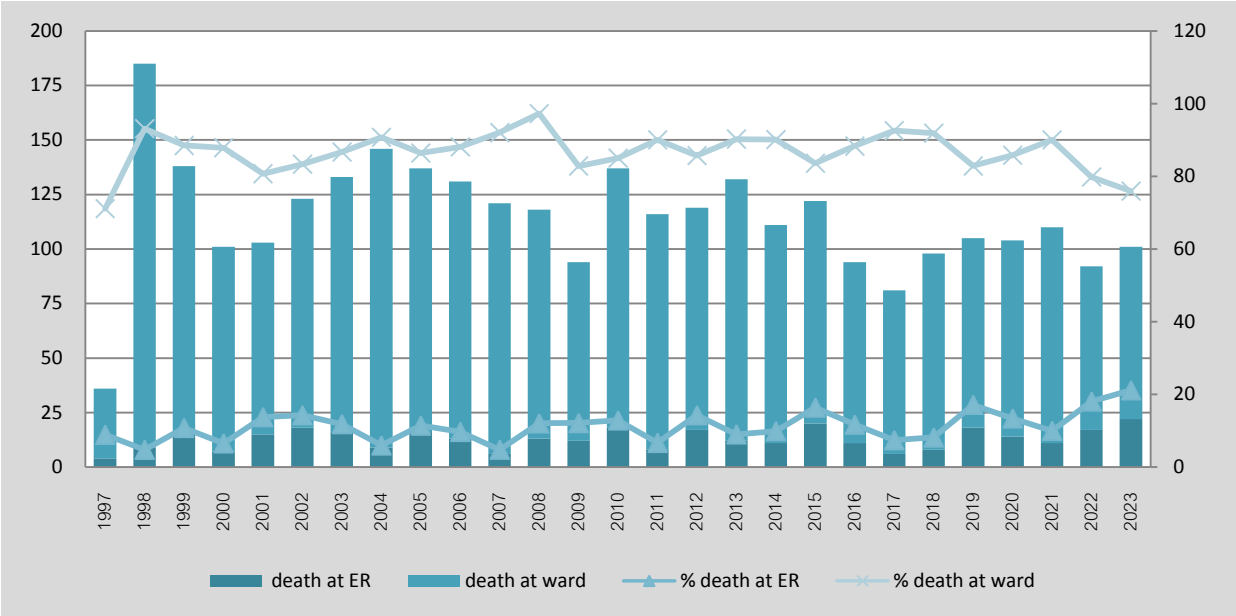
In both causes of death, the death at ward was among the place of death (72-88% by traffic cause and 71-97% by non traffic cause)

Figure 11 Number and Percentage of deaths by traffic cause (1997-2023)



The percentage of traffic fatality at ward was highest (88.54%) and tended to be decreased since 2007. but 2020 was increasing.

Figure 12 Number and percentage of deaths by non traffic cause (1997-2023)

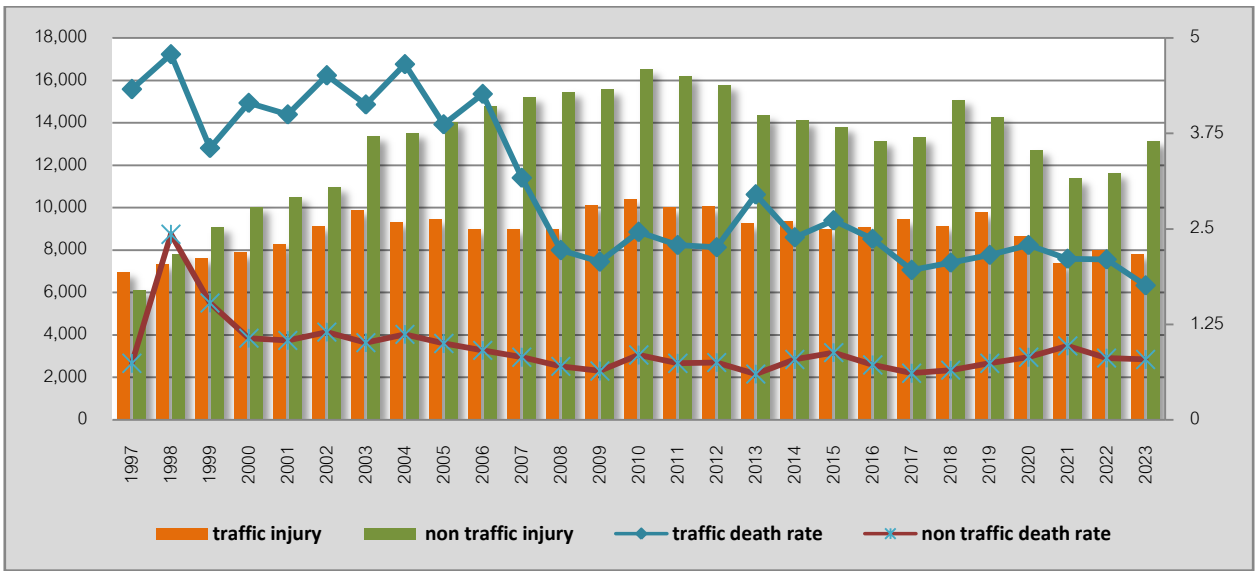


In non-traffic injury group, the percentage of the deaths at ward was highest (70-97%) when comparing with the death at ER and DBA.

Table 9 Number and death rate by cause (1997-2023)

Years	traffic			non traffic		
	injury	death	death rate	injury	death	death 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	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
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	0.7
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	0.6
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
2017	9,440	185	1.96	13,317	81	0.61
2018	9,142	188	2.06	15,065	98	0.65
2019	9,769	211	2.16	14,256	105	0.74
2020	8,658	199	2.29	12,702	105	0.82
2021	7,384	156	2.11	11,368	110	0.97
2022	8,007	168	2.10	11,622	94	0.81
2023	7,810	138	1.76	13,130	104	0.79

Figure 13 Number and death rate by cause (1997-2023)



The death rate of traffic injuries more than non-traffic injuries and were decreasing.

1.4.2 Injuries by various causes

Table 10 Number of injuries by various causes (1997-2023)

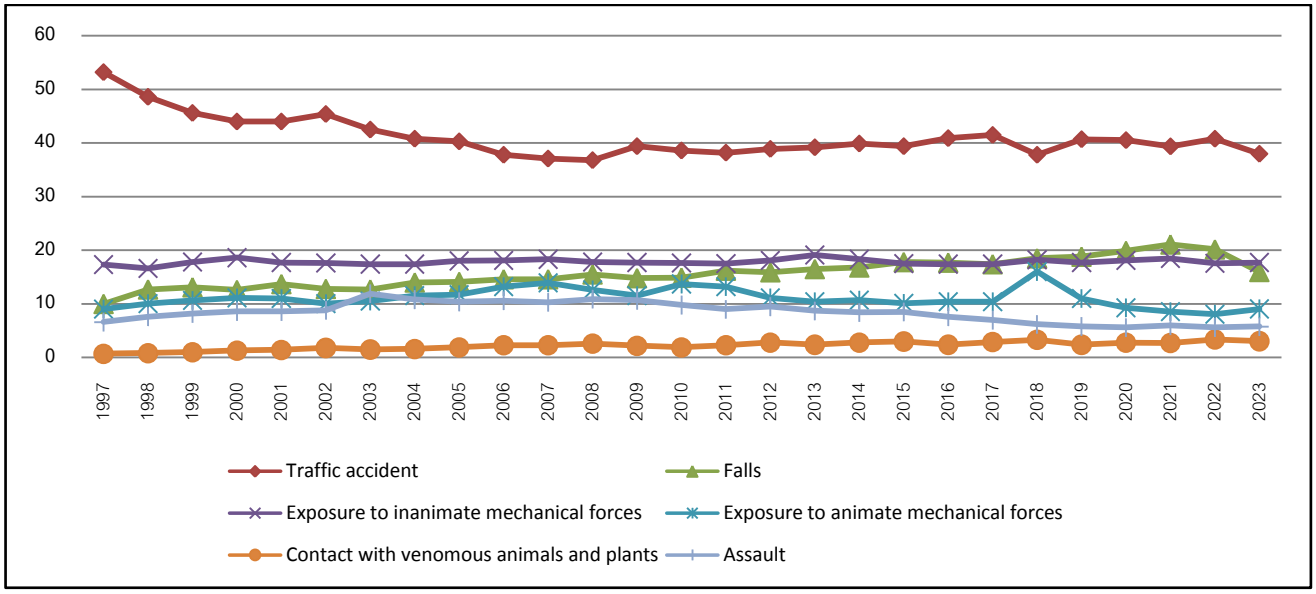
Causes of injuries	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Traffic accident	6,952	7,350	7,615	7,883	8,269	9,126	9,893	9,316	9,452	8,987	8,992	8,978	10,117	10,380	10,007	10,047	9,255	9,382	8,997	9,087	9,440	9,142	9,769	8,658	7,384	8,007	7,828
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	3,968	4,223	4,526	4,247	3,953	3,957	3,341
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	3,968	4,147	4,252	3,867	3,457	3,444	3,705
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	2,366	3,645	2,635	1,972	1,598	1,581	1,890
Accidental drowning and submersion	5	25	39	38	40	40	28	29	41	34	31	32	33	30	32	26	17	23	13	19	21	26	28	11	26	15	22
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	0	0	0	1	0	2	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	75	60	71	70	58	52	74
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	39	43	38	44	25	31	36
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	110	129	121	117	83	86	97
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	670	754	571	597	509	662	640
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	4	0	4	2	3	3	4
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	51	57	61	64	37	32	57
Overexertion, travel	1	13	10	72	76	90	87	118	131	152	161	177	149	123	128	155	156	134	172	159	150	213	226	174	125	153	184
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	0	1	0	0	0	7	16
Intentional self harm	59	236	273	334	262	298	374	390	363	325	366	392	350	406	381	344	330	244	288	254	257	274	307	330	360	428	436
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	1,586	1,414	1,394	1,198	1,122	1,105	1,203
Event of undetermined intent	42	31	33	6	11	5	9	7	19	14	9	9	16	60	40	60	32	44	79	59	50	42	22	31	34	50	48
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	0	0	0	0	0	0	0
Unknown	202	88	7	7	7	16	31	42	5	20	20	43	28	10	3	2	0	0	2	2	2	37	0	0	0	0	0
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	22,757	24,207	24,025	21,361	18,754	19,628	20,938

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

Table 11 Percentage of injuries by various causes (1997-2023)

Causes of Injury rate	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Traffic accident	53.2	48.6	45.6	44	44	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	41.5	37.8	40.7	40.5	39.4	40.8	37.4
Falls	10	12.7	13.1	12.6	13.7	12.8	12.7	14	14.1	14.6	14.6	15.5	14.8	14.9	16.2	15.9	16.5	16.8	17.8	17.7	17.4	18.5	18.8	19.9	21.0	20.1	15.7
Exposure to inanimate mechanical forces	17.3	16.6	17.8	18.6	17.7	17.6	17.4	17.4	18	18.1	18.3	17.8	17.7	17.6	17.5	18.1	19.1	18.3	17.5	17.4	17.4	18.2	17.7	18.1	18.4	17.5	17.7
Exposure to animate mechanical forces	9	10	10.6	11.1	11	10	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	10.4	16	11	9.2	8.52	8.05	9.03
Accidental drowning and submersion	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	0.1	0.1	0.1	0.05	0.14	0.08	0.11
Others accidental threats to breathing	0	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.01	0.00
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	0.3	0.3	0.3	0.32	0.31	0.26	0.35
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	0.2	0.2	0.2	0.2	0.13	0.16	0.17
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	0.5	0.6	0.5	0.54	0.44	0.44	0.46
Contact with venomous animals and plants	0.7	0.8	1	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	2.4	2.9	3.3	2.4	2.79	2.71	3.37	3.06
Exposure to forces of nature	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	0.02	0.02	0.02
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	0.2	0.3	0.3	0.29	0.20	0.16	0.27
Overexertion, travel	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	0.7	0.9	0.9	0.81	0.67	0.78	0.88
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	0.00	0.04	0.08
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	1.3	1.1	1.1	1.2	1.3	1.54	1.92	2.18	2.08
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	9.5	8.7	8.4	8.5	7.6	7	6.2	5.8	5.6	5.98	5.63	5.75
Event of undetermined intent	0.3	0.2	0.2	0	0.1	0	0	0	0.1	0.1	0	0	0.1	0.2	0.2	0.2	0.1	0.2	0.3	0.3	0.2	0.2	0.1	0.14	0.18	0.25	0.23
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	0.00	0.00	0.00
Unknown	1.5	0.6	0	0	0	0.1	0.1	0.2	0	0.1	0.1	0.2	0.1	0	0	0	0	0	0	0	0	0.2	0	0	0.00	0.00	0.00

Figure 14 Percentage of injuries by various causes (1997-2023)



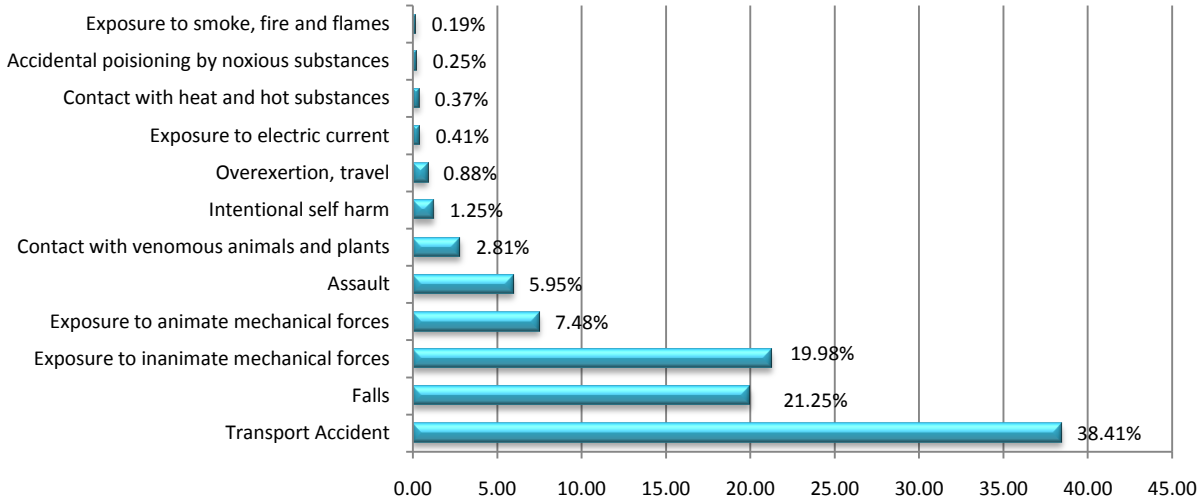
It was shown that the percentage of traffic injury was highest (>40%), fall was the second ; inanimate injury was the third, animate injury was the fourth, and injury by assault was the fifth.

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 The Number of male injured patients by various causes (2008-2023)

Causes of Injuries	male injury													
	2008	2009	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Transport Accident	6,109	6,851	6,689	6,140	6,203	5,857	6,016	6,338	5,924	6,108	5,614	4,734	4,953	4,748
Falls	2,297	2,394	2,475	2,262	2,319	2,355	2,297	2,302	2,351	2,544	2,410	2,241	2,093	2,470
Exposure to inanimate mechanical forces	3,221	3,373	3,466	3,428	3,232	2,981	2,923	2,907	3,045	3,081	2,853	2,538	2,317	2,626
Exposure to animate mechanical forces	1,704	1,640	1,507	1,258	1,338	1,259	1,202	1,257	1,911	1,343	1,029	768	789	925
Accidental drowning and submersion	26	25	17	13	17	11	12	12	18	20	10	18	12	15
Others accidental threats to breathing	0	0	0	0	0	0	1	0	0	0	0	0	1	0
Exposure to electric current	50	58	71	98	51	71	82	64	48	57	53	53	41	57
Exposure to smoke, fire and flames	21	24	38	31	24	24	22	32	30	26	29	19	23	24
Contact with heat and hot substances	68	64	69	59	49	55	47	66	67	65	62	42	40	46
Contact with venomous animals and plants	346	303	382	316	345	341	274	369	416	310	313	293	376	347
Exposure to forces of nature	2	5	2	3	0	2	0	4	0	1	2	3	3	3
Accidental poisoning by noxious substances	35	58	57	38	42	27	46	27	36	37	38	22	16	31
Overexertion, travel	126	114	102	103	91	123	108	104	143	142	121	91	88	109
Accidental exposure to other and unspecified factors	0	0	0	0	0	0	0	0	1	0	0	0	3	11
Intentional self harm	190	176	175	183	136	172	142	137	149	173	176	172	127	154
Assault	2,026	2,084	1,813	1,458	1,418	1,390	1,162	1,064	928	918	716	722	675	735
Event of undetermined intent	7	15	50	29	38	75	48	43	37	41	28	30	36	29
Legal intervention and operations of war	0	0	1	0	2	0	0	0	0	0	2	0	0	0
Unknown	3	22	0	0	0	0	1	1	26	0	2	0	0	0
Total	16,231	17,206	16,914	15,419	15,305	14,743	14,383	14,727	15,130	14,866	13,444	11,730	11,784	12,360

Figure 15 Percentage of male injured patients by various causes in 2023

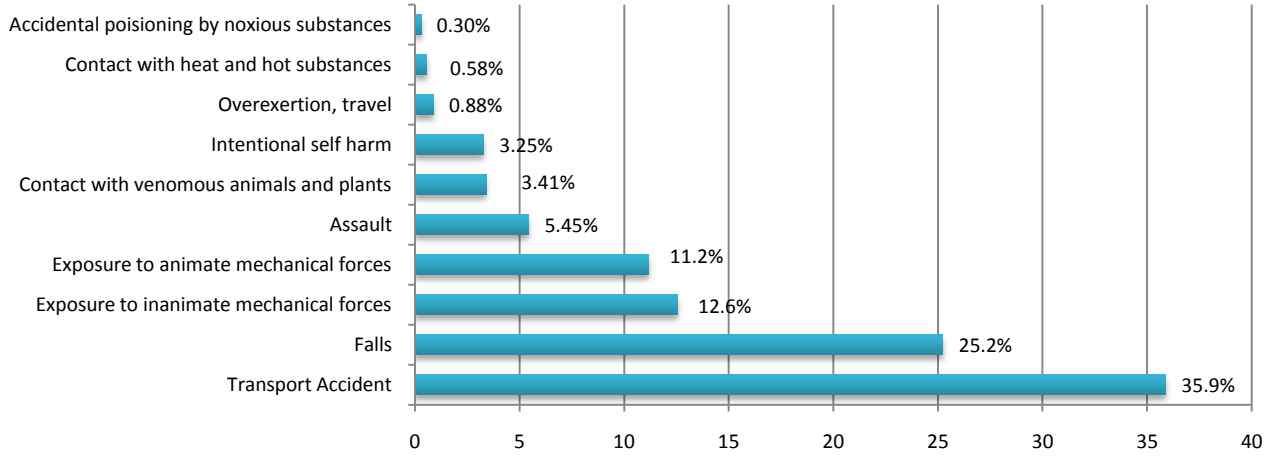


In 2023 It was shown that in male group the percentage of traffic injury was highest (39%), inanimate injury was the second (21%), and fall was the third (20%).

Table 13 The Number of female injured patients by various causes (2008-2023)

Causes of Injuries	female injury													
	2008	2009	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Transport Accident	2,867	3,267	3,358	3,115	3,179	3,140	3,071	3,103	3,218	3,342	3,044	2,650	3,048	3,074
Falls	1,479	1,418	1,632	1,631	1,633	1,703	1,635	1,665	1,872	1,969	1,837	1,712	1,859	2,162
Exposure to inanimate mechanical forces	1,122	1,172	1,208	1,074	1,077	1,010	950	1,061	1,102	1,158	1,014	919	951	1,075
Exposure to animate mechanical forces	1,368	1,325	1,365	1,198	1,168	1,052	1,115	1,109	1,734	1,291	943	830	791	965
Accidental drowning and submersion	6	8	9	4	6	2	7	9	8	8	1	8	1	4
Others accidental threats to breathing	0	0	0	0	0	0	0	0	0	0	1	0	1	0
Exposure to electric current	15	9	23	18	18	19	8	11	12	15	17	5	12	17
Exposure to smoke, fire and flames	19	6	7	17	9	7	11	7	13	11	15	6	8	12
Contact with heat and hot substances	69	64	65	52	49	53	42	44	62	56	55	41	46	50
Contact with venomous animals and plants	289	273	354	247	324	335	264	301	336	259	284	216	286	292
Exposure to forces of nature	1	1	0	0	0	3	0	0	0	2	0	0	0	1
Accidental poisoning by noxious substances	22	57	39	27	23	25	31	24	21	23	26	15	16	26
Overexertion, travel	51	35	53	53	43	49	51	46	70	82	53	34	65	75
Accidental exposure to other and unspecified factors	0	0	0	0	0	1	0	0	0	0	0	0	4	2
Intentional self harm	202	174	169	147	108	116	112	120	125	133	138	188	301	282
Assault	625	657	630	586	550	547	522	522	486	470	514	400	430	467
Event of undetermined intent	2	1	10	3	6	4	11	7	5	5	3	3	11	19
Legal intervention and operations of war	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	9	5	2	0	0	2	1	1	11	1	0	0	0	0
Total	8,146	8,472	8,924	8,172	8,193	8,068	7,831	8,030	9,075	8,825	7,917	7,022	7,844	8,565

Figure 16 Percentage of female injured patients by various causes in 2023



In 2023 It was shown that in female group the percentage of traffic injury was highest (36%), fall was the second (26%), and inanimate injury was the third (13%).

1.4.3 Deaths by various causes

Table 14 Number of deaths by various causes (1997-2023)

Causes of Deaths	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Traffic accident	301	352	271	327	331	412	409	434	366	384	327	245	258	305	280	271	273	224	235	215	185	188	211	195	156	168	138
Falls	20	28	32	30	29	36	39	56	36	48	59	45	40	55	46	32	60	46	40	36	27	42	60	57	62	43	56
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	3	4	4	6	1	7	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	0	1	1	1	0	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	5	6	5	2	10	2	4
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	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	4	2	3	2	4	5	5
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	0	3	1	3	1	2	3
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	0	1	0	1	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	0	0	0	0	1	0	2
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	0	0	0	0	1	0	0
Accidental poisoning by noxious substances	0	2	0	1	1	0	1	7	0	0	1	0	0	0	0	2	1	1	0	2	0	1	0	1	0	0	1
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
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	0	0	0	0	0	0	1
Intentional self harm	0	10	16	16	14	14	14	13	14	7	14	6	10	19	18	18	18	13	22	12	24	16	19	22	12	15	15
Assault	7	19	27	18	19	23	43	33	31	27	21	33	26	32	16	42	23	31	30	14	15	11	6	9	11	12	4
Event of undetermined intent	0	3	0	0	1	0	2	0	2	1	2	0	0	8	8	7	6	7	10	10	3	8	6	4	7	7	7
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
Unknown	3	2	2	2	1	5	1	3	13	11	3	6	4	1	1	1	0	0	0	0	0	3	0	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**	**266**	**286**	**316**	**304**	**266**	**262**	**242**

Table 15 Percentage of deaths by various causes (1997-2023)

Causes of deaths rate	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
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	69.5	67.2	66.9	65.8	69.4	69.5	65.7	66.8	64.14	58.65	63.88	57.02
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	10.2	14.7	19	18.75	23.31	16.35	23.14
Exposure to inanimate mechanical forces	2.3	1.6	1.3	2.5	3	2.4	1.8	1.5	1.2	1.5	1.8	2.5	0.8	2	3.3	0.8	2	1.2	1.4	1.6	1.1	1.4	1.3	1.97	0.38	2.66	2.07
Exposure to animate mechanical forces	1.4	0.2	0	0.5	0	0	0.4	0.2	0.2	1	0.7	0	0	0.4	0.8	0.3	0.7	0.3	0.3	0.3	0	0.3	0.3	0.33	0.00	0.38	0.41
Accidental drowning and submersion	0	2	3.4	3.2	3.4	3.9	2.4	2.4	3.4	2.7	1.1	2.2	2	1.6	2.3	1	0.2	0.6	0.8	1	1.9	2.1	1.6	0.66	3.76	0.76	1.65
Others accidental threats to breathing	0	0	0.8	0.2	0.2	0	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00	0.00
Exposure to electric current	0.9	0.5	0.8	1.6	2	1.5	0.9	1.4	1.6	1	0.4	1.4	1.1	1.1	0.8	1.8	2.5	0.9	1.7	1.9	1.5	0.7	0.9	0.66	1.50	1.90	2.07
Exposure to smoke, fire and flames	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	0	1	0.3	0.99	0.38	0.76	1.24
Contact with heat and hot substances	0	0	0.3	0	0	0	0.2	0	0	0	0.2	0	0	0	0	0.3	0	0	0	0	0	0.3	0	0.33	0.00	0.00	0.00
Contact with venomous animals and plants	0.3	0.7	1.3	0.5	0.2	0	0.2	0.5	0.6	0.6	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0.38	0.00	0.83
Exposure to forces of nature	0	0	0.8	0	0	0	0	0.2	0.6	0.2	0.2	0.3	1.1	0.2	0.5	0	0	0	0.3	0	0	0	0	0	0.38	0.00	0.00
Accidental poisoning by noxious substances	0	0.5	0	0.2	0.2	0	0.2	1.2	0	0	0.2	0	0	0	0	0.5	0.2	0.3	0	0.6	0	0.3	0	0.33	0.00	0.00	0.41
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	0.00	0.00	0.00
Accidental exposure to other and unspecified factors	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	0.00	0.00	0.41
Intentional self harm	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	9	5.6	6	7.24	4.51	5.70	6.20
Assault	2	4.3	7	4.1	4.3	4.3	7.9	5.6	6.2	5.2	4.7	9.1	7.3	7.2	4	10.8	5.7	9.3	8.4	4.5	5.6	3.8	1.9	2.96	4.14	4.56	1.65
Event of undetermined intent	0	0.7	0	0	0.2	0	0.4	0	0.4	0.2	0.4	0	0	1.8	2	1.8	1.5	2.1	2.8	3.2	1.1	2.8	1.9	1.32	2.63	2.66	2.89
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	0.00	0.00	0.00
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	1	0	0	0.00	0.00	0.00
total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**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 (57.02% of all fatality), fall injury was the second (23.14%), and intentional self-harm was the third biggest cause of fatalities.

Figure 16 Death rate by various causes (1997-2023)

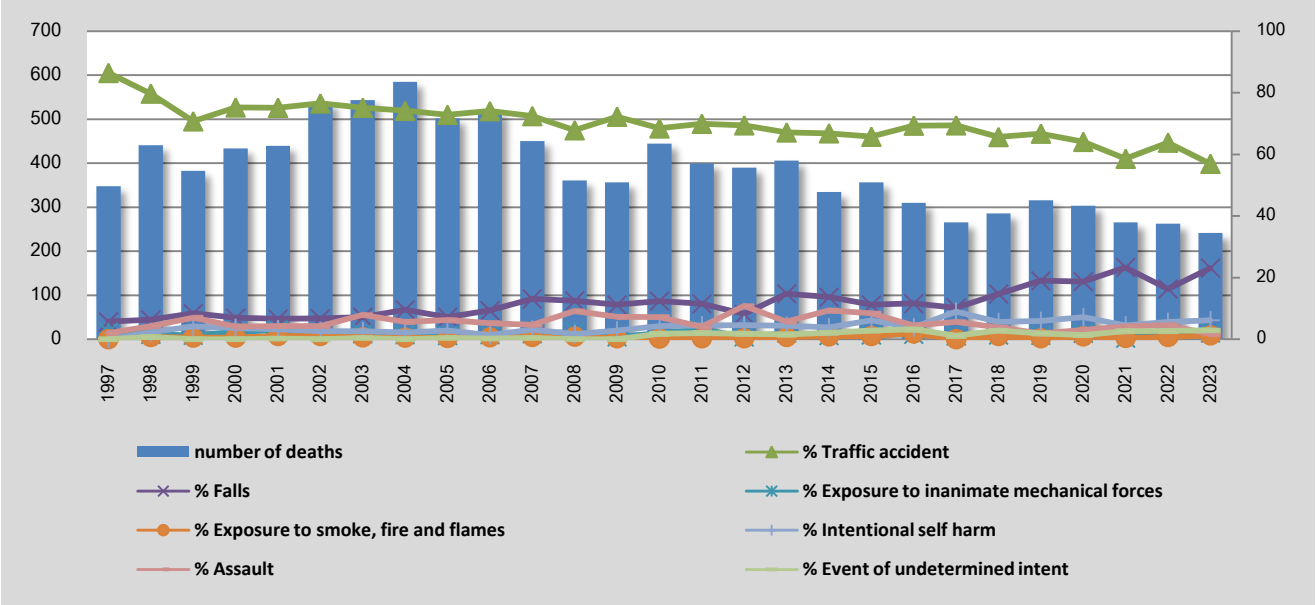
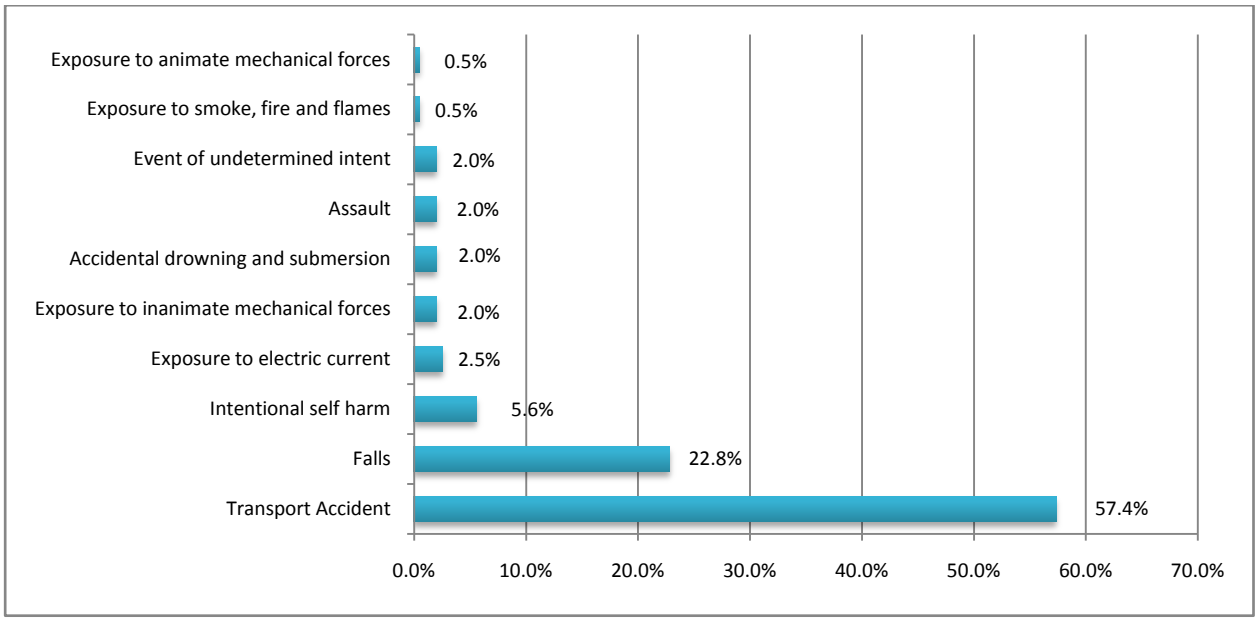


Table 16 Number of deaths by various causes in male victims (2008 - 2023)

Causes of death	Male death													
	2008	2009	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Transport Accident	208	197	215	219	174	185	166	151	145	172	165	126	135	113
Falls	34	25	24	48	35	29	31	24	30	50	50	46	32	45
Exposure to inanimate mechanical forces	7	2	2	6	3	4	3	2	5	4	6	1	7	4
Exposure to animate mechanical forces	0	0	0	3	1	1	1	0	0	1	1	0	0	1
Accidental drowning and submersion	7	7	3	1	1	2	3	4	6	4	0	7	1	4
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	3	2	2	1	4	4	5
Exposure to smoke, fire and flames	0	0	1	1	3	3	3	0	2	1	4	1	1	1
Contact with heat and hot substances	0	0	1	0	0	0	0	0	1	0	0	0	0	0
Contact with venomous animals and plants	0	0	0	0	0	0	0	0	0	0	1	1	0	1
Exposure to forces of nature	1	3	0	0	0	0	0	0	0	0	0	1	0	0
Accidental poisioning by noxious substances	0	0	2	1	1	0	1	0	1	0	1	0	0	1
Overexertion, travel	0	0	0	0	0	0	0	0	1	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	20	15	16	20	11	12	11
Assault	33	24	37	23	30	27	14	11	8	5	5	9	8	4
Event of undetermined intent	0	0	5	4	6	10	7	2	7	6	3	6	7	4
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	0	3	0	0	0	0	0
Total	306	272	310	330	269	286	245	217	226	261	258	213	207	197

Figure 17 Percentage of male death patients by various causes in 2023

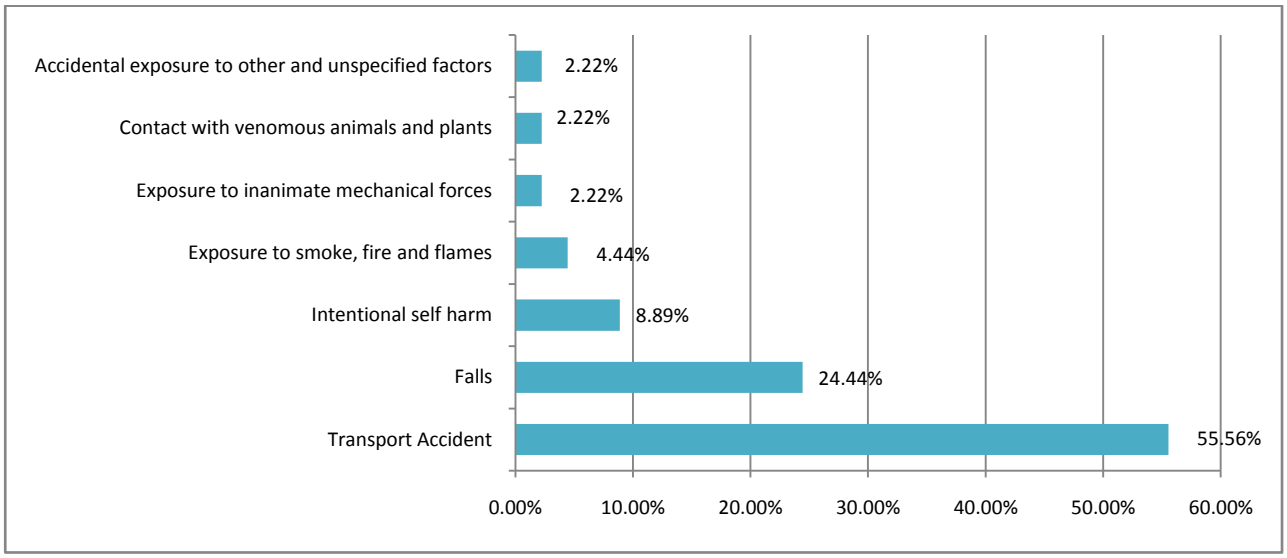


It was shown that in male group the percentage of traffic fatality was highest (57.4% of all fatality), fall injury was the second 22.8%, and intentional self-harm was the third 5.6 % biggest cause of fatalities.

Table 17 Number of deaths by various in female victims (2008 - 2023)

Causes of death	Female death													
	2008	2009	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Transport Accident	37	61	56	54	50	50	49	34	43	39	34	30	33	25
Falls	11	15	8	12	11	11	5	3	12	10	7	16	11	11
Exposure to inanimate mechanical forces	2	1	1	2	1	1	2	1	2	0	0	0	0	1
Exposure to animate mechanical forces	0	0	1	0	0	0	0	0	2	0	0	0	1	0
Accidental drowning and submersion	1	0	1	0	1	1	0	1	0	1	0	3	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	0	0	0	0	0	0	0	1	0	1	1	0	1	0
Exposure to smoke, fire and flames	3	1	0	2	0	1	3	0	1	0	0	0	1	2
Contact with heat and hot substances	0	0	0	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	1
Exposure to forces of nature	0	1	0	0	0	1	0	0	0	0	0	0	0	0
Accidental poisoning by noxious substances	0	0	0	0	0	0	1	0	0	0	0	0	0	0
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	1
Intentional self harm	2	2	5	4	1	3	2	4	2	3	2	1	3	4
Assault	0	2	5	0	1	3	0	4	3	1	1	2	4	0
Event of undetermined intent	0	0	2	2	1	0	3	1	1	0	1	1	0	0
Legal intervention and operations of war	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	1	2	1	0	0	0	0	0	0	0	0	0	0	0
Total	57	85	80	76	66	71	65	49	66	55	46	53	55	45

Figure 18 Percentage of female death patients by various causes in 2023



It was shown that in female group the percentage of traffic fatality was highest 55.56 % of all fatality fall injury was the second 24.44% and self-harm was the third 8.89 %.

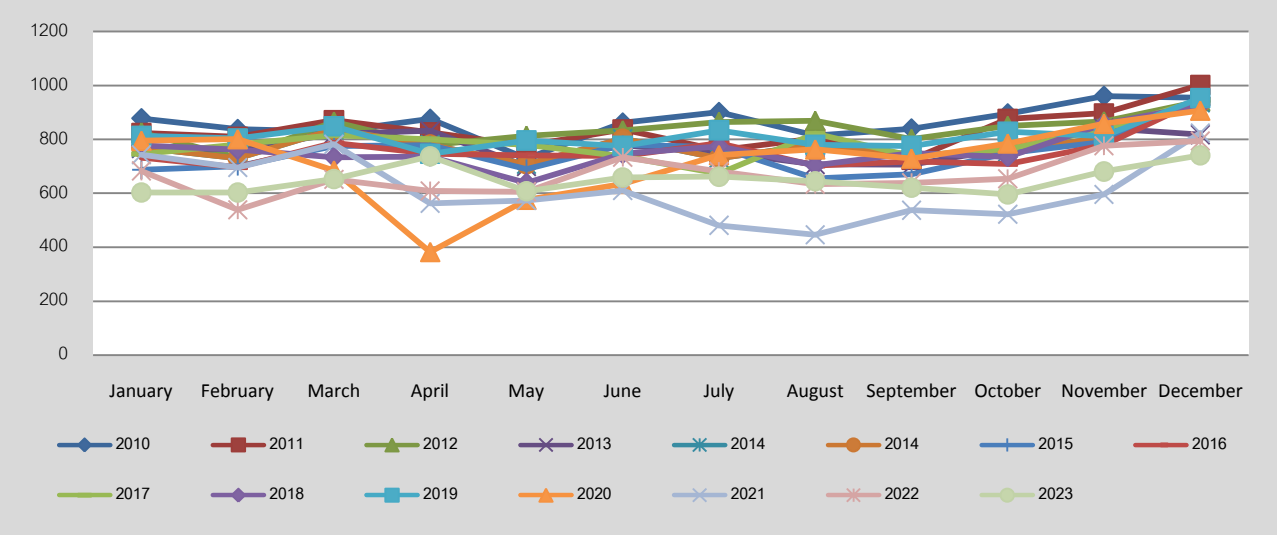
2. Traffic injury

Monthly distribution of traffic injury

Table 18 The number of traffic injury distribution by month (1997 - 2023)

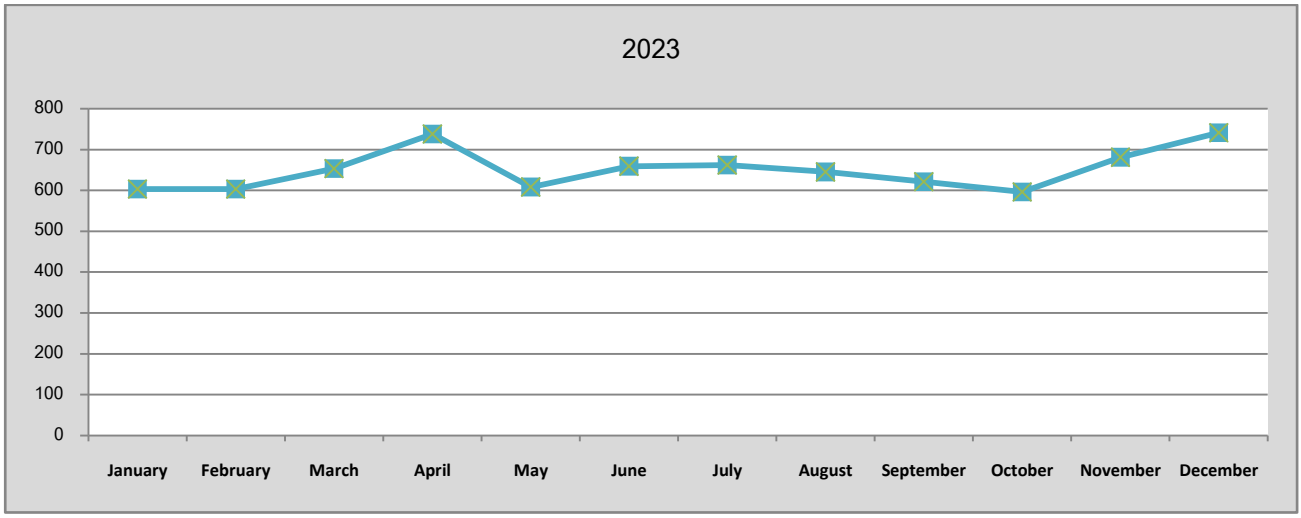
Year	January	February	March	April	May	June	July	August	September	October	November	December	Total
1997	289	345	469	747	644	655	639	606	664	662	736	495	6,951
1998	647	646	634	639	613	605	583	583	584	585	605	685	7,409
1999	632	611	596	619	571	559	601	601	580	619	674	812	7,475
2000	629	699	687	707	560	532	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
2017	746	781	816	800	780	737	673	821	738	765	838	945	9,440
2018	778	762	734	736	639	747	774	704	749	735	857	927	9,142
2019	813	804	849	747	796	776	834	780	776	829	812	953	9,769
2020	795	801	685	382	576	635	742	763	729	785	858	907	8,658
2021	743	696	782	562	573	610	481	446	537	522	596	824	7,372
2022	683	539	652	609	606	734	681	634	639	654	776	794	8,001
2023	603	603	653	738	608	659	662	645	621	596	681	741	7,810

Figure 19 Monthly distribution of traffic injury (2010 - 2023)



The number of traffic injured patients was increasing during December – January (New Year Festival) , but in 2020-2023 was decreasing during April (Thai New Year Festival- Songkran Festival) due to Covid-19 Pandemic.

Figure 20 Monthly distribution of traffic injury in 2023



2.2 Type of vehicle

Table 19 Number of traffic injuries by vehicle (1997-2023)

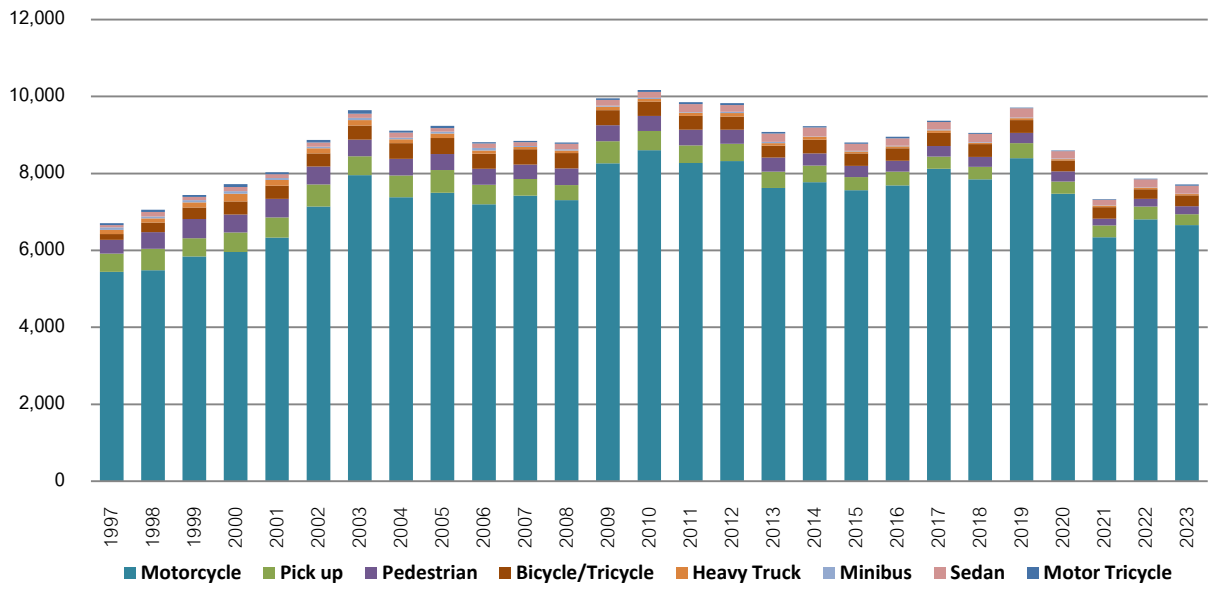
Road user / injury	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Motorcycle	5,443	5,488	5,842	5,958	6,329	7,141	7,954	7,381	7,500	7,200	7,425	7,304	8,261	8,603	8,272	8,318	7,624	7,772	7,568	7,687	8,120	7,845	8,393	7,471	6,341	6,808	6,655
Pick up	473	551	473	504	529	577	492	567	589	505	430	392	575	499	460	457	422	433	335	358	319	325	393	316	307	331	286
Pedestrian	360	437	503	467	483	464	433	433	414	413	376	435	418	391	407	359	364	316	297	288	274	263	272	265	172	200	208
Bicycle/Tricycle	149	248	300	344	339	340	370	408	419	394	395	397	391	376	356	342	315	361	325	320	345	329	332	285	307	249	281
Heavy Truck	107	108	127	204	152	134	138	98	116	81	58	71	95	68	83	91	59	76	44	54	61	31	51	36	38	40	34
Minibus	68	52	59	64	50	40	59	42	49	70	26	33	24	30	21	34	37	5	17	16	23	22	12	16	5	8	5
Sedan	56	113	89	109	95	106	110	132	92	114	106	141	146	151	207	177	219	236	187	190	199	212	238	190	148	208	215
Motor Tricycle	55	60	47	74	54	67	87	53	62	39	30	34	42	50	45	47	35	29	33	38	31	23	23	17	12	23	33
Bus	35	93	39	50	92	94	82	45	35	56	46	38	22	92	43	42	30	31	66	19	13	24	8	6	6	8	5
Agricultural vehicle	24	47	72	56	79	78	67	103	69	69	76	55	73	61	64	69	72	50	43	27	28	27	17	21	23	16	21
Trailer	11	11	2	4	4	8	10	1	14	2	5	3	1	6	11	14	5	7	7	3	4	6	9	5	6	1	4
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	4	2	2	0	0	0	1
Others	6	4	8	10	15	11	14	8	13	4	8	7	24	433	435	44	39	9	1	0	0	12	6	10	3	241	18
Taxi	3	0	1	1	6	0	0	0	0	0	0	1	0	2	2	5	3	1	1	2	3	4	1	0	0	1	1
Train	3	3	3	3	2	3	2	1	5	0	1	1	2	5	2	1	1	6	0	0	0	0	0	0	0	0	0
Van	2	0	0	0	0	0	0	0	0	0	0	14	14	23	23	34	26	27	38	29	17	18	12	18	9	29	31
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	9,441	9,143	9,769	8,656	7,377	8,007	7,810

Table 20 Percentage of traffic injuries by vehicle (1997-2023)

Road user/injury	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Motorcycle	80	76	77	75.9	76.8	78.7	81	79.6	79.9	80.4	82.6	81.8	81.8	82.7	82.5	85.9	82.4	83	84.4	85.1	86.1	85.8	85.9	86.31	85.94	85.03	85.21
Pick up	7	7.6	6.2	6.4	6.4	6.4	5	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	3.4	3.6	4	3.65	4.16	4.13	3.66
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	2.9	2.9	2.8	3.06	2.33	2.50	2.66
Bicycle/Tricycle	2.2	3.4	4	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	3.7	3.6	3.4	3.29	4.16	3.11	3.60
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	0.6	0.3	0.5	0.41	0.52	0.50	0.44
Minibus	1	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	0.2	0.2	0.1	0.18	0.07	0.10	0.06
Sedan	0.8	1.6	1.2	1.4	1.2	1.2	1.1	1.4	1	1.3	1.2	1.6	1.4	1.5	2.1	1.8	2.4	2.5	2.1	2.1	2.1	2.3	2.4	2.19	2.01	2.60	2.75
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	0.3	0.3	0.2	0.19	0.16	0.29	0.42
Bus	0.5	1.3	0.5	0.6	1.1	1	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	0.1	0.3	0.1	0.06	0.08	0.10	0.06
Agricultural vehicle	0.4	0.7	0.9	0.7	1	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	0.3	0.3	0.2	0.24	0.31	0.20	0.27
Trailer	0.2	0.2	0	0.1	0	0.1	0.1	0	0.1	0	0.1	0	0	0.1	0.1	0.1	0.1	0.1	0.1	0	0	0.1	0.1	0.05	0.08	0.01	0.05
Motor plough with pick up	0.1	0	0.3	0.1	0.1	0.1	0	0	0.1	0.1	0.1	0	0.1	0	0.1	0.1	0	0	0	0	0	0	0	0	0.00	0.00	0.01
Others	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0	0.1	0.1	0.2	4.2	4.3	0.5	0.4	0.1	0	0	0	0.1	0.1	0.11	0.04	3.01	0.23
Taxi	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0.00	0.01	0.01
Train	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0	0.00	0.00	0.00
Van	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	0.2	0.2	0.1	0.2	0.12	0.36	0.40

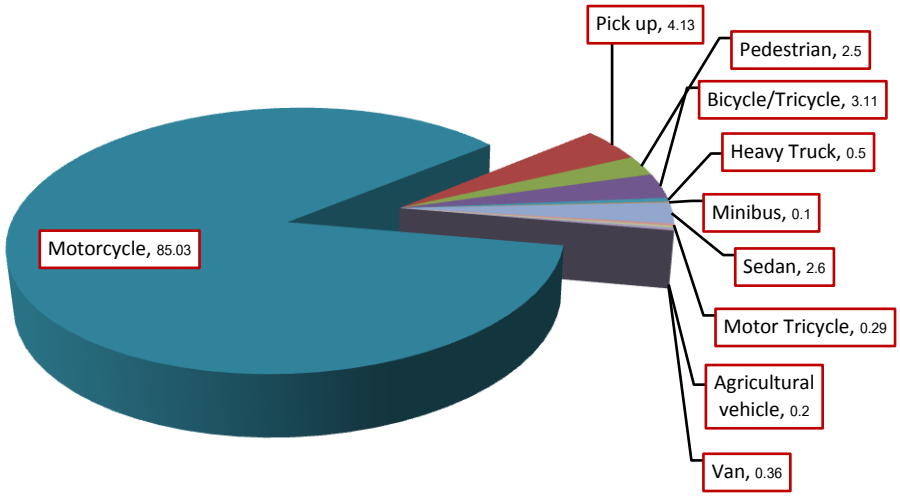
Traffic injury was the most common cause of all injury. Among road traffic injury ,85.21% was motorcycle injury. The Pickup injuries was the second(3.66%),followed by bicycle or tricycle injury(3.60%).The pedestrians had higher risk to get injury (2.66%)

Figure 21 Number of traffic injuries by vehicle (1997-2023)



Motorcycle was the most vulnerable when comparing with the other road users.

Figure 22 Percentage of traffic injuries by vehicle in 2023



By comparison the vehicle caused traffic injuries; it was show the motorcycle accident was the most common cause of injuries (85.03%) the second was the pickup accident (4.13%)

2.3 Age group distribution

Table 21 Number of traffic injuries and deaths by age and gender (2018-2023)

Age group	2018				2019				2020				2021				2022				2023			
	Injury		Death		Injury		Death		Injury		Death		Injury		Death		Injury		Death		Injury		Death	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
<10	206	139	1	3	195	131	1	0	154	122	1	1	149	101	1	0	127	97	3	1	146	97	0	1
10-<20	1,373	815	23	4	1,310	809	22	3	1,138	730	19	1	807	499	12	4	959	684	15	4	976	737	14	4
20-<30	1,598	874	20	5	1,717	911	20	6	1,514	795	30	4	1,297	731	20	0	1,344	866	26	4	1,228	814	16	4
30-<40	905	384	18	3	881	434	22	4	818	395	25	7	730	387	12	2	802	383	10	3	705	379	13	1
40-<50	705	398	17	6	758	403	39	7	683	363	30	3	632	336	20	4	630	359	18	2	578	318	19	1
50-<60	594	341	27	10	614	391	32	8	562	304	17	8	529	338	29	3	483	343	20	11	486	329	23	5
≥60	536	265	39	12	693	311	36	11	551	281	43	10	588	258	32	17	499	277	40	8	532	332	24	9
total	5,917	3,216	145	43	6,168	3,390	172	39	5,420	2,990	165	34	4,732	2,650	126	30	4,844	3,009	135	33	4,732	3,072	113	25

Figure 23 Number of traffic injuries by age and gender in 2023

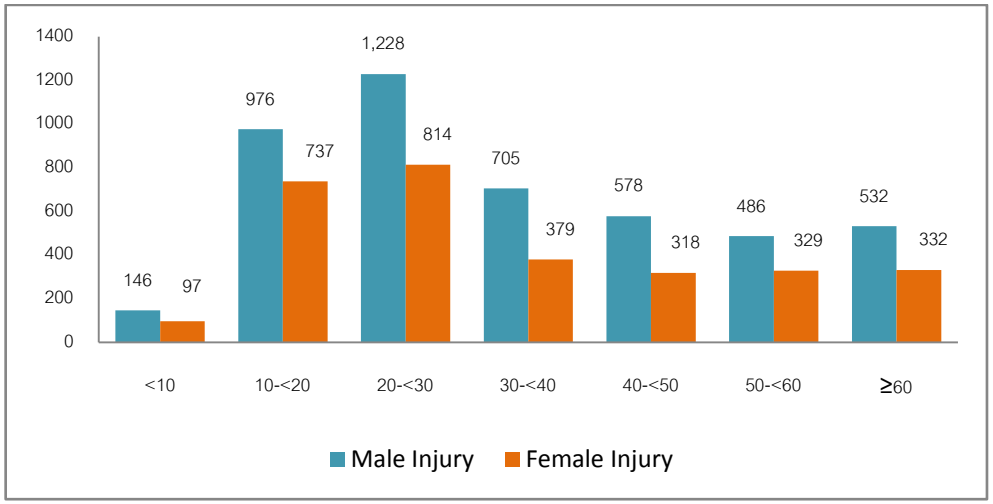
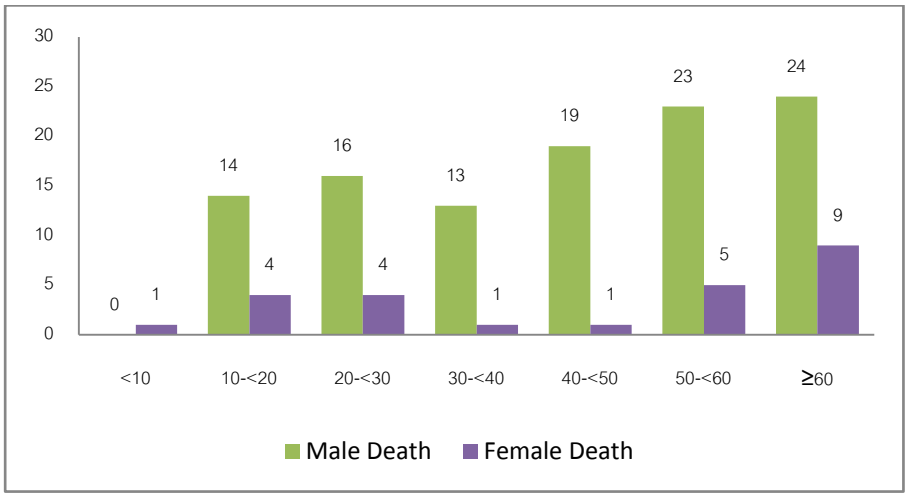


Figure 24 Number of traffic deaths by age and gender in 2023

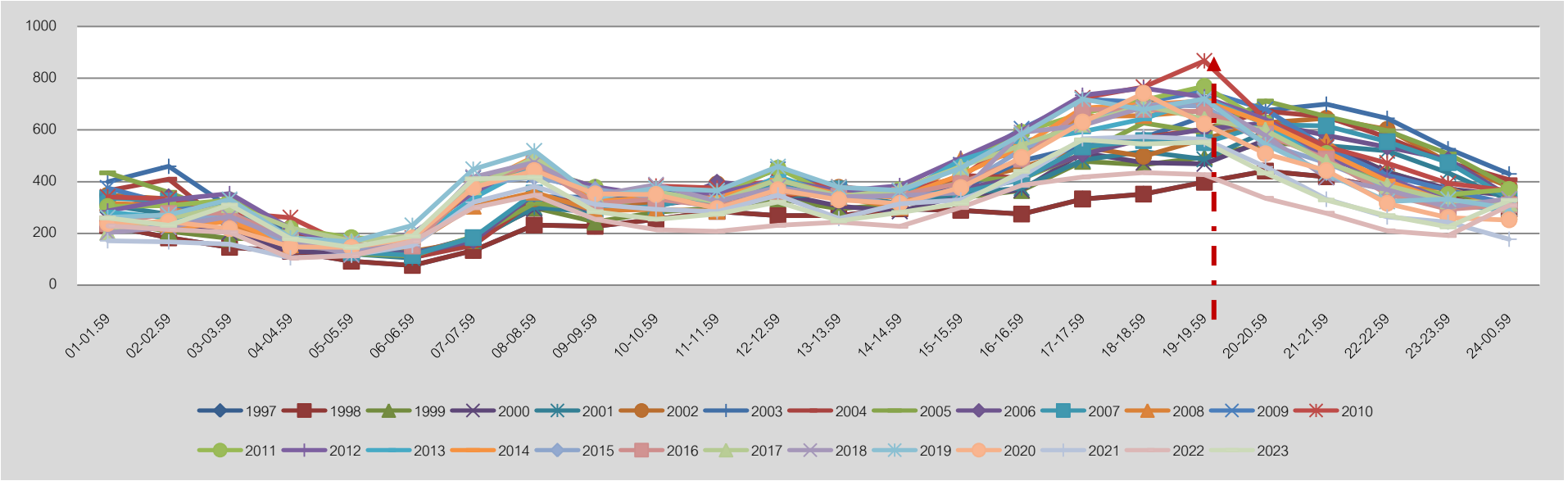


2.4 Traffic injuries by time of crashes

Table 22 Number of crashes by the hour (1997-2023)

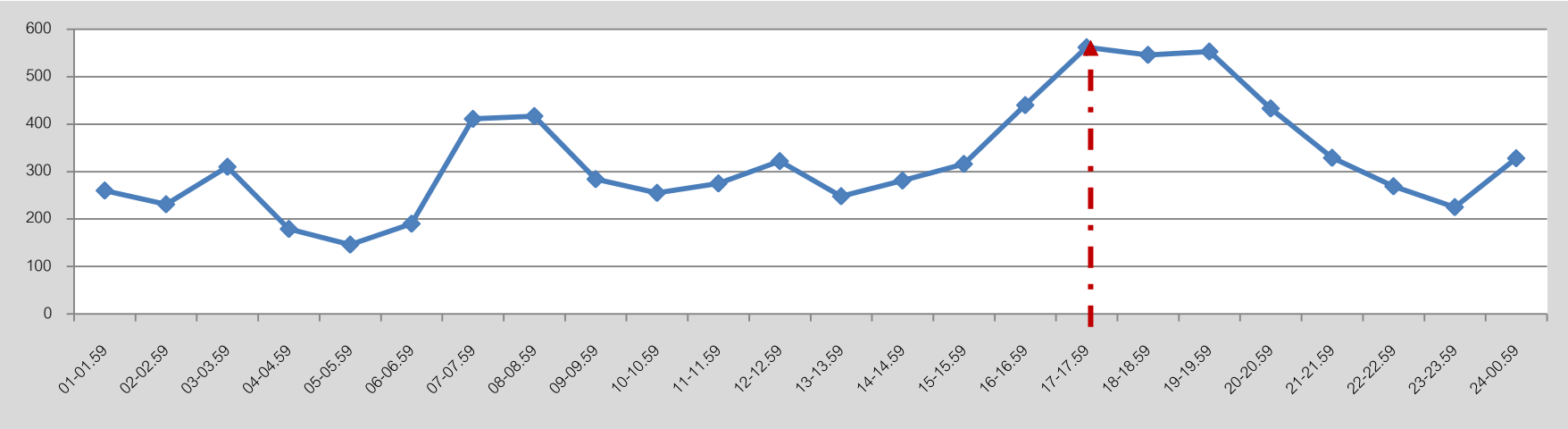
Time	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
01-01.59	230	230	247	255	309	348	400	365	434	291	337	317	376	341	304	287	282	248	229	237	203	202	261	238	171	229	260
02-02.59	183	183	207	225	273	334	460	410	359	342	326	307	314	334	307	330	261	212	237	277	256	224	272	246	167	215	231
03-03.59	146	146	180	204	237	246	300	220	263	290	301	237	273	281	329	354	273	250	284	279	311	265	331	218	158	203	310
04-04.59	131	131	177	130	181	154	209	193	183	182	174	155	191	261	218	218	179	154	150	177	221	171	182	148	105	104	179
05-05.59	92	92	128	126	120	133	132	150	121	127	126	148	134	148	183	140	130	140	137	157	170	117	167	146	115	113	146
06-06.59	76	76	117	122	104	131	125	106	112	120	115	159	170	181	174	201	169	162	165	151	191	174	231	182	153	169	190
07-07.59	134	134	172	185	169	172	174	154	188	171	184	305	414	366	390	356	337	380	390	395	380	418	448	377	320	299	411
08-08.59	232	232	299	294	301	334	342	326	316	352	356	359	426	474	454	447	461	497	418	467	492	474	519	443	381	348	417
09-09.59	227	227	244	312	282	308	340	330	294	285	289	288	359	332	378	380	328	324	370	315	350	346	337	353	312	254	284
10-10.59	254	254	282	310	318	318	356	328	347	298	304	293	351	383	330	344	333	340	339	333	361	388	375	350	293	214	255
11-11.59	285	285	299	340	337	391	384	376	364	398	355	286	366	375	346	354	310	337	300	304	321	324	365	296	284	208	275
12-12.59	269	269	334	354	343	354	379	338	361	374	381	360	448	404	452	409	421	406	366	363	409	378	458	369	348	231	322
13-13.59	269	269	295	306	352	378	332	385	353	367	372	339	368	379	334	363	338	351	353	344	343	341	378	330	257	243	248
14-14.59	295	295	313	285	315	344	369	336	362	349	359	300	360	361	369	385	348	340	307	348	368	345	366	316	314	227	281
15-15.59	289	289	338	347	355	398	370	424	409	370	359	487	466	417	460	491	484	426	379	395	458	357	452	377	329	300	316
16-16.59	275	275	366	368	375	454	481	416	410	419	408	505	605	579	591	598	557	537	523	487	542	590	583	494	420	386	440
17-17.59	333	333	479	512	483	534	537	505	508	505	535	653	720	724	664	735	593	685	633	680	623	618	719	630	566	418	562
18-18.59	352	352	466	474	516	498	570	571	627	565	559	656	707	766	715	762	643	699	699	680	696	688	678	742	574	435	546
19-19.59	398	398	494	469	486	566	653	604	590	604	551	675	751	867	769	728	722	712	692	670	642	715	720	623	564	427	553
20-20.59	441	441	550	561	593	628	676	673	712	627	621	555	680	642	628	641	623	627	547	585	600	578	543	508	457	336	433
21-21.59	419	419	540	550	539	645	700	652	652	579	616	556	532	535	509	491	473	515	473	488	476	416	433	443	332	278	329
22-22.59	371	371	439	436	519	602	645	571	597	534	555	371	425	472	383	415	389	403	376	352	385	369	323	316	263	210	269
23-23.59	346	346	364	372	434	476	528	475	507	486	474	375	367	393	350	326	314	321	317	293	326	301	332	261	243	191	225
24-00.59	294	294	285	346	328	380	430	408	382	344	334	292	315	365	370	292	287	316	313	310	316	334	296	252	177	308	328
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	9,440	9,133	9,769	8,658	7,303	8,007	7,810

Figure 25 Number of traffic injuries by the hour (1997-2023)



It was found that the peak time of the traffic injuries were 06.00-8.00 p.m. and slightly decrease after that.

Figure 26 Number of traffic injuries by the hour in 2023



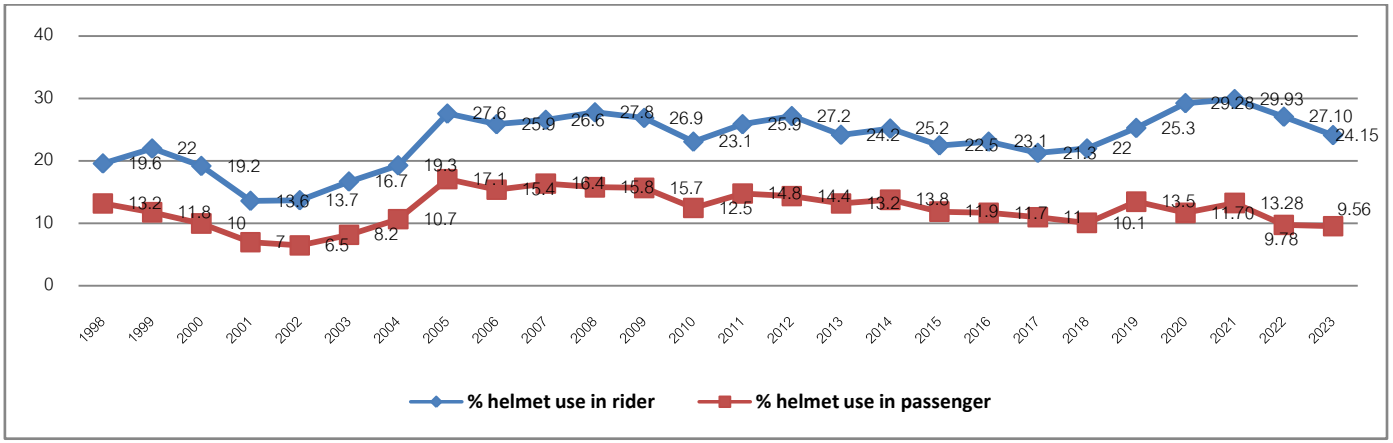
2.5 Risk behaviors

2.5.1 Helmet use

Table 23 Injuries with and without helmet use (1997-2023)

Rider	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
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	1,443	1,429	1,759	1,878	1,662	1,564	1,377
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	5,347	5,080	5,197	4,219	3,671	3,870	4,047
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	6,790	6,509	6,956	6,097	5,553	5,771	5,702
% helmet use in rider	19.6	22	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	21.3	22	25.3	29.28	29.93	27.10	24.15
Passenger	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
helmet	156	156	127	98	95	149	165	271	216	241	220	250	220	242	211	172	180	145	144	133	119	161	123	104	94	89
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	1,077	1,055	1,033	907	671	835	817
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	1,210	1,174	1,194	1,051	783	961	931
% helmet use in passenger	13.2	11.8	10	7	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	11	10.1	13.5	11.70	13.28	9.78	9.56

Figure 27 Percentage of helmet use injuries (1997-2023)

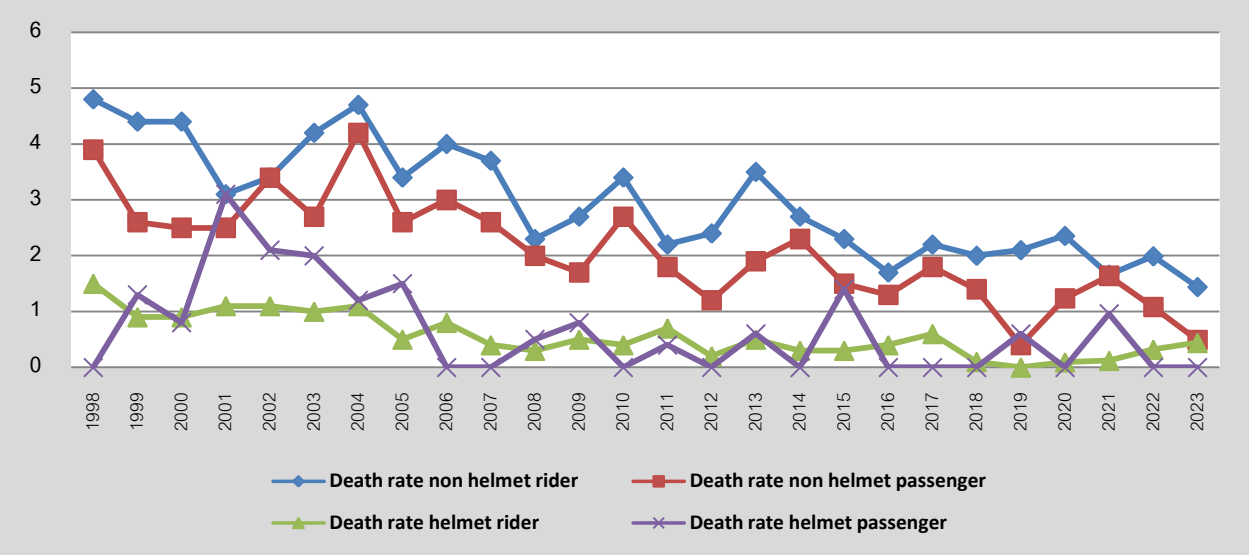


The proportion of helmet use in motorcycle driver injured in transport accident was higher than passenger. It was shown that the trend of helmet use was slightly decreased since 2005.but in 2018 trended to be increasing.

Table 24 Death with and without helmet use (1997-2023)

non helmet	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
non helmet rider dead	156	149	158	129	161	209	219	142	167	159	92	130	189	112	115	164	128	109	81	118	100	107	151	61	77	57
Death rate non helmet rider	4.8	4.4	4.4	3.1	3.4	4.2	4.7	3.4	4	3.7	2.3	2.7	3.4	2.2	2.4	3.5	2.7	2.3	1.7	2.2	2	2.1	2.35	1.66	1.99	1.41
non helmet passenger dead	40	30	28	33	47	46	57	34	35	32	23	27	41	25	15	22	26	16	14	19	15	4	13	11	9	4
Death rate non helmet passenger	3.9	2.6	2.5	2.5	3.4	2.7	4.2	2.6	3	2.6	2	1.7	2.7	1.8	1.2	1.9	2.3	1.5	1.3	1.8	1.4	0.4	1.24	1.64	1.08	0.49
helmet	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
helmet rider dead	12	9	8	7	8	10	12	8	12	7	5	8	7	13	3	8	5	4	6	8	1	0	6	2	5	6
Death rate helmet rider	1.5	0.9	0.9	1.1	1.1	1	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	0.6	0.1	-	0.09	0.12	0.32	0.44
helmet passenger dead	-	2	1	3	2	3	2	4	-	-	1	2	-	1	-	1	-	2	-	0	0	1	0	1	0	0
Death rate helmet passenger	0	1.3	0.8	3.1	2.1	2	1.2	1.5	0	0	0.5	0.8	0	0.4	-	0.6	-	1.4	-	-	-	0.6	0	0.96	0.00	0.00

Figure 28 Death rate of Mc rider and passenger with and without helmet use (1997-2023)



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

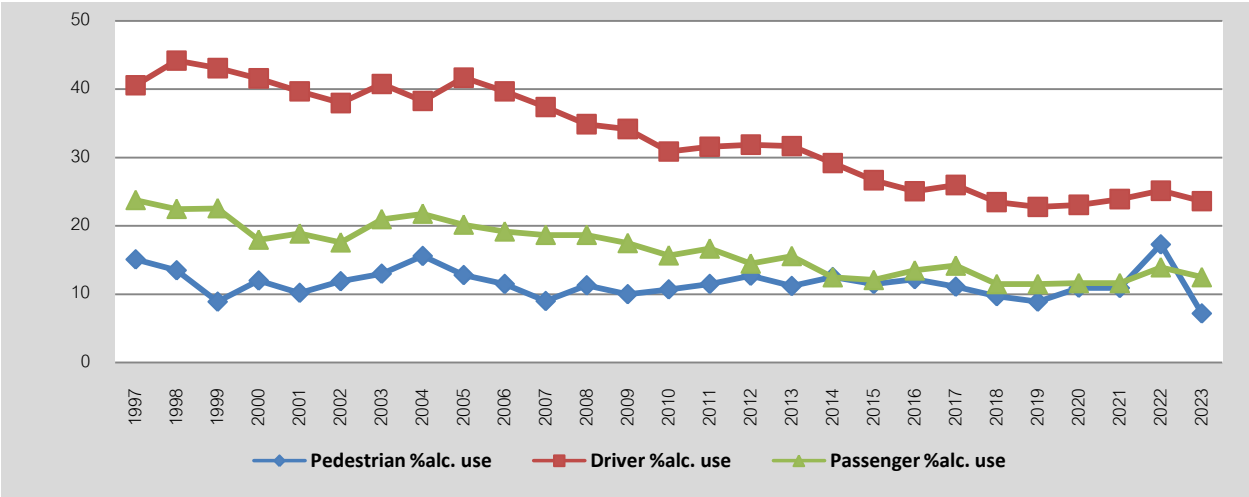
2.5.2 Alcohol use

Table 25 Number of injuries with and without alcohol use (1997-2023)

Year	Pedestrian				Driver				Passenger			
	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	2,909	2,075	4,984	41.6	1,774	389	2,163	18
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	1,930	413	2,343	17.6
2003	368	55	423	13	3,834	2,646	6,480	40.8	2,058	546	2,604	21
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	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	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
2017	240	30	270	11.1	5,484	1,923	7,407	26	1,369	226	1,595	14.2
2018	224	24	248	9.7	5,358	1,647	7,005	23.5	1,370	178	1,548	11.5
2019	235	23	258	8.9	5,706	1,684	7,390	22.8	1,417	184	1,601	11.5
2020	236	29	265	10.94	5,385	1,618	7,003	23.10	1,207	159	1,366	11.64
2021	147	18	165	10.91	4,432	1,395	5,827	23.94	911	120	1,031	11.64
2022	153	32	185	17.30	4,520	1,520	6,040	25.17	1,073	174	1,247	13.95
2023	181	14	195	7.18	4,524	1,400	5,924	23.63	1,056	151	1,207	12.51

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

Figure 29 Percentage of injuries with alcohol use (1997-2023)



The trend of alcohol used among driver was slightly decreasing but the passenger and pedestrian seemed to be increasing.

Table 26 Number of deaths, with and without alcohol use (1997-2023)

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
1998	22	6	5	8.8	77	3	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	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	51	1.4	78	3	45	2.4	12	2.5
2006	11	3.1	0	0	72	2	78	3.3	48	2.9	10	2.6
2007	19	5.6	0	0	64	1.6	67	2.7	43	2.6	10	2.6
2008	10	2.7	2	4.2	41	1	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	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	30	1.5	33	2.1	3	1.3
2015	11	4.3	1	3	76	1.6	27	1.5	29	1.9	2	1
2016	8	3.3	0	0	59	1.2	22	1.3	23	1.6	1	0.5
2017	11	4.6	1	3.3	94	1.7	49	2.5	26	1.9	4	1.8
2108	11	4.9	0	0	73	1.4	17	1	19	1.4	1	0.6
2019	1	0.4	0	0	59	1	22	1.3	17	1.2	4	2.2
2020	3	1.27	0	0	51	0.95	19	1.17	12	0.99	1	0.63
2021	10	6.90	0	0	46	1.04	15	1.08	9	0.99	1	0.83
2022	4	2.61	1	3.13	50	1.11	20	1.32	12	1.12	0	0.00
2023	9	4.97	0	0.00	31	0.69	12	0.86	4	0.38	2	1.32

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

Figure 30 Death rate of drivers with and without alcohol use

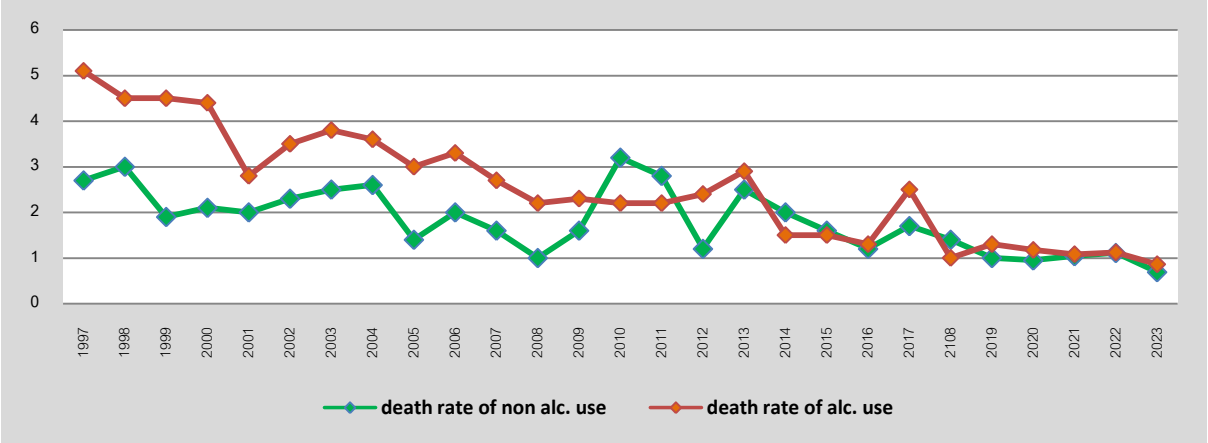


Figure 31 Death rate of passengers with and without alcohol use

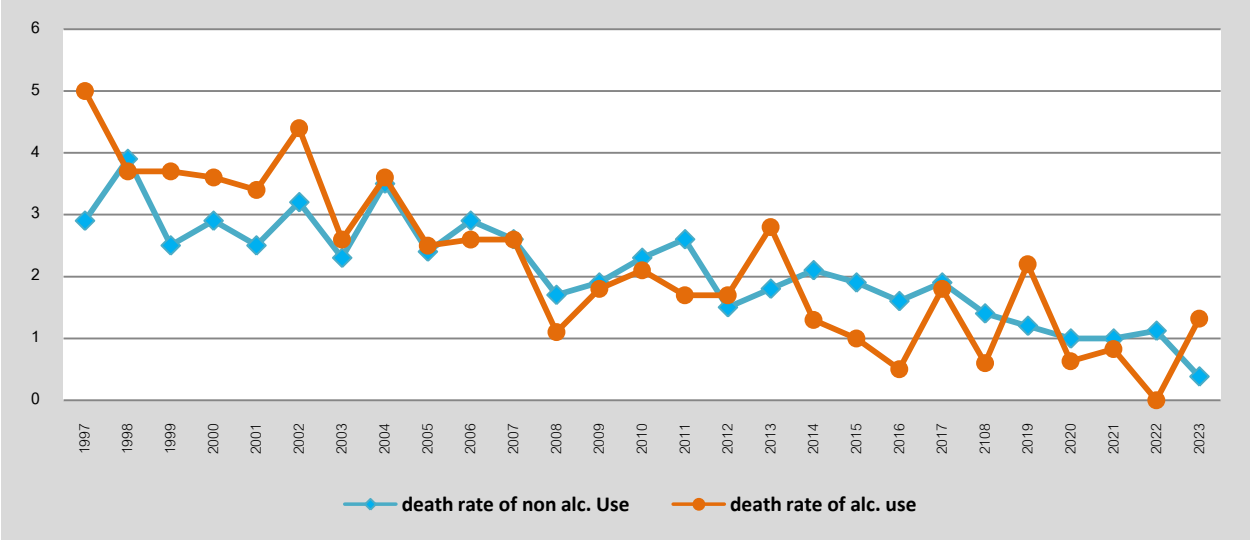
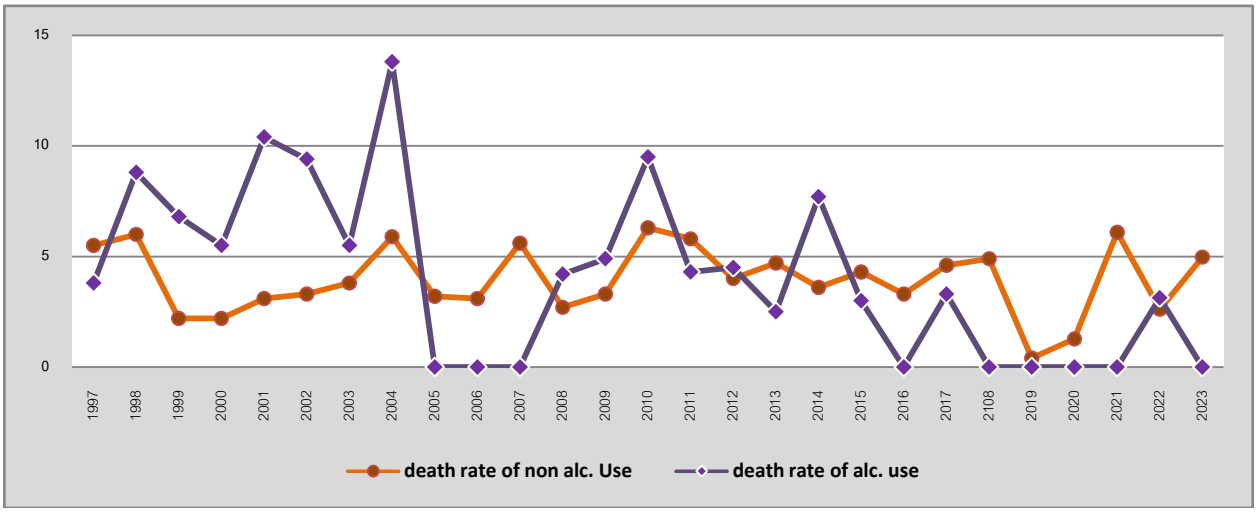


Figure 32 Death rate of pedestrians with and without alcohol use



2.5.3 Alcohol use by vehicle type

Table 27 The number of road user injuries with and without alcohol use by vehicle (1997-2023)

Vehicle type	alcohol	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Bicycle/Tricycle	yes	19	28	29	38	34	37	26	32	33	37	27	28	30	36	35	28	37	29	23	30	28	27	32	27	39	20	44
	no	94	151	204	221	237	249	225	285	295	274	296	309	285	340	321	267	233	287	297	250	284	293	296	250	266	223	228
	total	113	179	233	259	271	286	251	317	328	311	323	337	315	376	356	295	270	316	320	280	312	320	328	277	305	243	272
	% alc. use	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	9	8.4	9.8	9.75	12.79	8.23	16.18
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	1,821	1,665	1,722	1,653	1,368	1,531	1,403
	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	4,940	5,884	6,216	5,394	4,658	4,927	4,876
	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	6,761	7,549	7,938	7,047	6,026	6,458	6,279
	% alc. use	41.4	45.9	45.1	43.5	42.1	39.8	42.7	40.5	43.8	41.8	41	36.6	35.7	29.3	30.4	33.1	32.6	30.2	25.3	25.7	26.9	22.1	21.7	23.46	22.70	23.71	22.34
Motor Tricycle	yes	3	13	18	16	7	5	12	11	4	3	2	5	5	8	4	8	5	3	4	7	6	4	3	1	2	1	3
	no	14	18	11	20	15	20	25	19	20	14	16	13	15	42	41	22	21	10	28	19	16	19	18	12	9	22	28
	total	17	31	29	36	22	25	37	30	24	17	18	18	20	50	45	30	26	13	32	26	22	23	21	13	11	13	31
	% alc. use	17.6	41.9	62.1	44.4	31.8	20	32.4	36.7	16.7	17.6	11.1	38.5	25	16	8.9	26.7	19.2	23.1	12.5	26.9	27.3	17.4	14.3	7.69	18.18	7.69	9.68
Sedan	yes	11	21	14	20	18	12	22	23	19	20	25	35	32	40	61	31	45	43	45	37	26	57	46	47	45	72	51
	no	14	35	24	25	25	32	34	42	28	35	27	36	50	111	146	69	81	73	135	62	88	146	181	135	93	122	147
	total	25	56	38	45	43	44	56	65	47	55	52	71	82	151	207	100	126	116	180	99	114	203	227	182	138	194	198
	% alc. use	44	37.5	36.8	44.4	41.9	27.3	39.3	35.4	40.4	36.4	48.1	49.3	39	26.5	29.5	31	35.7	37.1	25	37.4	22.8	28.1	20.3	25.82	32.61	37.11	25.76
Pick up	yes	61	69	65	45	53	49	51	51	63	51	60	44	48	75	70	47	61	63	63	36	32	62	60	45	57	78	49
	no	66	89	83	65	105	87	91	107	77	91	84	85	126	424	390	89	103	127	261	98	99	252	303	250	226	235	214
	total	127	158	148	110	158	136	142	158	140	142	144	129	174	499	460	136	164	190	324	134	131	314	363	295	307	313	263
	% alc. use	48	43.7	43.9	40.9	33.5	36	35.9	32.3	45	35.9	41.7	34.1	27.6	15	15.2	34.6	37.2	33.2	19.4	26.9	24.4	19.7	16.5	15.25	18.57	24.92	18.63
Heavy Truck	yes	7	10	8	13	4	5	4	2	6	5	1	5	4	2	5	8	3	3	1	0	4	2	4	1	2	2	1
	no	21	16	26	24	28	25	31	28	22	18	17	20	26	66	78	28	25	32	43	24	24	29	47	33	36	37	32
	total	28	26	34	37	32	30	35	30	28	23	18	25	30	68	83	36	28	35	44	24	28	31	51	34	38	39	33
	% alc. use	25	38.5	23.5	35.1	12.5	13.3	11.4	6.7	21.4	21.7	5.6	20	13.3	2.9	6	22.2	10.7	8.6	2.3	0	14.3	6.5	7.8	2.94	5.26	5.13	3.03
Trailer	yes	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	2	0	1	0	0	1	0	0	1	0	0	1
	no	9	1	0	2	0	2	4	1	5	1	3	1	0	6	11	5	3	4	7	2	3	6	9	4	6	0	2
	total	9	1	0	2	0	3	5	1	5	1	3	1	0	6	11	11	3	3	7	2	4	6	9	5	6	0	3
	% alc. use	0	0	0	0	0	33.3	20	0	0	0	0	0	0	0	0	18.2	0	33.3	0	0	25	0	0	20	0	0	25
Minibus	yes	0	4	0	0	0	2	1	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	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	1	22	12	16	5	8	5
	total	2	7	0	0	1	3	2	1	3	1	2	2	0	30	21	2	3	3	17	0	1	22	12	16	5	8	5
	% alc. use	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	0	0
Bus	yes	0	1	1	0	1	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	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	1	24	8	6	6	8	5
	total	1	1	2	1	4	4	3	5	1	2	4	2	0	92	43	3	4	4	66	0	1	24	8	6	6	8	5
	% alc. use	0	100	100	0	25	25	0	20	0	0	0	0	0	0	2	0	0	0	0	0	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	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	2	4	1	0	0	0	1
	total	0	0	0	0	2	0	0	0	0	0	0	0	0	2	2	4	3	3	1	2	2	4	1	0	0	1	1
	% alc. use	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

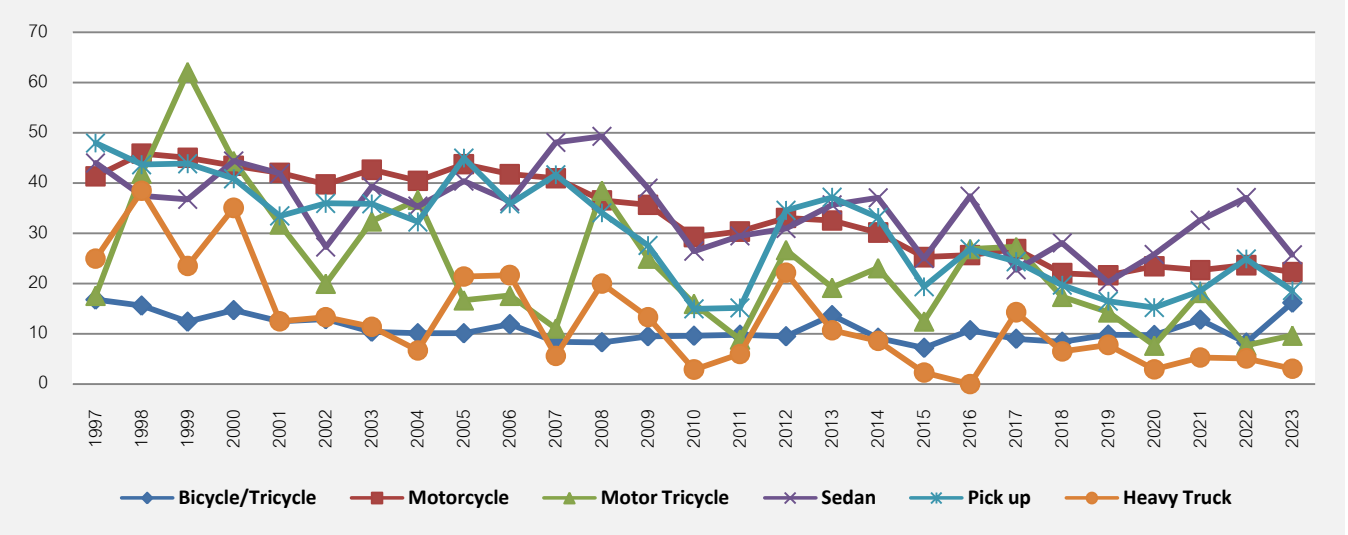
Vehicle type	alcohol	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Train	yes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	no	0	0	0	0	0	0	0	0	0	0	0	0	0	5	1	0	0	0	0	0	0	0	0	0	0	0	0
	total	0	0	0	0	0	0	0	0	0	0	0	0	0	5	2	0	0	0	0	0	0	0	0	0	0	0	0
	% alc. use	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0	0	0	0	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	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	0	0	0	0	0	0	0
	total	0	2	3	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	% alc. use	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
Airplane, helicopter	yes	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
	no	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
	total	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
	% alc. use	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
Watercraft	yes	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	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	0	0	0	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	0	0	0	0	0	0	0
	% alc. use	0	0	0	0	0	0	0	0	0	0	60	0	0	0	0	0	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	5	3	1	1	2	3	2
	no	7	26	29	27	44	25	25	38	23	28	28	30	25	52	60	25	36	23	42	15	15	23	16	20	21	11	18
	total	9	28	32	30	52	30	29	43	30	30	34	33	30	61	64	28	40	29	43	15	20	26	17	21	23	14	20
	% alc. use	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	20.7	2.3	0	25	11.5	5.9	4.76	8.70	21.43	10.00
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	0	1	0	0	0	0	0
	no	2	1	6	0	1	3	0	0	1	1	4	2	3	4	3	2	2	0	1	0	3	1	1	0	0	0	1
	total	2	1	7	0	1	3	0	0	1	2	4	2	3	4	6	4	2	1	1	0	0	0	0	0	0	0	1
	% alc. use	0	0	14.3	0	0	0	0	0	0	50	0	0	0	0	50	50	0	100	0	0	0	0	0	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	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	0	0	1	0	0	0	0
	total	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
	% alc. use	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
Others	yes	2	0	0	2	0	0	2	0	4	0	0	0	0	45	49	1	1	0	0	0	0	1	1	1	0	5	0
	no	2	4	0	0	5	3	5	8	2	2		2	5	388	386	9	6	3	38	4	5	18	15	22	17	27	47
	total	4	4	0	2	5	3	7	8	6	2	0	2	5	433	435	10	7	3	38	4	0	0	16	23	17	32	47
	% alc. use	50	0	0	100	0	0	28.6	66.7	66.7	0	0	0	0	10.4	11.3	10	14.3	0	0	0	0	0	6.3	4	0	15.63	0.00

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

Table 28 The number of road user death with and without alcohol use by vehicle (1997-2023)

Vehicle type	alc. use	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Bicycle/Tricycle	yes	2	0	0	1	0	0	1	0	1	2	1	1	2	0	0	1	0	1	2	0	0	2	0	0	0	1	0
	no	1	3	4	4	1	3	4	4	8	9	7	3	5	2	3	5	5	5	6	5	7	5	3	4	6	1	2
Motorcycle	yes	91	90	90	86	56	78	100	85	75	74	64	42	54	65	56	53	57	28	26	37	47	15	20	18	16	17	14
	no	66	60	46	54	58	75	80	87	40	60	54	35	62	201	160	46	105	86	80	105	79	77	63	57	45	57	29
Motor Tricycle	yes	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0
	no	0	1	0	1	1	0	5	2	0	0	0	0	1	4	2	1	0	0	3	1	2	2	1	2	0	0	1
Sedan	yes	0	0	1	1	1	1	0	0	1	0	0	0	0	2	0	0	1	0	1	2	1	0	0	0	0	0	0
	no	0	3	1	1	0	0	0	3	0	0	1	0	0	5	6	2	3	3	2	0	1	0	3	3	2	1	1
Pick up	yes	1	1	3	2	1	0	0	0	1	2	1	3	0	3	1	0	3	1	0	2	1	1	3	2	0	2	0
	no	2	4	0	2	2	1	3	3	2	3	0	2	5	17	22	2	4	2	9	4	5	4	8	13	6	1	1
Heavy Truck	yes	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
	no	1	1	0	0	0	1	2	1	0	0	0	0	1	1	2	1	0	2	2	0	0	1	2	1	2	1	0
Trailer	yes	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
	no	0	0	0	1	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	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	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	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	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	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	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	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	0	0	0	0	0	0	0
	no	1	3	1	0	2	3	1	2	1	0	1	1	1	1	2	1	1	0	0	0	0	1	0	0	0	0	1
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	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	0	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	0	0	1	0	0	1	0
	no	0	0	0	0	0	0	0	0	0	0	0	0	0	23	23	0	0	0	2	0	0	2	7	1	0	0	1

Figure 33 Percentage of injuries with alcohol use by vehicle (1997-2023)



The alcohol use 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 29 Motorcycle accidents by injury and death (1997-2023)

	Alc. use	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
injuries	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	1,821	1,665	1,722	1,635	1,368	1,531	1,403
	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	4,940	5,884	6,216	5,339	4,658	4,927	4,876
	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	6,761	7,549	7,938	6,974	6,026	6,458	6,279
	% alc. used	41.4	45.9	45.1	43.5	42.1	39.8	42.7	40.5	43.8	41.8	41	36.6	35.7	29.3	30.4	33.1	31.7	30.2	25.3	27.4	26.9	22.1	21.7	23.44	22.70	23.71	22.34
	% no alc. use	58.6	54.1	54.9	56.5	57.9	60.2	57.3	59.5	56.2	58.2	59	63.4	64.3	70.7	69.6	66.9	68.3	69.8	74.7	72.6	73.1	77.9	78.3	76.56	77.30	76.29	77.66
Death	yes	91	90	90	86	56	78	100	85	75	74	64	42	54	65	56	53	63	28	26	37	47	15	20	18	16	17	14
	no	66	60	46	54	58	75	80	87	40	60	54	35	62	201	160	46	118	86	80	105	79	77	63	55	45	57	29
	total	157	150	136	140	114	153	180	172	115	134	118	77	116	266	216	99	181	114	106	142	126	92	83	73	61	74	43
	% alc. use	58	60	66.2	61.4	49.1	51	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	37.3	16.3	24.1	24.66	26.23	22.97	32.56
	% no alc. use	42	40	33.8	38.6	50.9	49	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	62.7	83.7	75.9	75.34	36.29	77.03	26.61
Death rate	Death rate Alc. use	5.3	4.8	4.5	4.4	2.9	3.7	4	3.7	3.1	3.2	2.7	2	2.3	2.6	2.2	2.5	2.9	1.5	1.4	2.1	2.6	0.9	1.2	1.10	1.17	1.11	1.00
	Death rate no alc. use	2.7	2.7	1.9	2.1	2.2	2.3	2.4	2.6	1.3	1.9	1.6	1	1.5	3.3	2.8	1.1	2.5	2	1.5	2.2	1.6	1.3	1	1.03	0.97	1.16	0.59

Figure 34 Proportion of motorcyclist injuries with & without alcohol use (1997-2023)

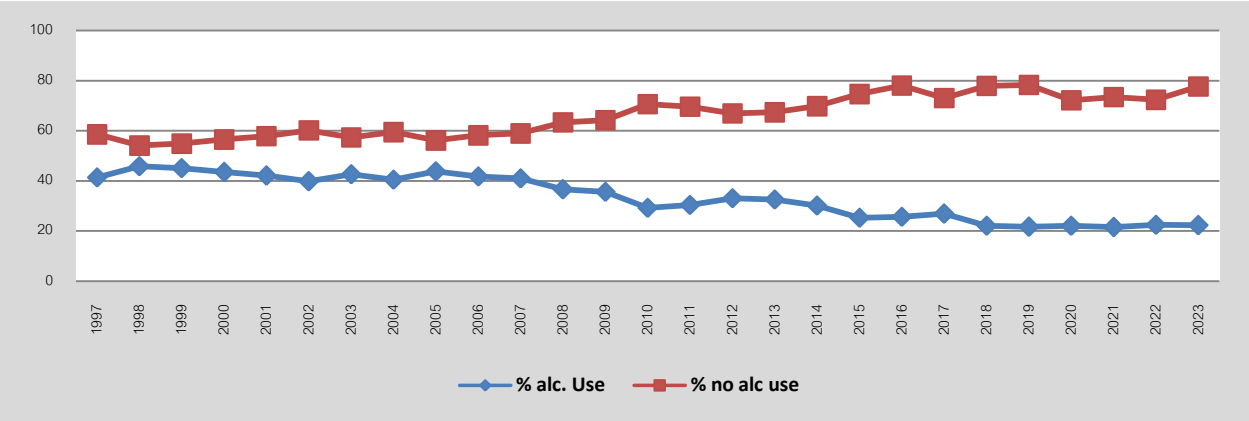
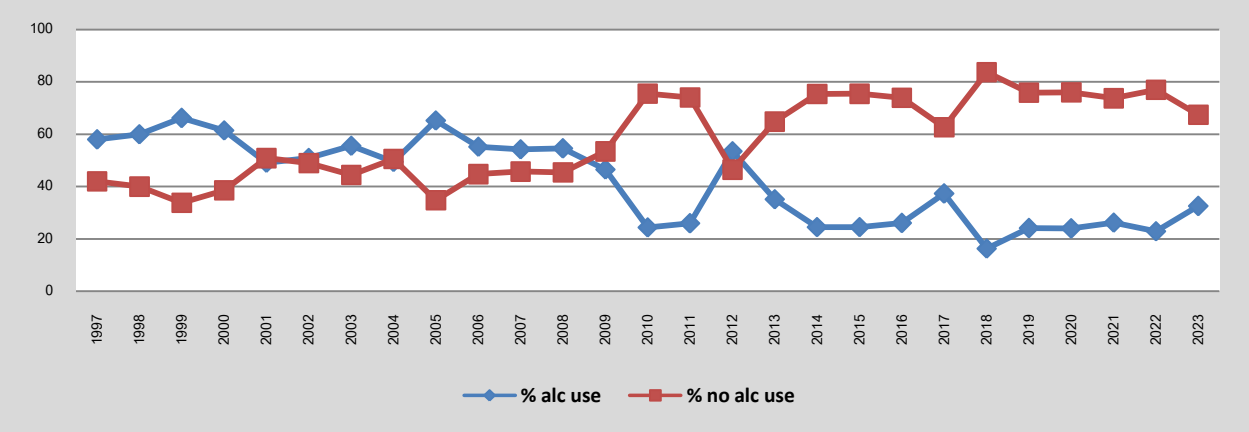
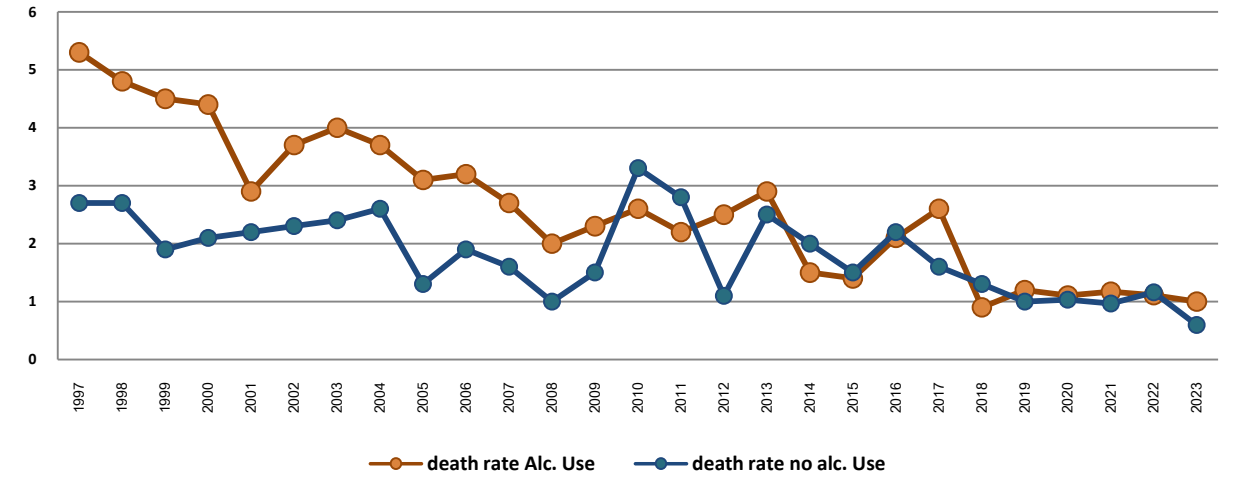


Figure 35 Proportion of motorcyclist deaths with & without alcohol use (1997-2023)



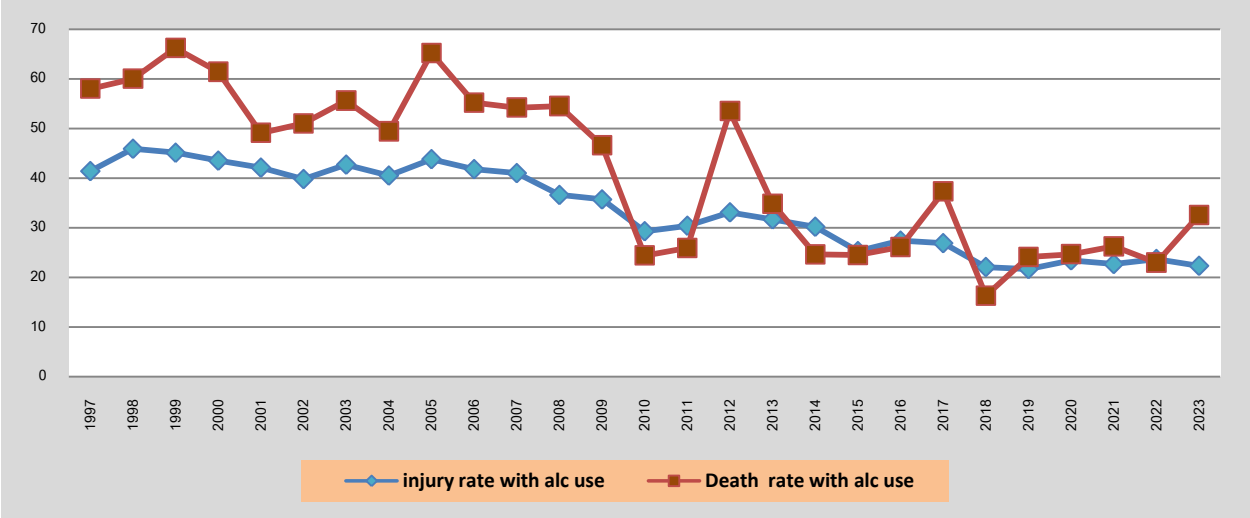
Due to number of death among vehicle users apart from motorcycle was small and the rate was fluctuated, we would not analyze the mortality of other vehicle user.

Figure 36 Death rate of motorcyclist with & without alcohol use (1997-2023)



Death rate of motorcyclist with alcohol use tended to be decreasing.

Figure 37 Injury rate and death rate of motorcyclist with alcohol use (1997-2023)



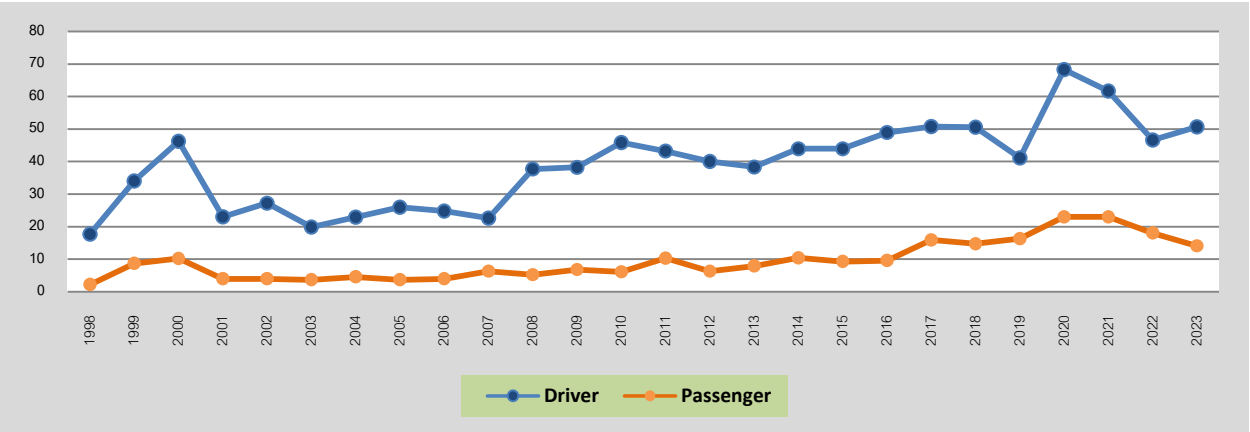
For motorcycle injury, the death rate of alcohol use tended to be decreasing in both group.

2.5.4 Seat belt use

Table 30 Injuries and Death rate with and without seat belt use (1997-2023)

Injury																											
Year		1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Driver	Seat belt	51	80	86	67	66	60	75	73	68	62	75	110	125	152	118	127	157	111	130	145	142	180	189	179	184	156
	Non Seat belt	237	155	100	224	177	242	252	208	206	212	124	178	148	200	177	205	201	142	136	141	139	258	88	87	155	121
	total	288	235	186	291	243	302	327	281	274	274	199	288	273	352	295	332	358	253	266	286	281	438	277	291	395	308
	% seat belt use	17.7	34	46.2	23	27.2	19.9	22.9	26	24.8	22.6	37.7	38.2	45.8	43.2	40	38.3	43.9	43.9	48.9	50.7	50.5	41.1	68.23	61.51	46.58	50.65
Passenger	Seat belt	14	37	45	25	27	25	30	26	23	29	18	30	38	51	32	36	47	36	33	54	51	63	61	54	51	37
	Non Seat belt	630	389	397	600	644	644	620	686	559	428	331	408	582	446	480	421	404	351	310	286	295	324	205	163	209	201
	total	644	426	442	625	671	669	650	712	582	457	349	438	620	497	512	457	451	387	343	340	346	387	266	235	283	263
	%seat belt use	2.2	8.7	10.2	4	4	3.7	4.6	3.7	4	6.3	5.2	6.8	6.1	10.3	6.3	7.9	10.4	9.3	9.6	15.9	14.7	16.3	22.93	22.98	18.02	14.07
Deaths																											
Year		1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Driver	Seat belt	1	0	0	1	0	2	0	1	1	0	2	2	4	1	2	4	3	1	0	1	0	3	0	0	1	2
	%	2	0	0	1.5	0	3.3	0	1.4	1.5	0	2.7	1.9	3.2	0.7	1.7	3.1	1.9	0.9	0	0.7	0	1.7	0	0	0.54	1.28
	Non Seat belt	13	5	3	3	3	17	12	4	8	8	3	7	9	12	7	10	4	3	8	6	3	15	3	8	3	2
	%	5.5	3.2	3	1.3	1.7	7	4.8	1.9	3.9	3.8	2.4	3.9	6.1	6	4	4.9	2	2.1	5.9	4.3	2.2	5.8	3.41	9.20	1.94	1.65
Passenger	Seat belt	0	0	3	1	2	0	0	0	0	0	1	1	0	1	3	2	0	0	0	1	0	1	0	1	0	0
	%	0	0	6.7	4	7.4	0	0	0	0	0	5.6	3.3	0	2	9.4	5.6	0	0	0	1.9	0	1.6	0	1.85	0.00	0.00
	Non Seat belt	31	11	15	21	29	15	33	22	26	19	6	10	12	19	15	13	10	14	11	10	8	6	5	1	3	1
	%	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	3.5	3.5	2.7	1.9	2.44	0.61	1.44	0.50

Figure 38 Percentage of seat belt use (1997-2023)



The injured drivers use much more seat belt than passengers.

Figure 39 Driver death rate of seat belt and non-seat belt use (1997-2023)

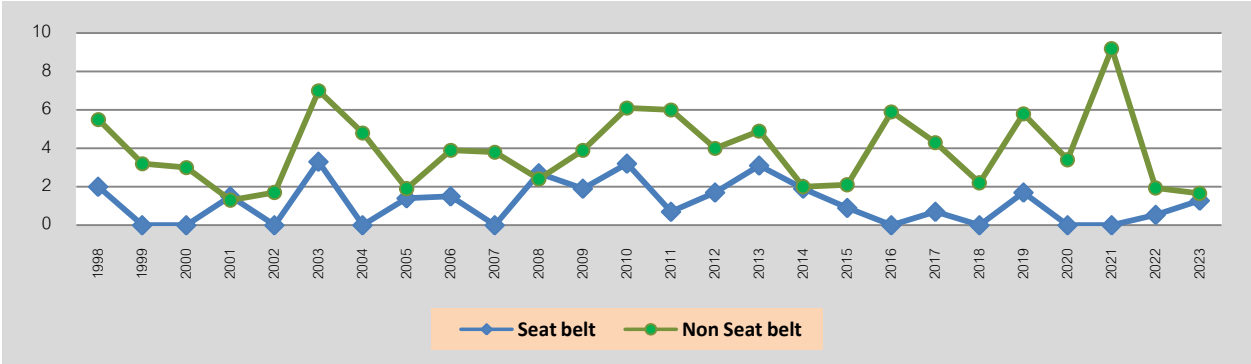
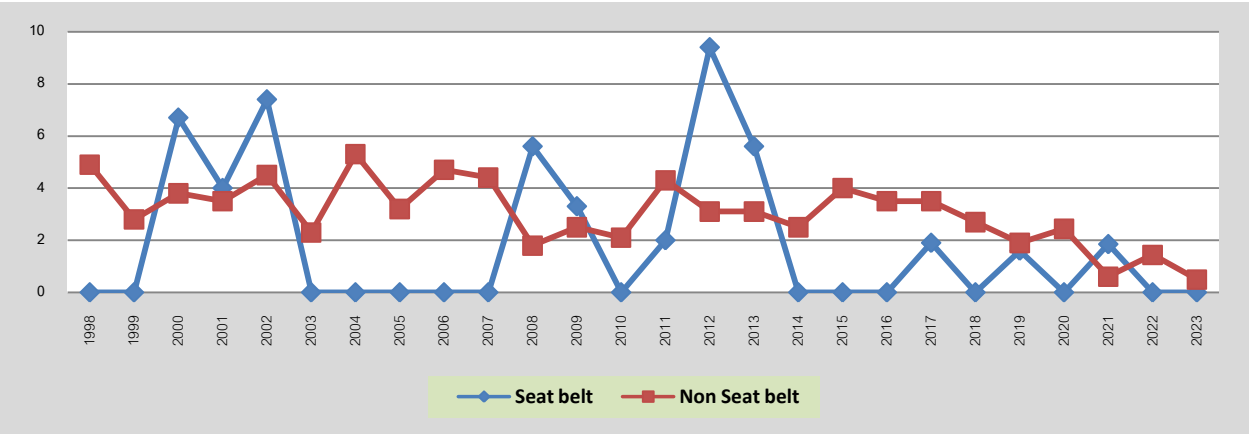


Figure 40 Passenger death rate of seat belt and non-seat belt use (1997-2023)



The trend of seat belt use death rate in both drivers and passengers had significant increased.

Helmet use and alcohol use

Table 31 Number of riders and passengers with and without helmet and alcohol use (1997-2023)

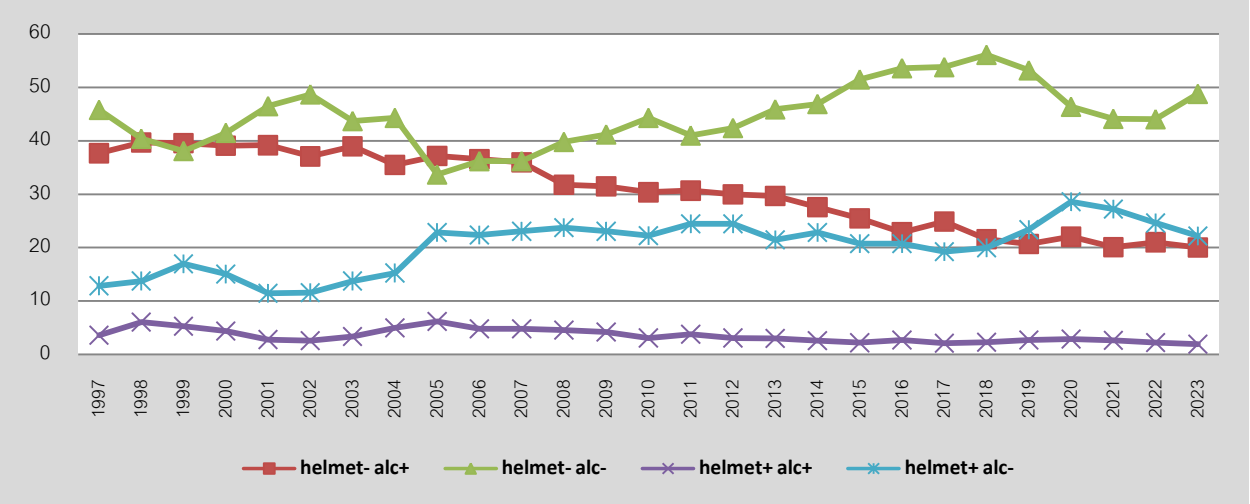
Drive injury	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
helmet- alc+	1,555	1,601	1,723	1,720	1,786	1,949	2,289	1,980	2,053	1,978	2,016	1,759	2,020	1,994	1,950	1,959	1,845	1,741	1,532	1,364	1,675	1,376	1,393	1,303	1,118	1,214	1,144
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	3,622	3,576	3,579	2,738	2,450	2,542	2,782
helmet+ alc+	149	248	229	192	127	136	201	277	339	261	267	253	269	201	243	200	184	164	133	163	140	145	182	172	146	129	110
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	1,301	1,273	1,574	1,690	1,513	1,423	1,266
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	6,738	6,370	6,728	5,903	5,553	5,771	5,702
Passenger injury	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
helmet- alc+	329	304	351	298	324	304	447	383	371	330	310	263	322	298	274	228	216	167	156	180	171	138	139	133	91	128	118
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	902	905	884	769	570	699	691
helmet+ alc+	12	26	22	11	9	10	16	22	28	14	21	24	15	20	23	9	6	12	5	6	4	5	5	2	2	1	1
helmet+ alc-	85	129	136	117	91	87	136	145	247	202	219	195	232	198	219	202	166	168	140	138	129	114	156	120	102	92	88
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	1,206	1,162	1,184	1,024	783	961	931

non helmet use=helmet–,helmet use=helmet+,non alcohol use=alcohol–,alcohol use=alcohol+

Table 32 Percentage of riders and passengers with and without helmet and alcohol use (1997-2023)

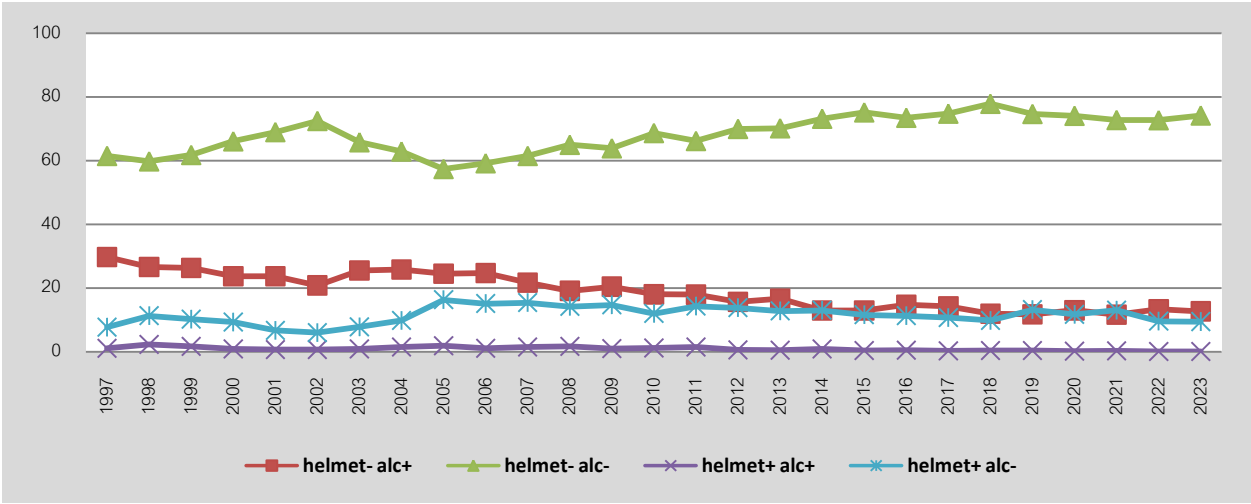
Rider injury	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
helmet- alc+	37.7	39.7	39.6	39.1	39.2	37.1	39	35.5	37.2	36.6	36	31.8	31.5	30.4	30.7	30	29.7	27.6	25.5	22.9	24.9	21.6	20.7	22.07	20.13	21.04	20.06
helmet- 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	42.4	45.9	46.9	51.5	53.6	53.8	56.1	53.2	46.38	44.12	44.05	48.79
helmet+ alc+	3.6	6.1	5.3	4.4	2.8	2.6	3.4	5	6.2	4.8	4.8	4.6	4.2	3.1	3.8	3.1	3	2.6	2.2	2.7	2.1	2.3	2.7	2.9	2.63	2.24	1.93
helmet+ alc-	12.9	13.8	17	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	19.3	20	23.4	28.63	27.25	24.66	22.20
Passenger injury	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	**2019**	**2020**	**2021**	**2022**	**2023**
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	17.9	15.6	16.6	12.9	12.9	14.7	14.2	11.9	11.7	12.98	11.62	13.32	12.67
helmet- alc-	61.5	59.8	61.8	66.1	69	72.5	65.8	62.9	57.4	59.2	61.5	65	63.9	68.7	66.2	70	70.2	73.2	75.2	73.5	74.8	77.9	74.7	74.12	72.80	72.74	74.22
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	1.2	1.5	0.6	0.5	0.9	0.4	0.5	0.3	0.4	0.4	0.19	0.26	0.10	0.11
helmet+ alc-	7.7	11.3	10.2	9.3	6.7	6	7.8	9.8	16.3	15.1	15.4	14.2	14.7	12	14.3	13.8	12.8	13	11.6	11.3	10.7	9.8	13.2	11.71	13.03	9.57	9.45

Figure 41 Percentage of injured riders with and without helmet and alcohol use



It was found that riders without helmet and non-alcohol use were increasing. since 2018 Riders without helmet and non-alcohol used was tended to be slightly decreased. Riders without helmet and alcohol use did not significantly reduce.

Figure 42 Percentage of injuried passengers with and without helmet and alcohol use



It was found that passengers with helmet and non alcohol use 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.

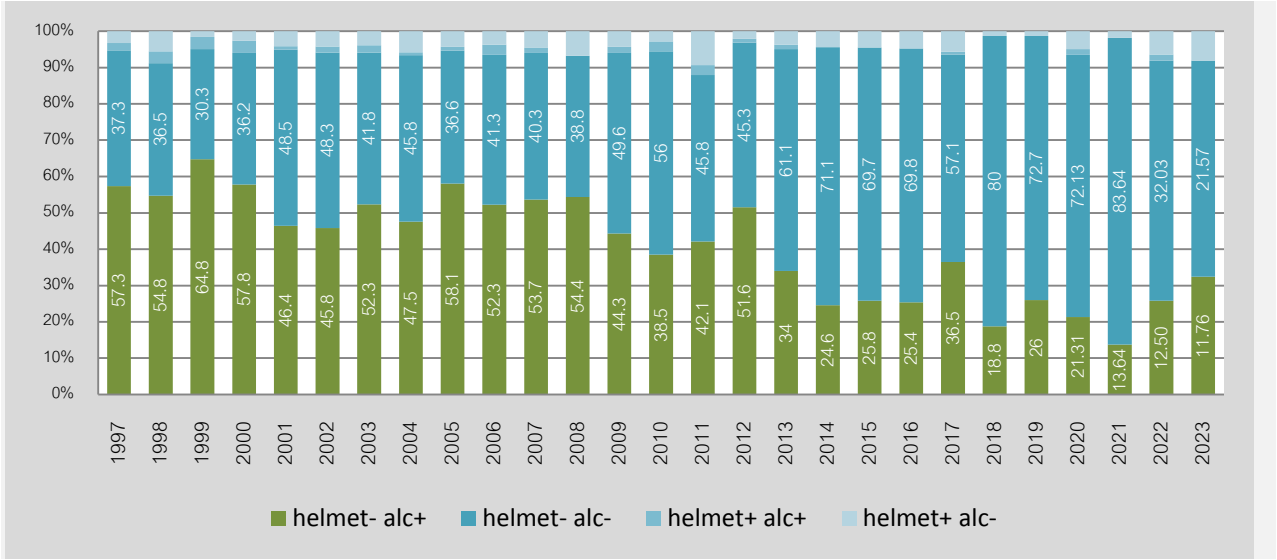
Table 33 Death of riders and passengers with and without helmet and alcohol use (1997-2023)

Rider death	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
helmet- alc+	86	69	79	67	45	54	80	57	54	57	36	56	51	42	45	49	55	28	23	16	46	15	**20**	**13**	**15**	**16**	**12**
helmet- alc-	56	46	37	42	47	57	64	55	34	45	27	40	57	61	49	43	99	81	62	44	72	64	**56**	**44**	**92**	**41**	**22**
helmet+ alc+	3	4	4	4	1	2	3	1	1	3	1	0	2	3	3	1	2	0	0	0	1	0	**0**	**1**	**0**	**1**	**0**
helmet+ alc-	5	7	2	3	4	5	6	7	4	4	3	7	5	3	10	2	6	5	4	3	7	1	**1**	**3**	**2**	**4**	**3**
total	150	126	122	116	97	118	153	120	93	109	67	103	115	109	107	95	162	114	89	63	126	80	**77**	**61**	**110**	**128**	**102**
Passenger death	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
helmet- alc+	14	10	10	8	8	13	8	9	10	6	3	8	7	6	6	4	6	3	2	1	4	0	**0**	**1**	**1**	**0**	**2**
helmet- alc-	21	23	16	13	14	19	28	23	11	14	17	20	18	27	18	10	15	20	12	13	15	12	**4**	**7**	**11**	**9**	**2**
helmet+ alc+	1	0	1	1	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	1	0	3	2	2	1	1	0	0	0	2	0	1	0	1	0	2	0	0	0	**1**	**0**	**1**	**0**	**0**
total	36	33	28	22	25	34	38	33	22	20	20	28	27	33	25	14	22	23	16	14	19	12	**5**	**8**	**13**	**12**	**6**

Table 34 Proportion of death riders and passengers with and without helmet and alcohol use (1997-2023)

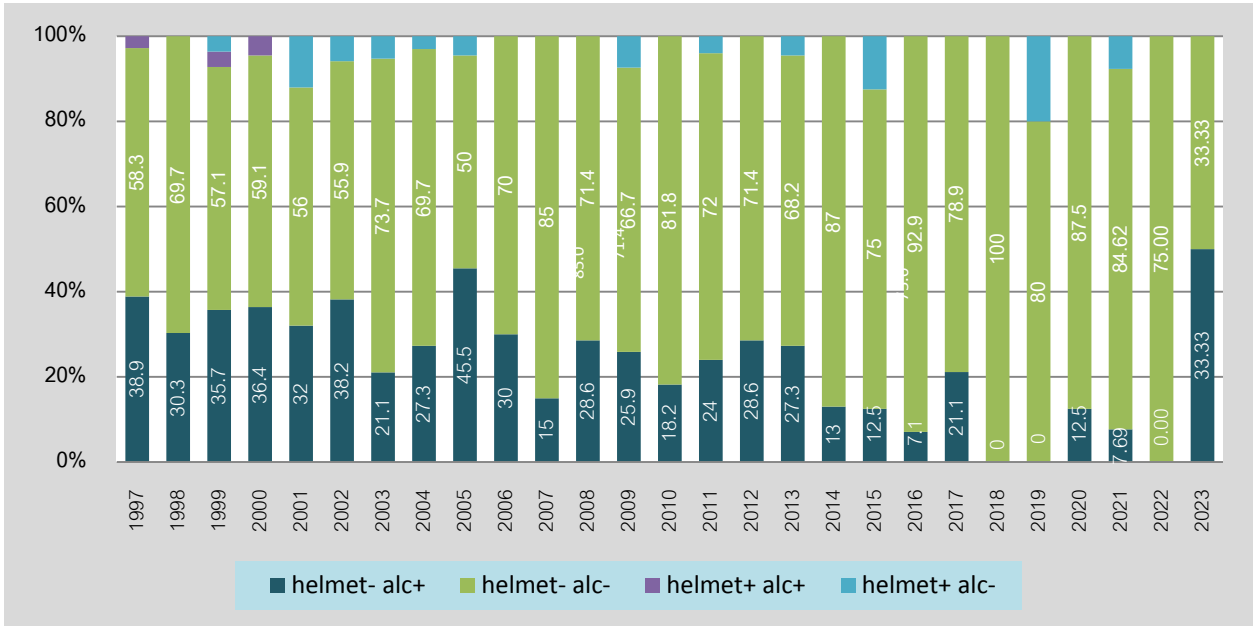
Rider death	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
helmet- alc+	57.3	54.8	64.8	57.8	46.4	45.8	52.3	47.5	58.1	52.3	53.7	54.4	44.3	38.5	42.1	51.6	34	24.6	25.8	25.4	36.5	18.8	**26**	**21.31**	**13.64**	**12.50**	**11.76**
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	45.8	45.3	61.1	71.1	69.7	69.8	57.1	80	**72.7**	**72.13**	**83.64**	**32.03**	**21.57**
helmet+ alc+	2	3.2	3.3	3.4	1	1.7	2	0.8	1.1	2.8	1.5	0	1.7	2.8	2.8	1.1	1.2	0	0	0	0.8	0	**0**	**1.6**	**0.00**	**0.78**	**0.00**
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	5.6	1.3	**1.3**	**4.9**	**1.82**	**3.13**	**2.94**
Passenger death	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
helmet- alc+	38.9	30.3	35.7	36.4	32	38.2	21.1	27.3	45.5	30	15	28.6	25.9	18.2	24	28.6	27.3	13	12.5	7.1	21.1	0	**0**	**12.5**	**7.69**	**0.00**	**33.33**
helmet- alc-	58.3	69.7	57.1	59.1	56	55.9	73.7	69.7	50	70	85	71.4	66.7	81.8	72	71.4	68.2	87	75	92.9	78.9	100	**80**	**87.5**	**84.62**	**75.00**	**33.33**
helmet+ alc+	2.8	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**	**0.00**	**0.00**	**0.00**
helmet+ alc-	0	0	3.6	0	12	5.9	5.3	3	4.5	0	0	0	7.4	0	4	0	4.5	0	12.5	0	0	0	**20**	**0**	**7.69**	**0.00**	**0.00**

Figure 43 Proportion of rider deaths with and without helmet and alcohol use



It was found that riders without helmet and non-alcohol use were increasing. since 2008 Riders without helmet and alcohol use was tended to be decreased.

Figure 44 Proportion of passenger deaths with and without helmet and alcohol use



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 use had no significant changed.

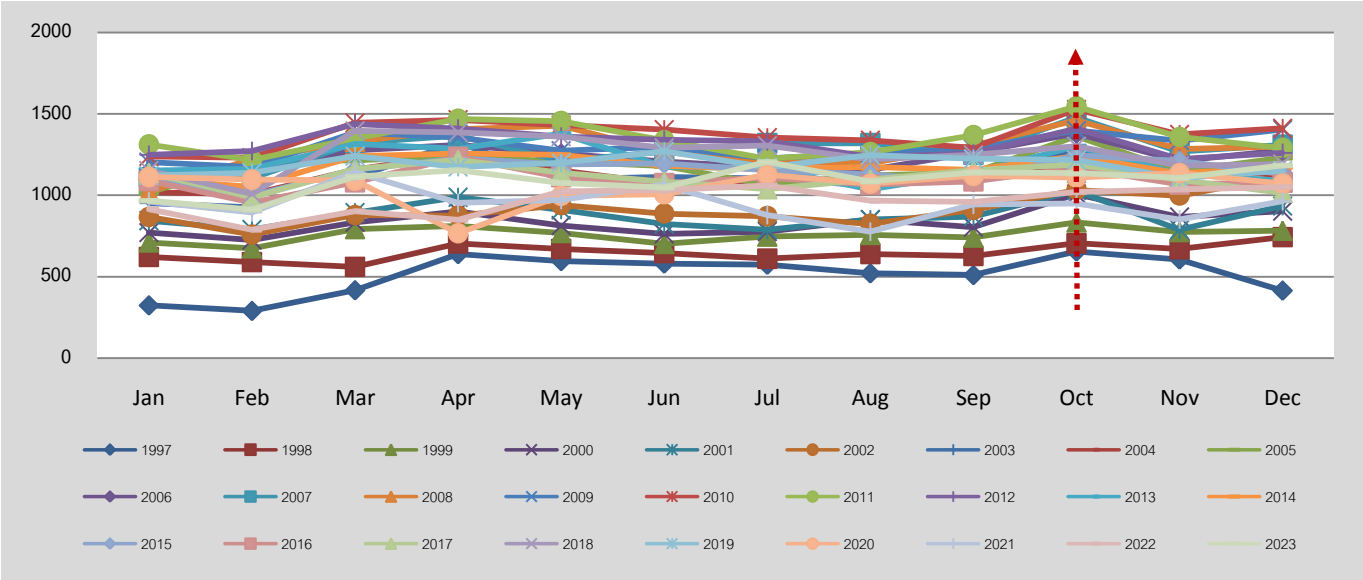
3. Non traffic injuries

3.1 Non traffic injuries by monthly distribution

Table 35 The number of non-traffic injuries by month distribution (1997 - 2023)

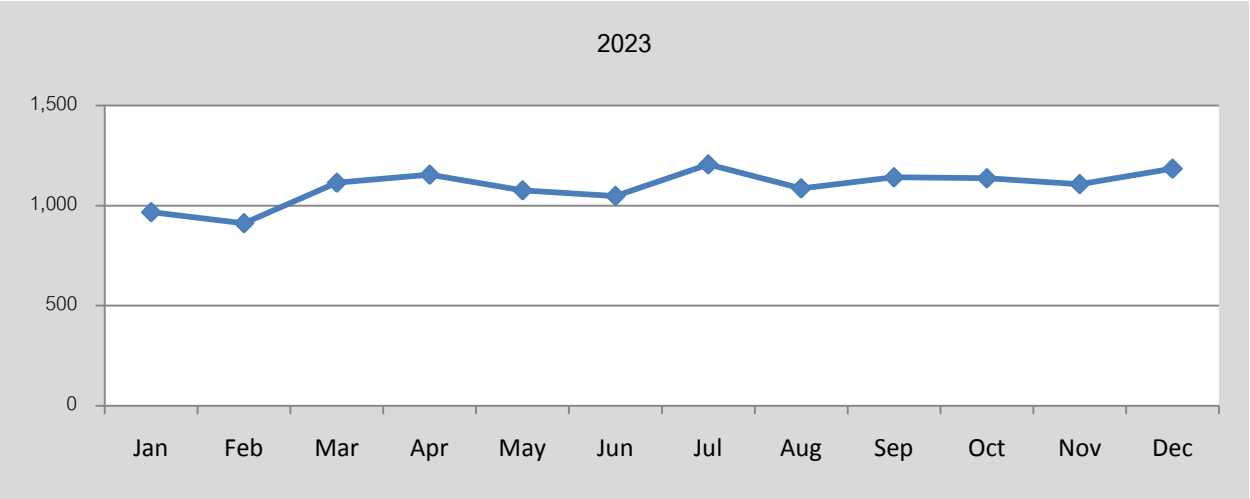
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1997	324	290	417	639	596	581	574	521	510	655	606	415	6,128
1998	621	590	561	704	671	646	611	640	627	705	670	743	7,789
1999	710	674	792	811	768	701	746	756	740	833	774	782	9,087
2000	771	726	834	900	814	763	778	852	804	1,007	868	903	10,020
2001	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
2017	1,138	988	1,162	1,217	1,139	1,083	1,038	1,098	1,154	1,189	1,095	1,016	13,317
2018	1,153	1,009	1,397	1,388	1,361	1,292	1,307	1,221	1,249	1,303	1,183	1,193	15,056
2019	1,121	1,138	1,241	1,174	1,199	1,270	1,171	1,246	1,224	1,216	1,105	1,151	14,256
2020	1,112	1,096	1,090	767	997	1,006	1,126	1,071	1,120	1,109	1,136	1,072	12,702
2021	961	895	1,142	953	972	1,066	880	777	943	949	851	963	11,368
2022	915	789	902	849	1,025	1,032	1,060	967	960	1,021	1,036	1,051	11,622
2023	967	912	1,114	1,154	1,076	1,048	1,205	1,086	1,141	1,136	1,107	1,184	13,130

Figure 45 The number of non-traffic injuries by month distribution (1997 - 2023)



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

Figure 46 monthly distribution of non-traffic injuries in 2023



3.2 Specific type of non traffic injuries

3.2.1 Burn

Table 36 Burn injury classified by burn type (1997-2023)

Burn	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Electrical/radiation	29	51	57	79	59	68	60	67	58	66	52	65	67	97	93	94	116	69	90	90	75	60	72	70	58	52	74
Flame burn	12	19	27	21	32	28	27	46	29	36	30	40	30	30	51	45	48	33	31	33	39	43	37	43	25	31	36
Heat material/liquid	60	78	79	62	100	87	119	119	118	113	121	137	128	103	117	134	111	98	108	89	110	129	121	116	83	86	97
TOTAL	101	148	163	162	191	183	206	232	205	215	203	242	225	230	261	273	275	200	229	212	224	232	230	229	166	169	207
%Burn	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
Electrical/radiation	28.7	34.5	35	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	33.5	25.9	31.3	30.57	34.94	30.77	35.75
Flame burn	11.9	12.8	16.6	13	16.8	15.3	13.1	19.8	14.1	16.7	14.8	16.5	13.3	13	19.5	16.5	17.5	16.5	13.5	15.6	17.4	18.5	16.1	18.78	15.06	18.34	17.39
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	47.2	42	49.1	55.6	52.6	50.66	50.00	50.89	46.86
TOTAL	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100.00

Figure 46 Number of burn by burn type (1997-2023)

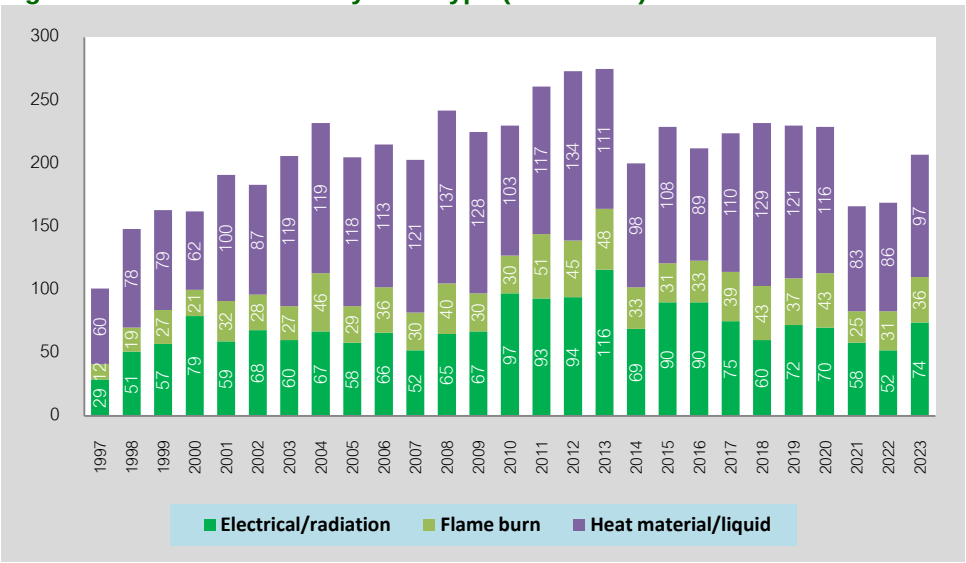
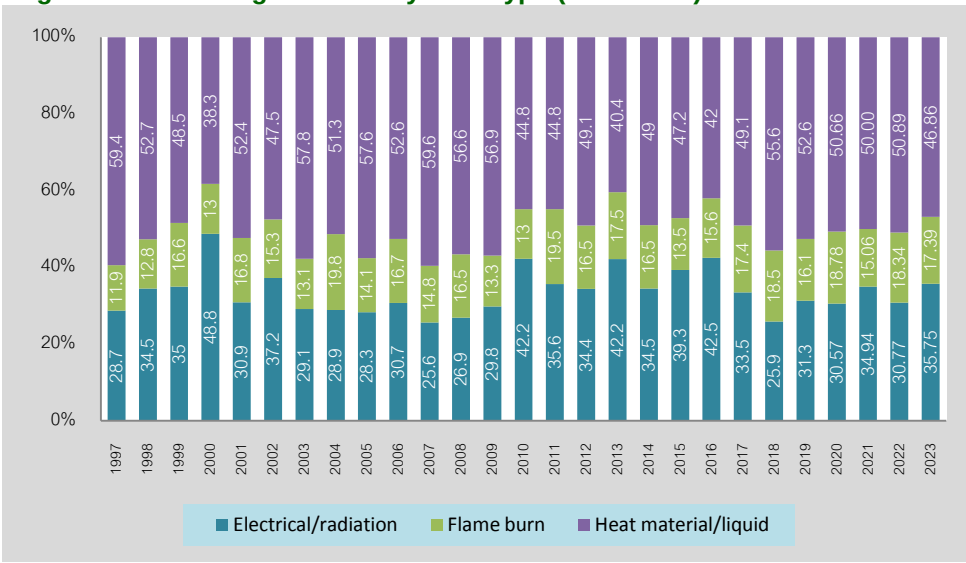


Figure 47 Percentage of burn by burn type (1997-2023)



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 decreasing but the cause of burn injury was proportionally the same except the electric/radiation which seemed to be slightly decreased

3.2.2 Animate injuries

Table 37 Causes of animate injuries (1997-2023)

cause of animate	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
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	190	226	187	146	111	156	174
bitten by rat	26	35	35	43	21	20	31	47	45	52	48	40	90	86	56	59	65	60	44	73	114	96	57	49	32	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	1,648	2,463	1,733	1,301	1,009	933	1,059
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	449	839	609	463	427	451	606
contact with marine animal	0	3	2	1	4	1	1	1	0	0	0	0	7	6	6	0	1	5	3	5	0	3	0	0	2	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	0	0	3	3	0	1	1
expose to other unspecified animate	40	8	32	26	5	8	1	1	4	0	0	1	5	2	4	1	0	1	1	0	0	3	0	0	2	2
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	2,365	3,642	2,634	1,970	1,598	1,577	1,889
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**	2017	2018	**2019**	**2020**	**2021**	**2022**	**2023**
dog bite	75.7	77	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	69.7	67.6	65.8	66.04	63.14	59.16	56.06
rat bite	1.7	2	1.8	2.1	1	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	3.1	3.1	3.6	2.89	3.07	2.03	2.33
bitten, striking by person	10.6	10.3	11.7	9.4	11.1	6.8	8	8.4	5.7	5	6.4	6	5.8	6.1	8.3	7.9	9.2	9.3	6.8	8	6.2	7.1	7.41	6.95	9.89	9.21
bitten, struck by other mammal	6.5	6.3	5.9	7.2	8.9	8.2	8.2	8.2	8.9	9	10	9.2	12.4	11.6	14.9	16.1	16	15.1	18.6	19	23	23.1	23.50	26.72	28.60	32.08
expose unspecified animal	2.6	0.5	1.6	1.3	0.2	0.3	0	0	0.1	0	0	0	0	0.1	0.1	0	0	0	0	0	0	0.1	0	0	0.13	0.11

Figure 48 Number of animate injury by cause (1997-2023)

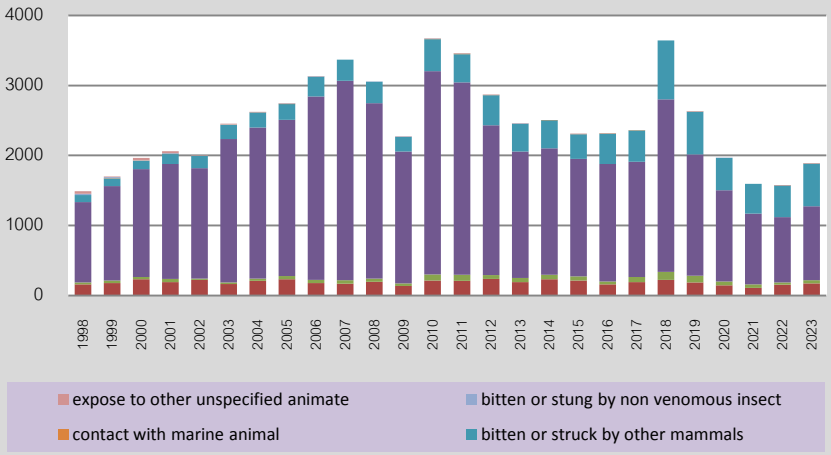
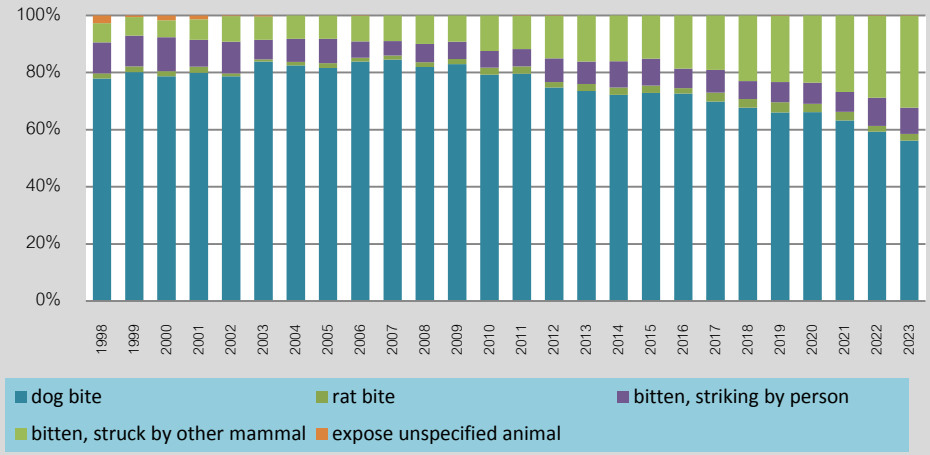


Table 49 Percentage of animate injury by cause (1997-2023)



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

3.2.3 Inanimate injuries

Table 38 Inanimate injuries (1997-2023)

Occupation	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
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	1,889	2,017	2,042	1,879	1,825	1,782	2,030
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	713	675	708	598	480	534	579
agriculture	308	328	367	362	339	319	275	198	201	187	261	317	384	339	352	301	244	184	162	133	106	147	91	92	62	35
officer	126	129	372	372	239	164	192	240	269	322	184	208	495	471	405	416	425	386	391	427	493	505	341	285	342	320
other	496	256	421	-	153	170	523	449	649	695	306	332	872	838	884	912	847	800	739	806	844	840	942	771	713	734
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	3,968	4,135	4,242	3,851	3,457	3,440	3,698
Occupation	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
labor	34.6	38.1	28.2	40.2	45.9	50.9	48	50.7	49.1	47.5	52.7	52.3	42.5	44.2	46	46.7	48.9	47.5	49.4	47.6	48.8	48.1	48.79	52.79	51.80	54.89
student	22.5	32.2	36.5	31.3	28.6	29.9	25.1	27	24.8	25.3	27	25.2	20.6	19.8	18.8	17	15.9	18	16.6	18	16.3	16.7	15.53	13.88	15.52	15.66
agriculture	14.2	13.7	11.2	14	11.8	9.4	7.5	5	4.7	4.2	7.1	8.3	8.1	7.4	7.5	6.7	5.7	4.6	4.3	3.4	2.6	3.5	2.36	2.66	1.80	0.95
officer	5.8	5.4	11.3	14.4	8.3	4.8	5.2	6	6.3	7.3	5	5.5	10.4	10.3	8.7	9.3	9.9	9.7	10.3	10.8	11.9	11.9	8.85	8.24	9.94	8.65
other	22.8	10.7	12.8	0	5.3	5	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	20.3	20.4	19.8	24.46	22.30	20.73	19.85

Figure 50 Number of inanimate injuries by occupation (1997-2023)

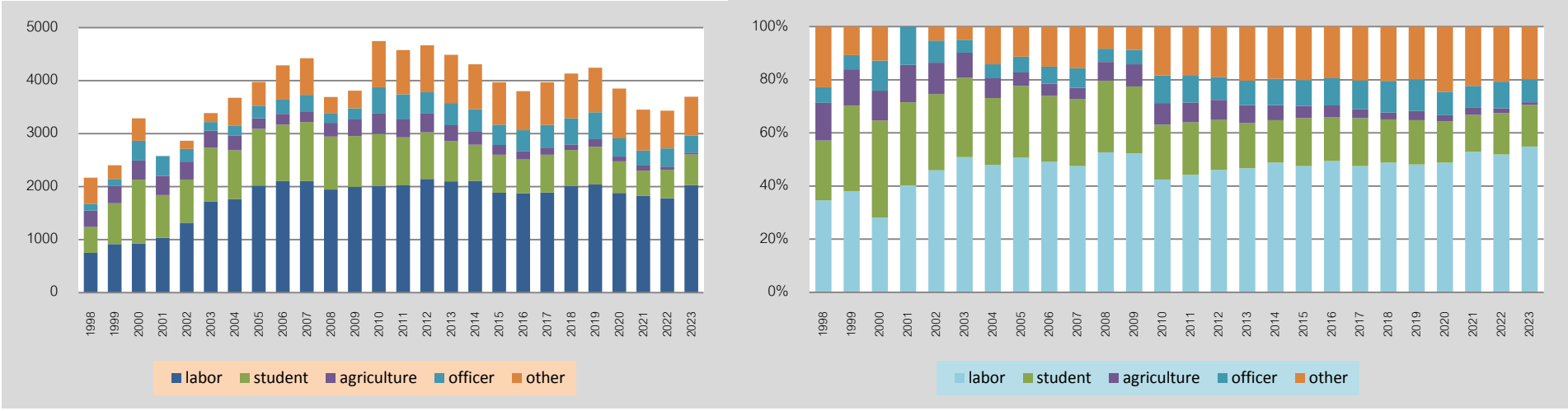


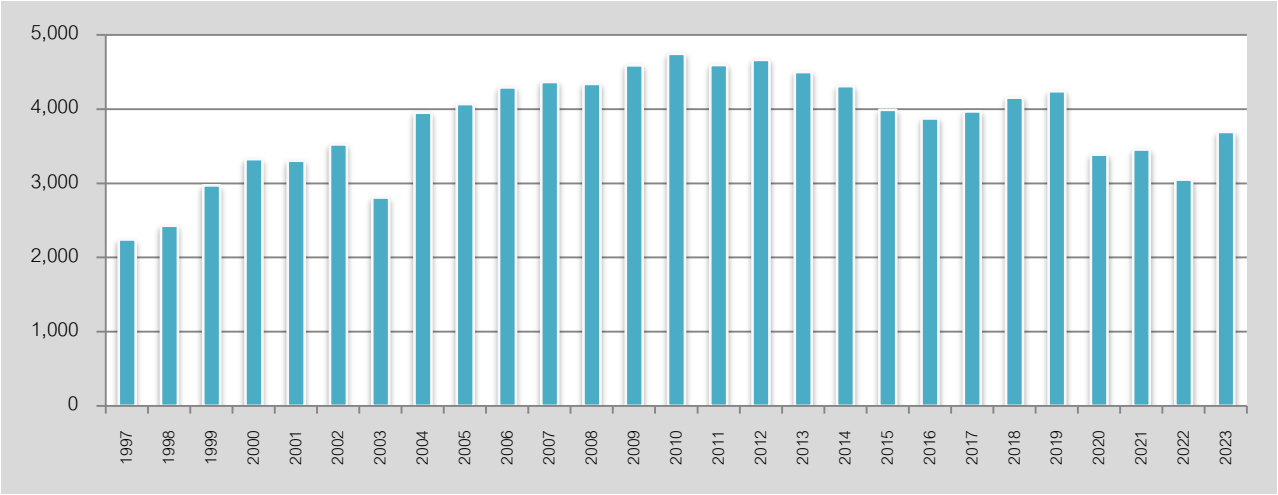
Figure 51 Percentage of inanimate injuries by occupation (1997-2023)

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 39 Time distribution of inanimate injuries (1997-2023)

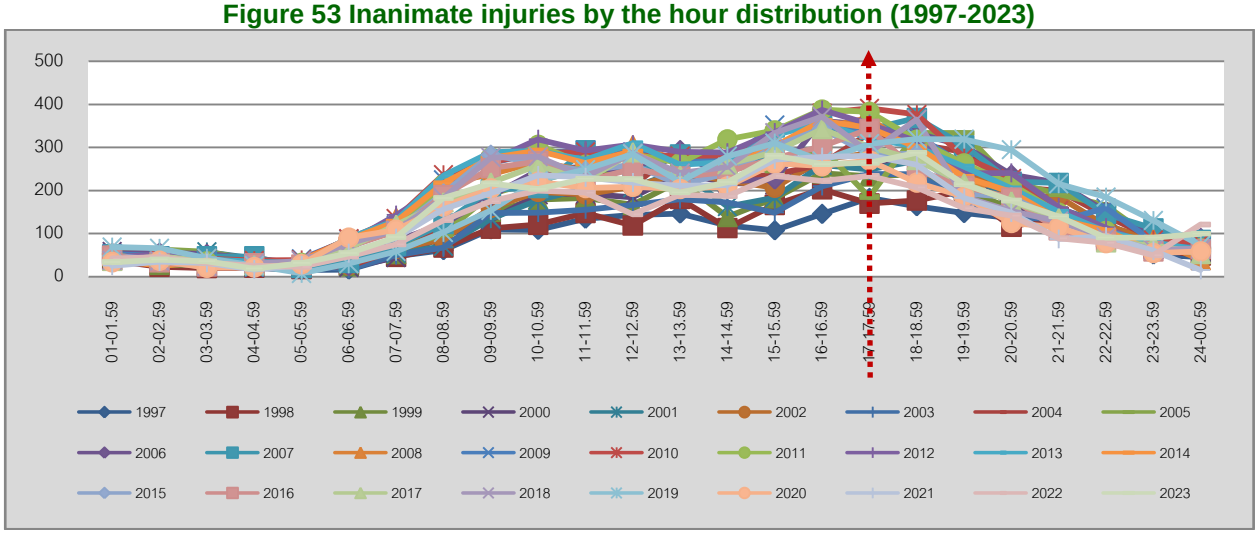
Time	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
01-01.59	35	38	46	59	42	53	48	67	65	55	52	49	53	41	52	45	41	40	49	49	37	38	69	34	26	42	34
02-02.59	40	23	28	42	46	43	35	53	63	56	47	48	48	43	34	51	42	25	39	34	48	37	66	37	35	45	40
03-03.59	30	20	28	41	58	32	42	32	58	53	47	37	35	42	36	39	40	34	35	24	36	25	43	21	32	33	36
04-04.59	21	21	26	35	43	36	34	39	39	43	47	35	22	38	30	31	35	20	28	31	27	31	26	22	17	25	19
05-05.59	16	18	28	19	25	22	25	25	32	31	20	31	42	39	32	29	32	38	28	28	32	37	8	29	27	23	32
06-06.59	17	27	25	22	33	27	18	24	33	25	32	82	87	88	85	80	90	86	69	70	67	78	30	91	55	47	55
07-07.59	48	46	53	45	55	65	50	63	64	84	72	137	119	135	111	143	131	128	109	106	121	108	59	109	90	75	92
08-08.59	62	68	90	95	71	87	68	111	99	123	123	216	225	237	214	213	235	217	193	189	173	183	103	163	157	131	183
09-09.59	110	112	151	132	135	160	148	192	192	187	203	238	264	266	277	269	289	276	283	252	219	277	154	205	194	175	217
10-10.59	109	121	179	191	178	197	149	230	223	247	206	267	289	287	306	319	292	293	262	268	259	279	223	221	236	200	204
11-11.59	135	148	183	193	205	191	156	255	250	256	294	246	293	290	260	293	271	264	246	222	223	232	249	206	231	195	228
12-12.59	144	119	167	185	207	209	167	211	243	244	237	306	290	281	285	307	310	291	260	251	289	287	285	209	219	145	227
13-13.59	147	181	222	241	247	240	180	295	289	294	284	269	274	280	264	290	260	235	213	232	235	241	220	204	211	190	196
14-14.59	119	113	139	218	163	223	173	229	261	222	258	276	268	282	319	288	266	255	240	243	261	255	280	210	213	187	220
15-15.59	108	167	182	214	184	207	149	237	247	226	285	303	352	326	340	335	329	303	302	275	290	334	310	263	272	234	281
16-16.59	146	203	240	267	259	273	210	262	300	362	361	347	339	380	388	387	356	362	344	303	343	372	269	257	278	222	262
17-17.59	183	170	233	251	249	286	239	333	185	352	342	369	348	391	383	354	322	346	284	343	302	289	309	270	281	234	265
18-18.59	164	177	238	276	269	271	238	308	334	333	369	291	329	377	318	314	302	301	285	248	271	365	320	219	260	207	288
19-19.59	148	199	201	258	248	254	177	290	334	304	305	207	260	278	263	240	256	232	193	210	217	186	319	186	183	159	215
20-20.59	136	116	159	162	177	188	137	208	220	237	221	222	214	228	215	241	205	197	185	183	175	153	295	125	149	142	177
21-21.59	126	139	140	137	158	186	135	200	192	218	218	145	128	154	149	161	151	134	131	108	136	129	216	115	88	89	140
22-22.59	101	91	89	106	125	119	92	141	166	152	146	93	160	98	106	114	105	107	84	83	80	92	185	78	94	79	91
23-23.59	52	65	72	78	70	87	77	90	87	97	112	87	82	85	64	69	80	60	67	59	74	63	131	55	61	50	91
24-00.59	46	49	53	58	57	67	61	57	93	90	85	39	71	80	66	54	62	65	62	64	53	65	73	59	16	121	100
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	3,968	**4,156**	**4,242**	**3,388**	**3,425**	**3,050**	**3,693**

Figure 52 Number of Inanimate injuries (1997-2023)

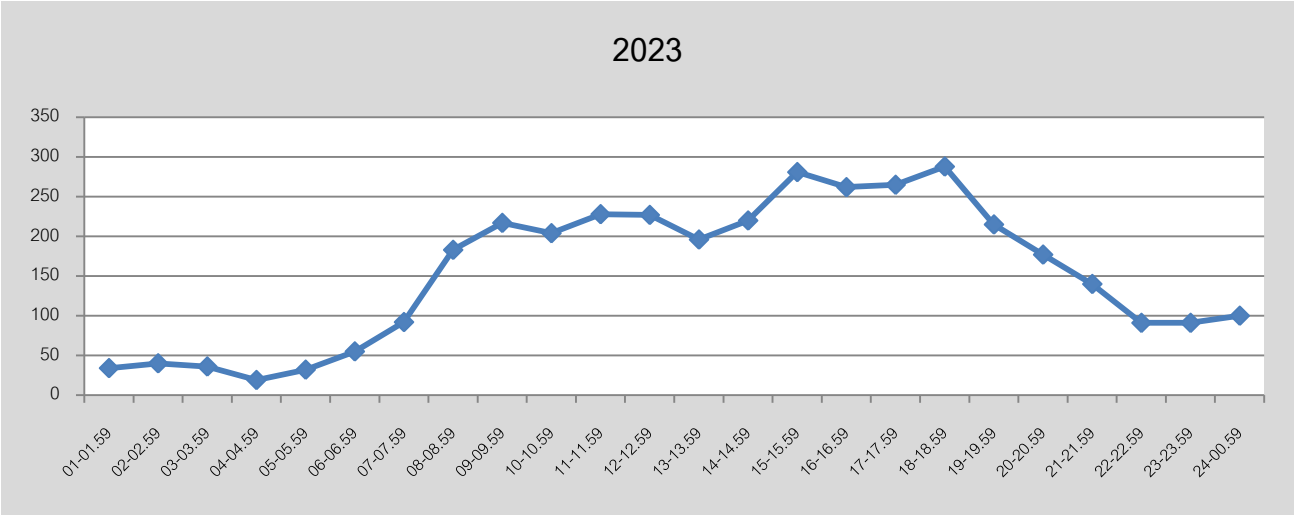


It was shown that inanimate injuries tended to be slightly increased 1997 to 2012 and then was decreased.

Figure 53 Inanimate injuries by the hour distribution (1997-2023)



It was shown that the highest incidence of inanimate injuries occurred during 04.00 p.m. to 06.00 p.m.



3.2.4 Falling

Table 40 Falls injuries by age-group distribution (1997-2023)

Age	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
<10	669	709	741	855	738	810	862	885	831	844	849	795	828	773	774	710	707	698	668	691	643	614	548	475	228	469
10_19	419	469	462	491	504	554	594	615	656	644	661	656	608	609	545	446	436	495	424	420	377	428	384	288	256	390
20-29	208	234	234	261	286	354	343	374	410	380	440	411	477	484	471	442	413	411	451	375	426	444	428	376	249	498
30-39	178	212	231	258	299	280	346	315	372	362	362	434	432	459	508	389	497	462	455	406	440	481	439	401	273	498
40-49	138	193	205	251	258	328	347	335	370	391	406	406	460	523	550	469	504	501	454	476	517	532	531	540	278	543
50-59	103	140	154	152	187	230	335	263	278	320	356	399	432	491	434	479	467	480	513	516	578	560	592	559	368	647
60-69	101	116	118	162	147	187	216	211	244	277	293	288	324	368	322	366	383	421	402	451	510	552	543	534	394	587
≥70	95	120	108	150	159	206	245	313	305	316	416	346	456	542	503	592	545	590	568	633	722	915	772	769	684	914
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	3,968	4,213	4,526	4,237	3,943	2,730	4,546
%	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
<10	35	32.3	32.9	33.1	28.6	27.5	26.2	26.7	24	23.9	22.4	21.3	20.6	18.2	18.8	18.2	17.9	17.2	17	17.4	15.3	13.6	12.93	12.05	8.35	10.32
10_19	21.9	21.4	20.5	19	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	12.2	10.8	10.6	8.9	9.5	9.06	7.30	9.38	8.58
20-29	10.9	10.7	10.4	10.1	11.1	12	10.4	11.3	11.8	10.8	11.6	11	11.9	11.4	11.5	11.4	10.5	10.1	11.5	9.5	10.1	9.8	10.10	9.54	9.12	10.95
30-39	9.3	9.7	10.3	10	11.6	9.5	10.5	9.5	10.7	10.2	9.6	11.6	10.8	10.8	12.4	10	12.6	11.4	11.6	10.2	10.4	10.6	10.36	10.17	10.00	10.95
40-49	7.2	8.8	9.1	9.7	10	11.1	10.6	10.1	10.7	11.1	10.7	10.9	11.5	12.3	13.4	12	12.8	12.3	11.5	12	12.3	11.8	12.53	13.70	10.18	11.94
50-59	5.4	6.4	6.8	5.9	7.3	7.8	10.2	7.9	8	9.1	9.4	10.7	10.8	11.6	10.6	12.3	11.8	11.8	13	13	13.7	12.4	13.97	14.18	13.48	14.23
60-69	5.3	5.3	5.2	6.3	5.7	6.3	6.6	6.4	7	7.8	7.7	7.7	8.1	8.7	7.8	9.4	9.7	10.4	10.2	11.4	12.1	12.2	12.82	13.54	14.43	12.91
≥70	5	5.5	4.8	5.8	6.2	7	7.5	9.5	8.8	8.9	11	9.3	11.4	12.8	12.2	15.2	13.8	14.5	14.4	16	17.1	20.2	18.22	19.50	25.05	20.11

Figure 54 Number of fall injuries by age-group distribution (1997-2023)

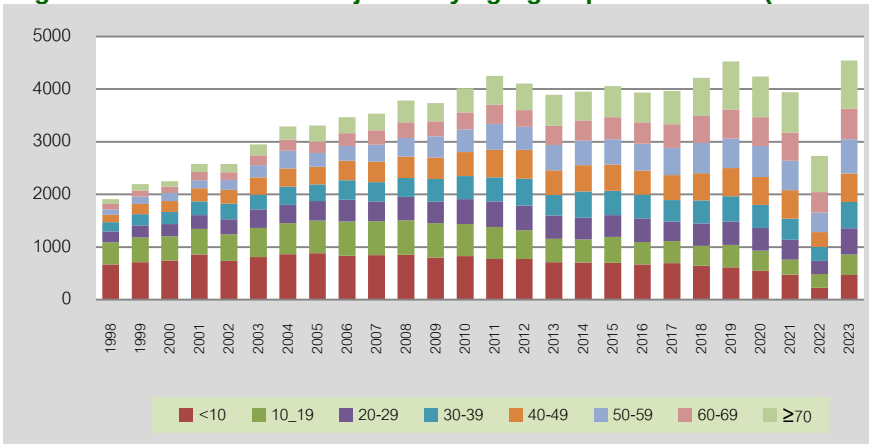
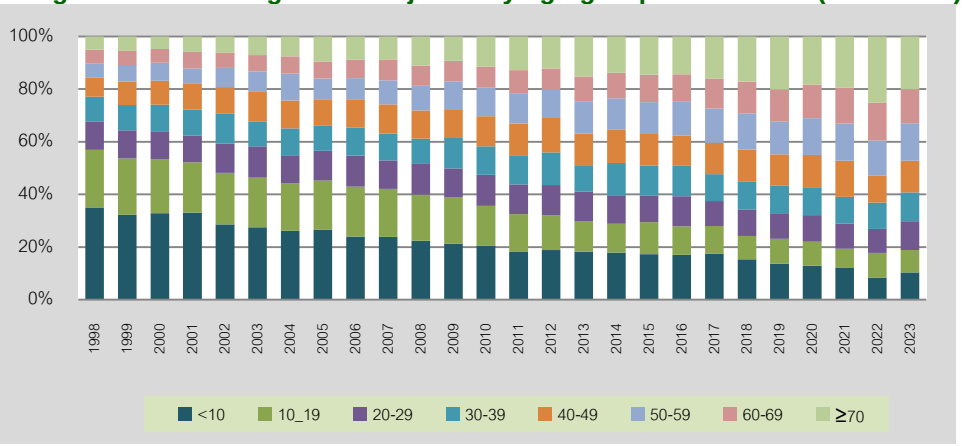


Figure 55 Percentage of fall injuries by age-group distribution (1997-2023)

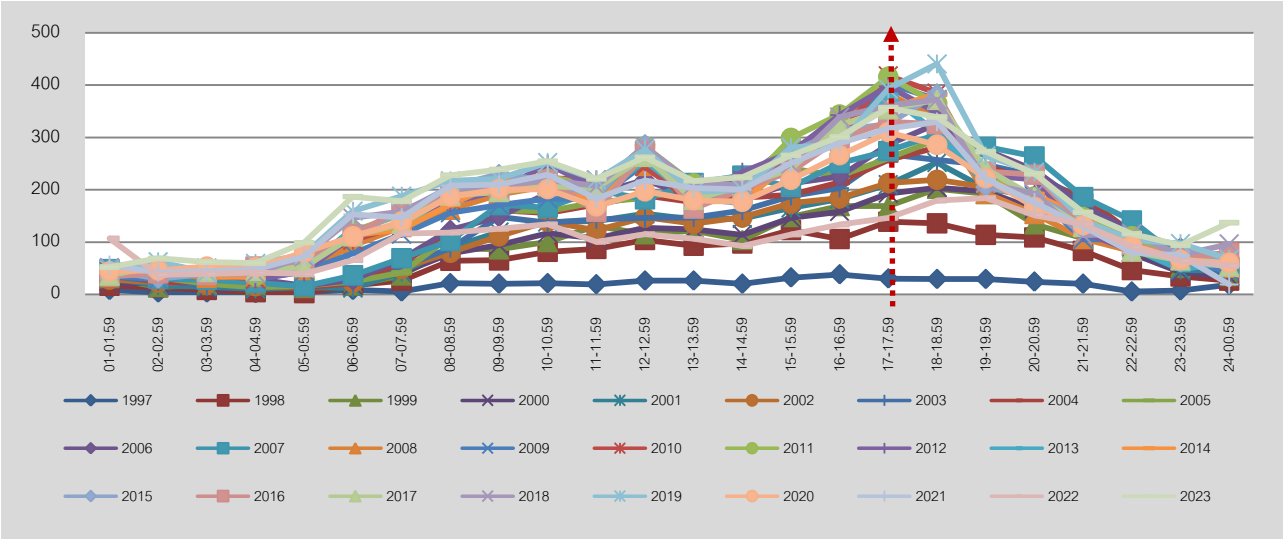


The percentage of fall injuries below 9 years old group and 10-19 years old group tended to be decreased while 50 years old and over tended to be slightly increased.

Table 41 The number of fall injuries by the hour (1997-2023)

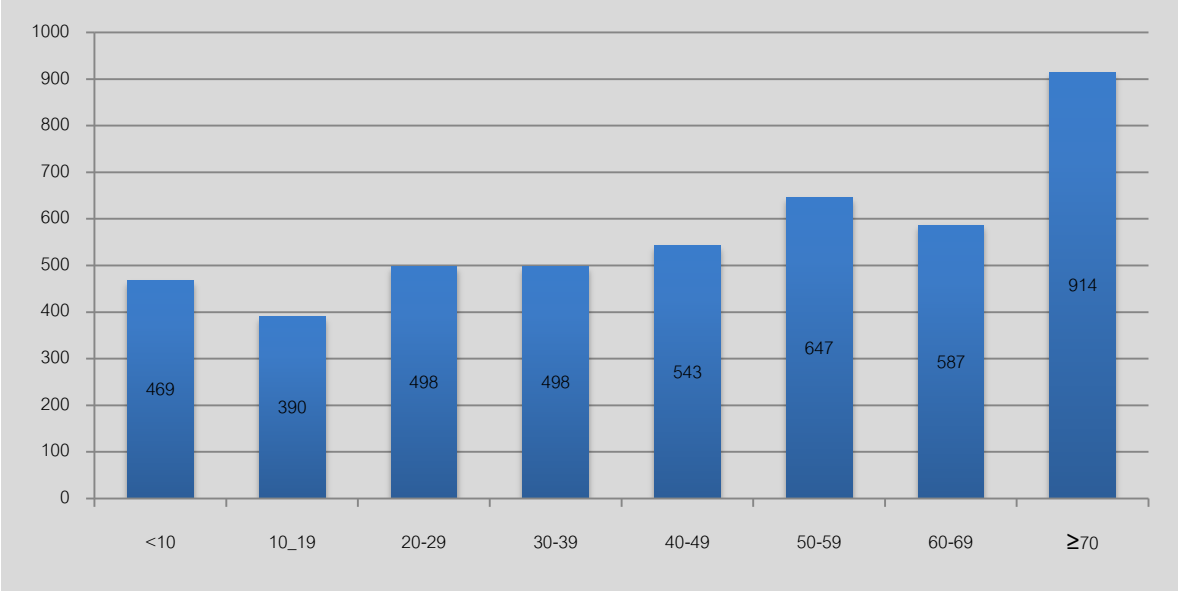
Time	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
01-01.59	8	16	31	20	32	28	35	42	46	48	48	37	36	44	42	39	61	40	46	34	36	51	47	44	56	107	52
02-02.59	3	13	14	22	16	23	25	23	32	29	30	41	28	37	44	47	38	42	30	40	55	46	62	46	42	37	69
03-03.59	3	8	18	11	14	19	17	24	20	28	28	32	50	38	44	47	45	35	39	37	43	41	42	53	44	39	62
04-04.59	2	4	17	10	10	16	18	20	13	29	22	34	28	29	35	30	43	33	40	53	45	40	59	52	48	41	60
05-05.59	4	2	12	17	13	13	18	13	16	16	15	47	44	62	56	43	48	69	61	60	52	71	76	80	72	39	99
06-06.59	8	17	17	17	12	23	22	21	24	27	36	93	78	103	121	112	126	113	116	114	111	146	159	111	153	65	187
07-07.59	5	26	36	41	42	50	53	60	41	67	69	129	115	132	152	126	128	124	157	162	135	158	188	139	147	116	178
08-08.59	21	64	88	78	89	80	88	113	110	123	102	162	156	181	194	175	194	172	206	191	189	202	217	187	208	118	228
09-09.59	20	65	86	94	119	111	148	161	160	148	171	191	171	216	200	199	224	213	230	196	196	208	221	201	210	125	239
10-10.59	21	81	100	117	138	139	137	155	159	193	166	207	183	222	226	249	216	228	218	219	207	218	252	201	229	134	255
11-11.59	19	87	131	107	140	122	143	172	176	192	199	197	182	219	206	203	187	170	187	158	203	207	219	168	183	100	221
12-12.59	26	104	115	127	154	147	146	189	184	219	182	246	250	244	283	285	255	267	287	274	263	282	277	197	218	115	262
13-13.59	26	93	122	124	143	135	147	176	205	183	213	199	186	174	212	184	185	178	181	164	181	210	196	180	203	106	217
14-14.59	20	97	104	114	145	147	160	185	199	180	227	198	219	194	201	234	174	178	206	201	208	209	200	177	201	92	224
15-15.59	32	123	148	146	165	174	188	190	240	212	205	259	287	257	299	271	261	252	272	235	240	248	281	219	251	114	266
16-16.59	38	106	169	158	182	184	203	214	226	225	251	333	292	304	344	343	291	322	314	298	323	339	288	266	289	133	301
17-17.59	30	139	169	193	210	213	268	257	260	286	274	384	403	418	416	398	381	355	326	330	354	361	393	310	317	146	357
18-18.59	29	136	202	204	252	219	257	281	296	326	306	336	373	385	365	347	310	383	384	326	372	372	441	286	330	179	339
19-19.59	29	114	192	197	202	205	248	245	272	276	282	193	214	213	227	228	211	216	206	235	240	212	265	222	221	184	273
20-20.59	24	109	134	163	189	186	227	216	231	237	264	154	192	177	187	220	183	191	186	229	186	192	234	167	176	151	231
21-21.59	20	83	107	142	134	130	182	188	171	170	186	106	105	142	148	118	134	148	140	134	129	113	141	132	130	134	157
22-22.59	5	46	93	78	88	95	118	117	113	121	141	82	105	82	111	84	89	88	98	95	82	116	104	94	80	90	116
23-23.59	7	34	51	42	46	64	54	75	69	89	68	72	65	63	68	62	48	69	61	71	65	75	97	66	75	64	94
24-00.59	18	26	35	33	45	55	45	49	48	43	51	51	44	81	68	63	61	66	67	79	53	96	67	60	19	55	137
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	**3,968**	**4,213**	**4,526**	**3,658**	**3,943**	**2,484**	**4,624**

Figure 56 Fall injuries classified by the hour (1997-2023)



Fall injuries had highest incidence during 5.00-6.00 p.m.

Figure 57 Fall injuries classified by age-group distribution in 2023



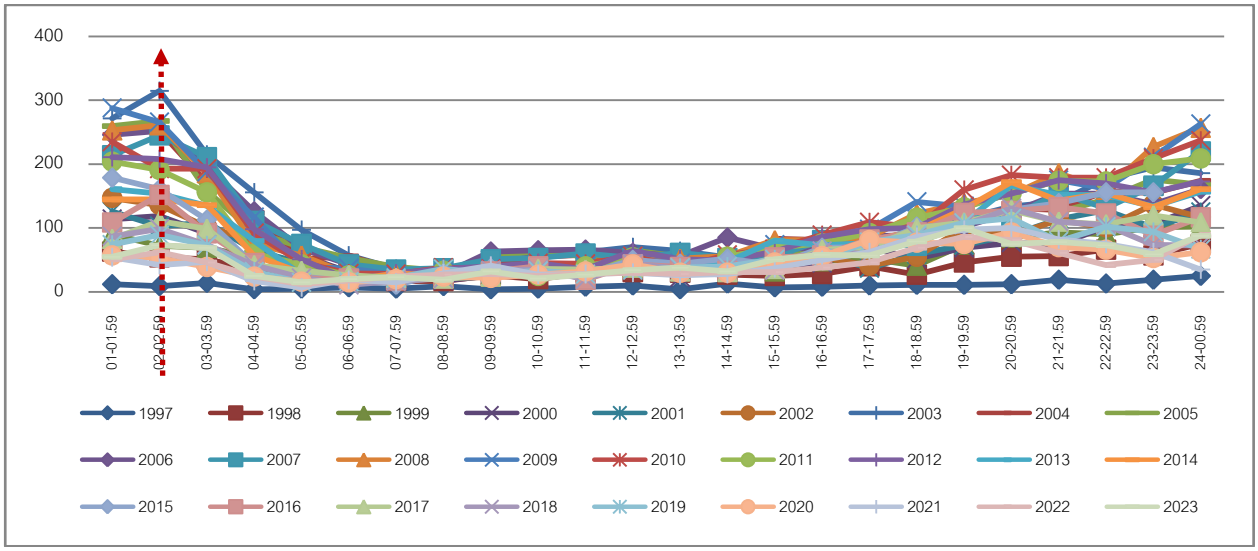
It was shown that age group70 years old and over had highest of fall injuries.

3.2.5 Self-harm and assault

Table 42 The number of assaults by the hour (1997-2023)

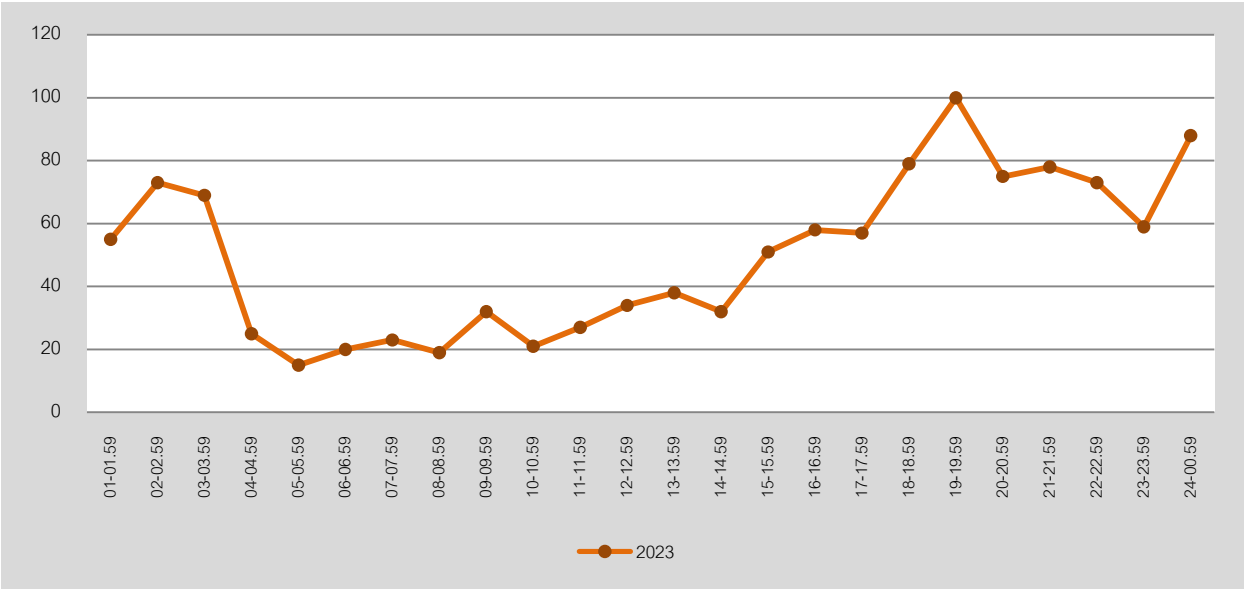
Time	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
01-01.59	12	63	90	114	126	147	272	258	260	246	214	253	288	235	204	211	161	145	179	109	83	87	74	57	54	51	55
02-02.59	9	54	72	119	103	136	315	252	268	252	245	261	266	193	191	208	154	145	161	152	111	99	89	53	42	62	73
03-03.59	14	51	69	92	109	102	215	171	158	197	211	186	188	193	156	195	135	136	113	92	99	74	73	39	47	46	69
04-04.59	4	35	54	78	65	80	156	124	94	126	111	75	117	92	60	98	80	57	42	45	42	42	32	24	17	24	25
05-05.59	5	25	48	57	45	67	97	51	70	68	75	57	38	46	43	51	27	30	23	21	33	22	15	16	7	12	15
06-06.59	7	36	34	31	31	45	57	56	53	43	43	28	37	29	26	19	21	18	26	21	26	11	16	15	19	18	20
07-07.59	5	17	24	29	24	29	36	35	39	28	35	27	26	28	17	29	17	29	11	18	22	17	22	20	15	24	23
08-08.59	9	17	33	18	34	32	34	34	33	28	37	26	30	38	33	36	22	25	29	21	21	21	36	24	29	27	19
09-09.59	4	26	27	25	31	33	45	45	53	63	51	24	37	36	29	40	41	36	37	32	24	34	29	22	41	28	32
10-10.59	5	20	47	37	35	36	65	55	65	65	53	35	35	45	25	45	25	30	28	40	36	35	33	27	27	25	21
11-11.59	8	30	34	38	39	46	62	58	55	66	60	34	41	44	40	35	28	33	28	19	35	20	28	32	28	28	27
12-12.59	10	31	39	52	46	56	70	59	65	61	53	48	51	56	54	64	47	40	50	43	38	44	34	43	30	30	34
13-13.59	4	30	42	23	45	44	64	48	55	56	61	52	45	38	31	51	40	30	44	39	32	36	38	30	26	28	38
14-14.59	13	27	38	51	42	52	54	41	52	85	53	56	50	58	55	49	47	35	52	33	31	37	40	30	28	31	32
15-15.59	7	25	32	41	49	63	61	83	73	67	55	81	74	67	69	63	80	51	42	54	36	34	51	46	37	31	51
16-16.59	8	28	48	45	59	54	59	81	52	69	81	81	80	89	76	86	73	58	69	57	66	64	52	56	50	38	58
17-17.59	10	40	52	69	37	41	72	81	70	87	77	85	98	109	92	98	76	80	70	82	69	59	78	81	62	46	57
18-18.59	11	27	41	52	59	55	87	75	77	89	72	122	141	101	116	100	99	96	102	93	100	86	89	77	86	69	79
19-19.59	11	46	74	69	73	100	115	113	105	102	117	139	134	160	132	137	109	130	106	124	109	105	108	75	97	86	100
20-20.59	12	55	85	77	89	88	134	131		124	117	152	154	183	155	154	167	172	129	127	128	131	115	93	100	81	75
21-21.59	19	56	93	74	114	113	141	128	125	154	155	186	175	179	174	175	152	143	139	133	110	110	79	70	82	61	78
22-22.59	13	66	90	102	128	101	177	158	145	154	131	160	162	179	173	170	152	155	156	123	106	105	102	66	75	42	73
23-23.59	19	57	101	106	101	137	195	155	176	137	166	227	211	209	200	156	134	133	156	89	120	74	94	53	62	50	59
24-00.59	25	75	102	135	125	117	186	174	168	161	220	257	263	237	209	173	157	161	145	117	109	73	67	62	35	89	88
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	**1,586**	1,420	1,394	1,111	1,122	1,027	1,201

Figure 58 Assaults classified by hour (1997-2023)



The assault time was mostly at night, while it peak at 01.00-02.00a.m.

Figure 59 Number of assaults classified by the hour in 2023

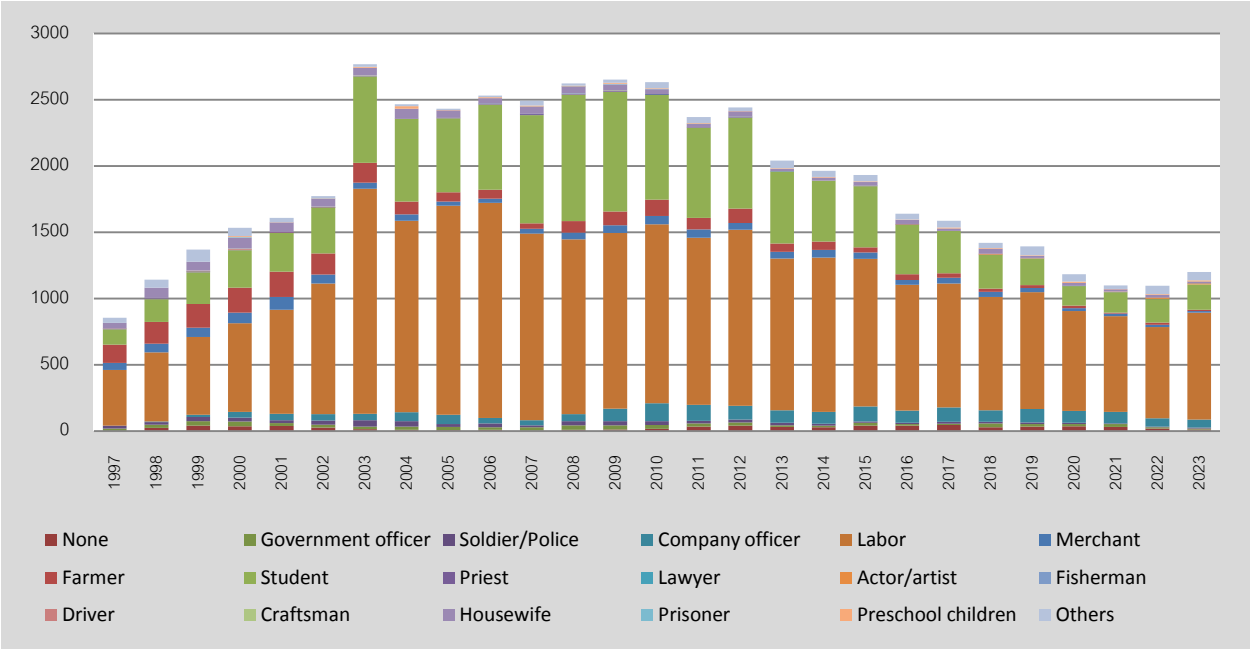


The assault time was mostly at night, while its peak at 7.00 - 08.59p.m.

Table 43 The number of assaults by occupation (1997-2023)

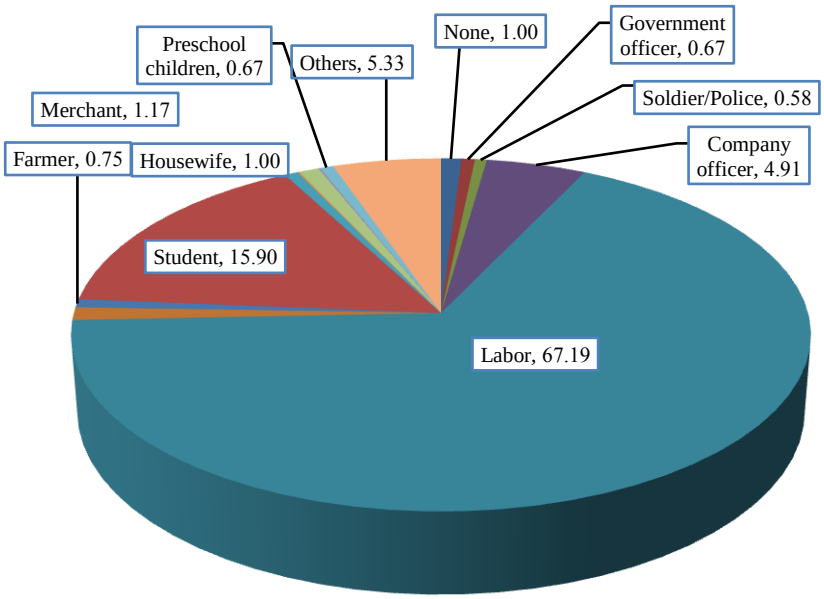
Occupation	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
None	-	25	41	36	38	26	15	10	8	10	3	10	13	17	34	41	31	28	40	42	47	28	34	37	32	20	12
Government officer	20	24	34	36	23	22	19	24	24	20	26	34	30	28	23	24	13	14	22	11	8	30	19	16	21	10	8
Soldier/Police	20	19	32	29	22	32	48	41	21	29	15	31	31	31	21	22	19	13	10	11	14	12	12	10	6	5	7
Company officer	-	4	15	45	47	47	49	67	71	40	37	54	94	133	121	103	93	91	113	90	109	87	101	89	86	61	59
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	936	856	882	754	721	690	807
Merchant	53	66	68	80	98	69	46	49	30	31	35	51	58	64	62	50	51	59	48	38	44	37	32	22	21	17	14
Farmer	138	164	180	187	190	158	150	97	70	68	41	88	105	122	88	109	63	62	38	43	34	26	21	18	7	17	9
Student	116	170	239	283	293	345	651	622	560	641	817	953	903	791	681	686	542	460	463	373	318	252	202	149	155	177	191
Priest	4	10	8	5	6	5	5	5	6	8	9	9	10	6	4	5	2	1	3	5	4	2	2	1	2	1	0
Lawyer	-	-	1	-	-	1	-	-	-	1	-	1	-	1	-	1	1	-		-	-	1	-	1	0	0	0
Actor/artist	1	-	1	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-		1	-	6	1	0	1	10	8
Fisherman	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-		-	-	-	-	0	0	1	1
Driver	-	-	4	4	1	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	1	-	0	0	1	0
Craftsman	-	1	-	3	-	1	2	-	-	-	-	-	1	-	-	1	-	-	1	-	-	-	-	0	0	0	0
Housewife	43	76	64	83	71	60	59	72	53	41	55	53	44	35	24	41	18	21	27	30	16	39	16	22	17	19	12
Prisoner	-	-	-	3	-	1	-	-	-	-	1	1	4	3	1	-	-	-		-	-	-	-	0	0	0	1
Preschool children	-	-	-	9	1	3	8	19	3	6	6	5	9	6	4	3	5	7	4	4	6	5	4	8	4	6	8
Others	40	62	92	62	34	17	19	16	10	12	37	16	23	46	47	27	56	45	49	44	50	38	68	57	26	62	64
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	**1,586**	**1,420**	**1,394**	**1,184**	**1,122**	**1,097**	**1,201**

Figure 60 The number of assaults by occupation (1997-2023)



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

Figure 61 Percentage of assault by occupation in 2023



Percentage of assault in 2023 was highest in labor group (67.19%). The student was the second (15.90%).

Table 44 Assaults classified by type (1997-2023)

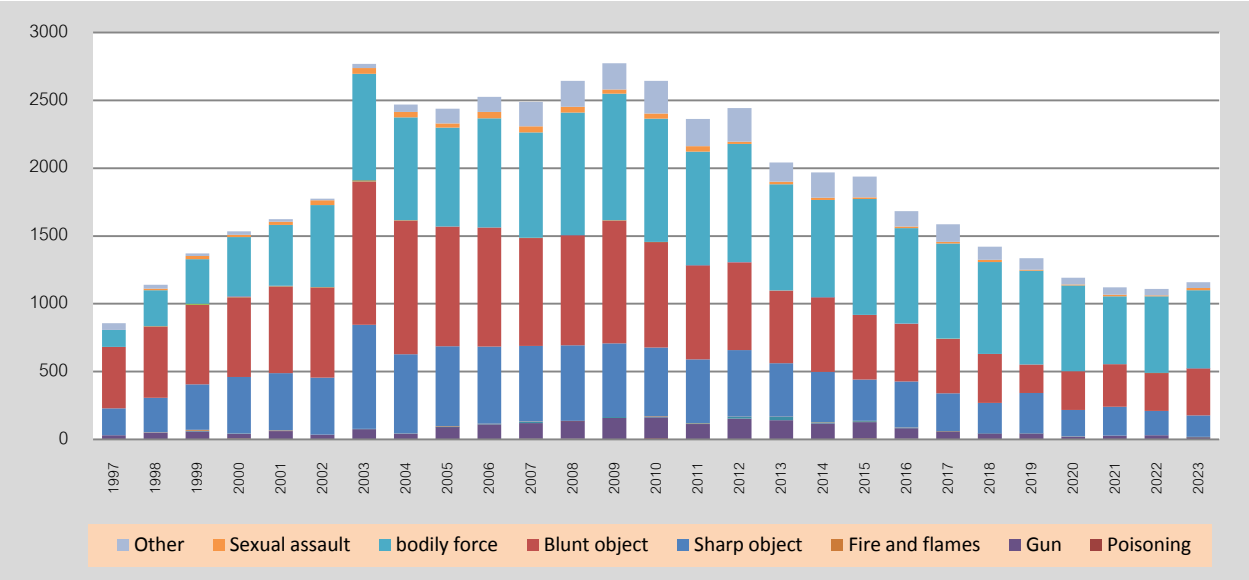
Type of assault	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Poisoning	1	1	3	5	3	2	2	1	3	1	4	4	3	7	3	3	1	2	5	4	2	1	0	0	0	0	0
Hanging	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0
Gun	30	49	56	36	58	34	74	40	89	111	116	133	154	155	111	151	141	117	122	79	56	42	42	20	29	31	16
Explosive material	0	0	4	3	0	0	1	0	1	1	8	0	9	4	4	11	23	5	7	3	1	1	0	0	0	0	1
Fire and flames	0	3	7	0	5	0	0	1	3	2	3	1	0	3	2	3	3	3	3	1	3	0	1	1	0	0	1
Sharp object	197	253	335	415	423	420	767	587	590	570	557	555	543	508	469	491	393	372	303	341	279	223	300	196	212	180	159
Blunt object	455	527	586	587	639	666	1059	985	884	878	796	812	906	779	695	647	535	548	478	424	401	362	210	285	314	279	347
Pushing or placing victim	0	2	9	3	2	2	8	3	0	0	2	0	1	1	0	0	1	0	0	0	2	0	0	0	0	1	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	0	0	0	0	0	0	1
bodily force	124	265	329	438	449	604	784	757	728	805	777	903	933	908	838	870	781	717	853	705	700	677	690	633	500	564	575
Sexual assault	0	12	24	16	23	35	43	40	31	47	45	43	32	37	38	18	20	15	12	10	12	18	9	8	13	7	16
Other	49	27	19	26	18	11	30	54	109	111	178	192	192	242	201	247	141	187	153	115	130	95	83	50	54	48	43
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	**1,586**	**1,420**	1,335	1,193	1,122	1,103	1,159

Assault was classified by types based on ICD10.The assault by bodily force was highest causes

Table 45 Death of assaults classified by type (1997-2023)

Type of assault	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Poisoning	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0
Gun	1	10	14	5	5	4	11	3	11	10	5	7	4	9	2	8	8	5	7	4	0	1	3	1	3	3	1
Sharp object	3	3	5	6	5	8	12	9	6	7	5	8	8	8	2	6	6	6	8	3	7	1	2	2	3	1	1
Blunt object	3	2	5	5	7	6	10	8	8	4	5	8	8	6	7	9	2	5	5	2	3	2	0	0	3	4	1
bodily force	0	2	2	1	1	2	2	1	2	1	2	2	2	4	0	3	2	2	5	1	1	1	1	1	2	0	0
Other	0	1	0	0		0	0	1	1	1	4	8	4	5	5	15	5	13	6	4	4	6	0	2	0	4	1
total	7	18	27	17	18	20	35	22	28	23	21	33	26	32	16	42	23	31	32	14	15	12	6	6	11	12	4

Figure 62 The number of assaults classified by types (1997-2023)



The assault by blunt object was highest in 1997-2007 and assault by bodily force was highest in 2008 - 2023. The trended of assault by bodily force was decreasing year by year.

Figure 63 The number of deaths by type of assault (1997-2023)

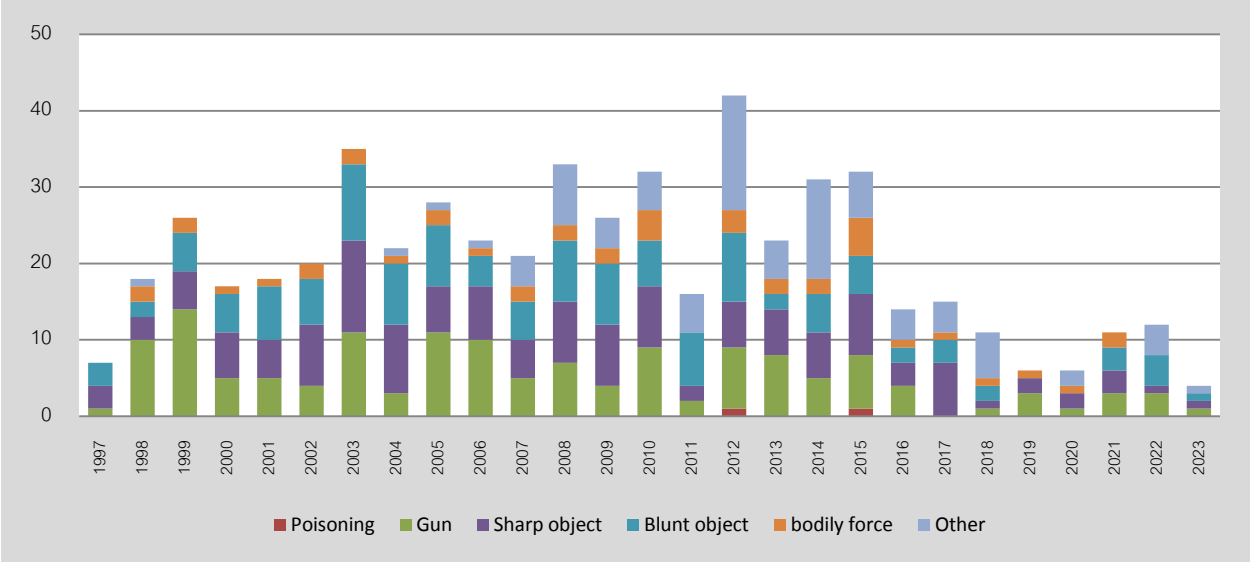
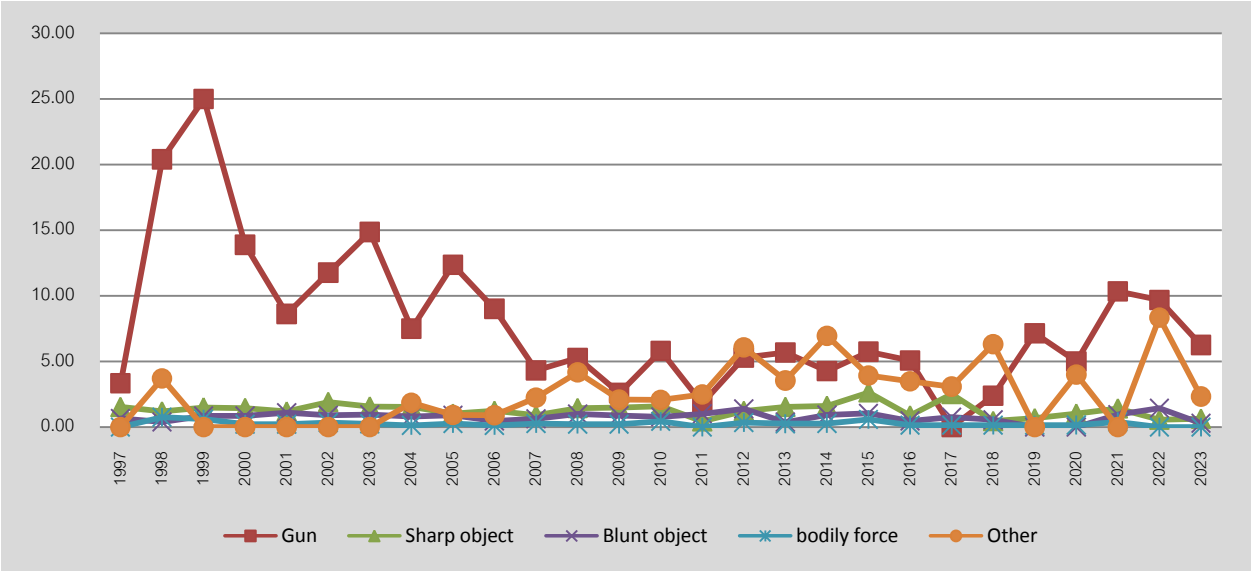


Figure 64 Death rate of assaults classified by type (1997-2023)

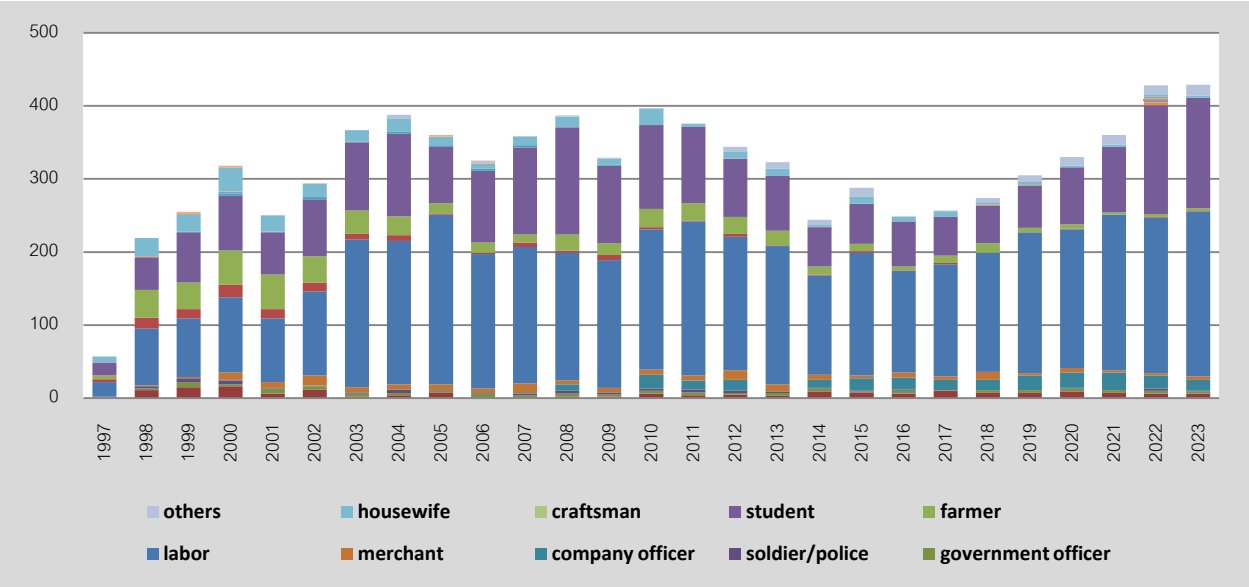


Death rate of assault by gun was highest. The trended of assault by gun was increasing year by year.

Table 46 The Number of self-harm patients classified by occupation (1997-2023)

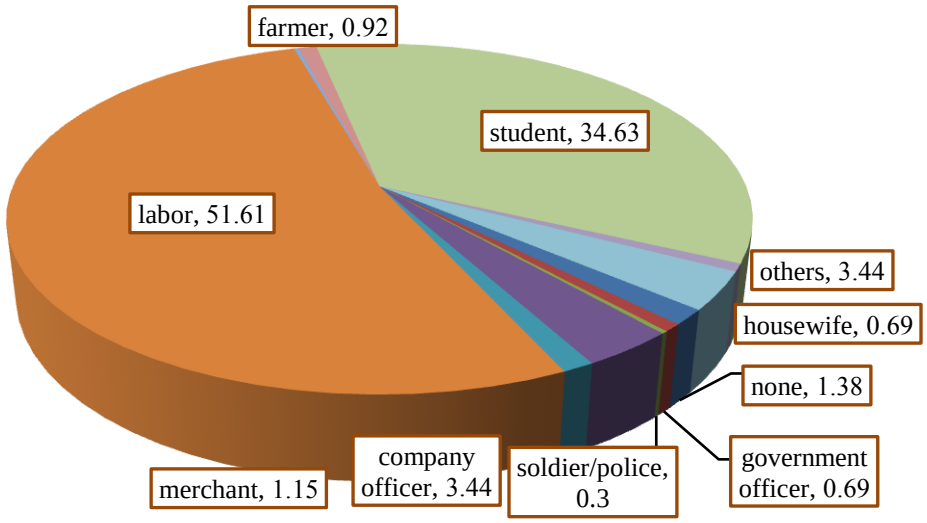
Occupation	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
none	0	11	15	16	6	12	2	4	8	1	1	2	2	6	4	5	3	9	8	6	10	8	8	9	8	6	6
government officer	1	2	7	3	7	4	4	3	2	5	3	4	3	4	4	2	4	4	1	4	1	3	3	4	3	4	3
soldier/police	1	3	5	5	1	0	2	5	1	1	2	4	3	3	4	3	2	1	1	2	0	0	0	1	0	3	1
company officer	0	1	0	1	0	1	0	0	0	0	1	9	0	19	12	15	0	11	17	16	14	14	20	21	24	18	15
merchant	0	1	2	10	8	14	7	7	8	6	13	5	6	7	7	13	10	7	4	7	5	11	3	6	3	3	5
labor	20	77	80	103	87	115	202	196	232	184	187	175	175	192	211	183	189	136	168	139	153	163	193	190	213	213	225
priest	4	15	13	17	13	12	8	8	2	2	6	3	7	3	1	4	1	1	2	1	2	0	0	1	0	1	1
farmer	5	38	36	47	47	36	32	26	14	14	11	22	16	25	24	23	20	11	10	5	10	13	6	6	3	4	4
student	17	45	69	75	58	78	93	113	77	98	119	146	106	115	104	80	75	54	55	62	53	52	58	78	90	149	151
lawyer	0	0	1	3	0	3	1	3	2	3	3	0	2	0	0	0	0	0	0	0	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	0	1	1	0	0	4	0
fisherman	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
driver	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	2	0
craftsman	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	2	0
prisoner	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	2	0
housewife	8	25	24	33	22	18	16	18	12	7	12	14	8	22	4	10	10	3	10	6	8	3	4	2	3	3	3
preschool children	0	0	3	2	0	1	0	0	2	2	0	0	0	0	0	0	0	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	1	6	9	12	13	12	15
Total	57	219	255	318	250	294	367	388	360	325	359	387	329	397	376	344	323	244	288	249	257	274	305	330	360	428	436

Figure 65 The number of self-harm patients by occupation (1997-2023)



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

Figure 66 Percentage of self-harm patients by occupation in 2023



Percentage of self-harm patients in 2023 was highest in labor group (51.61%). The student was the second (34.63%)

Table 47 The number of self-harm patients classified by type (1997-2023)

Type of self harm	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Poisoning	23	135	190	245	211	217	256	255	227	198	239	277	241	288	253	221	205	162	168	162	159	174	189	211	231	320	304
Hanging	3	4	13	10	7	11	9	8	13	14	17	12	14	25	22	21	30	16	33	21	19	26	38	51	33	19	34
Drowning	0	0	0	1	0	0	1	1	1	0	1	1	1	1	3	1	1	0	0	0	0	2	2	0	2	0	2
Gun	3	5	3	3	5	4	7	2	4	4	1	2	5	5	5	5	2	2	2	2	4	2	1	1	3	2	2
Explosive material	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
fire and flames	0	0	1	0	0	1	1	1	0	2	1	0	3	0	2	1	3	1	0	0	1	1	4	3	6	0	1
Sharp object	26	74	35	55	29	43	81	100	75	86	81	86	63	55	67	69	63	58	67	50	58	43	51	39	54	58	62
Blunt object	1	7	11	8	11	6	10	13	33	19	15	9	20	23	18	16	18	4	9	10	7	17	12	19	20	14	15
Jumping	1	1	7	5	3	2	4	10	4	1	3	3	7	5	8	7	5	0	6	7	6	6	10	4	8	9	12
others	2	9	13	7	4	14	5	0	6	1	7	2	3	4	3	3	3	0	3	2	3	3	0	2	3	6	4
total	59	236	273	334	270	298	374	390	363	325	366	392	357	406	381	344	331	244	288	254	**257**	**274**	307	330	360	428	436

Figure 67 Number of self-harm patients classified by type 1997-2023

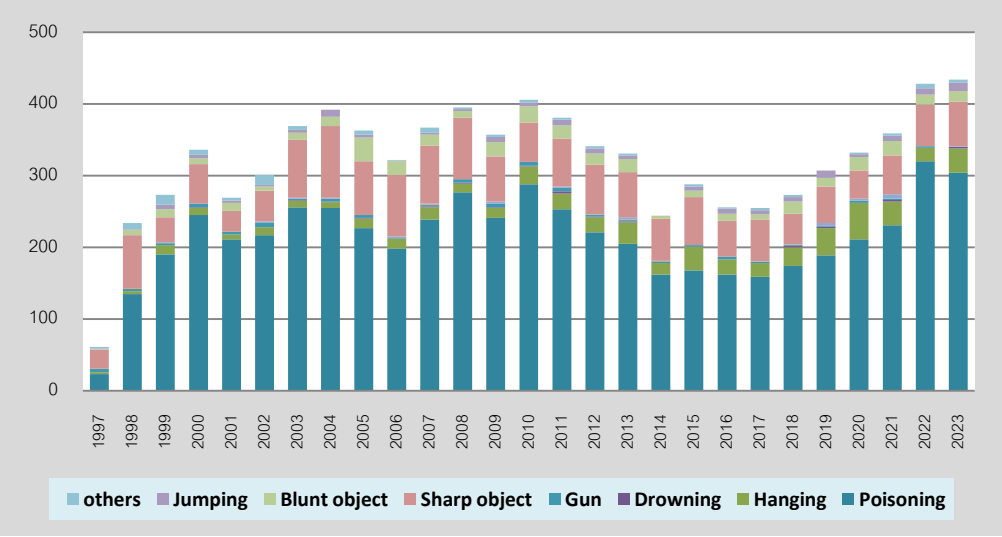
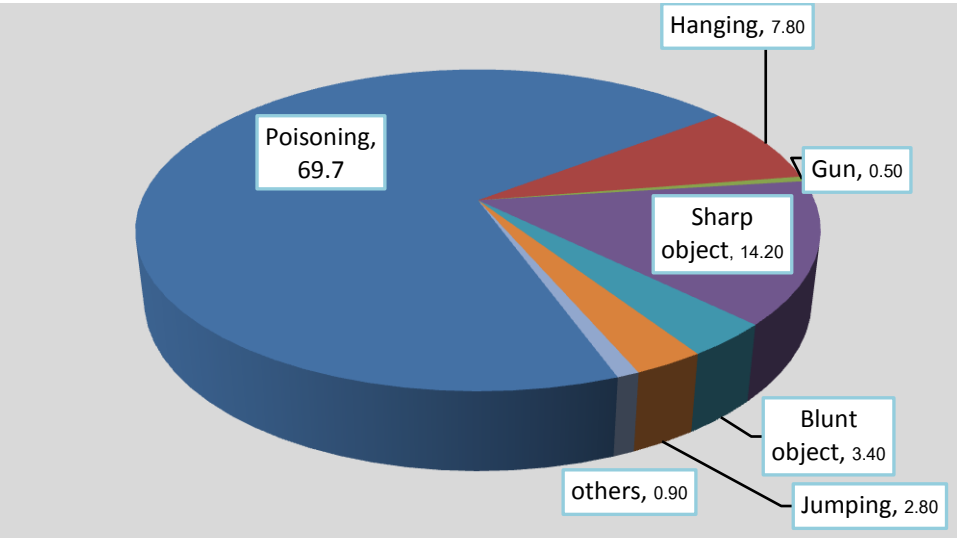


Figure66 Percentage of self-harm patients classified by type 2023



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 48 Death of Self-harm patients classified by type (1997-2023)

Type of self harm	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Poisoning	NA	5	9	12	9	8	4	7	5	2	5	4	3	7	5	7	7	9	11	7	15	12	13	12	4	9	6
Hanging	NA	1	3	0	1	3	4	1	5	4	7	2	3	8	7	7	9	2	10	5	5	2	3	9	2	4	5
Drowning	NA	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
Gun	NA	1	1	1	2	1	1	0	1	0	0	1	1	1	2	1	0	2	1	0	3	1	0	0	2	1	1
Explosive material	NA	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
Fire and flames	NA	0	1	0	0	1	0	0	0	0	0	0	1	0	1	1	2	0	0	0	0	1	1	0	1	0	0
Sharp object	NA	1	1	0	0	1	0	0	0	0	1	1	0	0	2	0	0	0	0	0	0	0	2	0	2	0	1
Blunt object	NA	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
Jumping	NA	0	0	0	1	0	0	0	1	0	1	0	2	3	1	2	0	0	0	0	0	0	0	1	1	1	2
others	NA	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0
total	**NA**	**8**	**15**	**14**	**13**	**14**	**10**	**8**	**12**	**6**	**14**	**8**	**10**	**19**	**19**	**18**	**18**	**13**	22	12	23	17	19	22	12	15	15

Table 49 Death rate of Self-harm patients classified by type (1997-2023)

Type of self harm	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	**2018**	2019	2020	2021	2022	2023
Poisoning	NA	3.7	4.7	4.9	4.3	3.7	1.6	2.7	2.2	1	2.1	1.4	1.2	2.4	2	3.2	3.4	5.6	6.5	4.3	9.4	6.9	6.9	5.69	1.73	2.81	1.97
Hanging	NA	25	23.1	0	14.3	27.3	44.4	12.5	38.5	28.6	41.2	16.7	21.4	32	31.8	33.3	30	12.5	30.3	23.8	26.3	7.7	7.9	17.65	6.06	21.05	14.71
Drowning	NA	0	0	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0.00	0.00
Gun	NA	20	33.3	33.3	40	0	14.3	0	25	0	0	50	20	20	40	20	0	100	50	0	75	50	0	0	66.67	50.00	50.00
Explosive material	NA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0.00
Fire and flames	NA	0	100	0	0	100	0	0	0	0	0	0	33.3	0	50	100	66.7	0	0	0	0	0	0	0	16.67	0.00	0.00
Sharp object	NA	1.4	2.9	0	0	2.3	0	0	0	0	1.2	1.2	0	0	3	0	0	0	0	0	0	0	3.9	0	3.70	0.00	1.61
Blunt object	NA	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	0.00	0.00
Jumping	NA	0	0	0	33.3	0	0	0	25	0	33.3	0	28.6	60	12.5	28.6	0	0	0	0	0	0	0	25	12.50	11.11	16.67
others	NA	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	0.00	0.00
total	NA	3.4	5.5	4.2	4.8	4.7	2.7	2.1	3.3	1.8	3.8	2	2.8	4.7	5	5.2	5.4	5.3	7.6	4.7	8.9	**6.2**	6.2	6.67	3.33	3.50	3.44

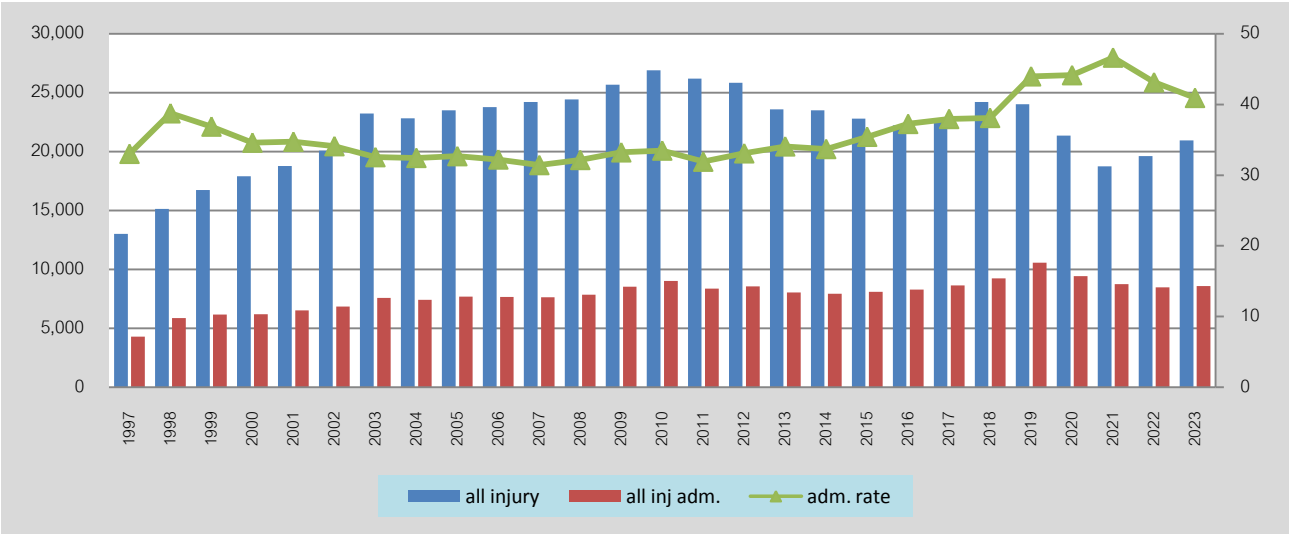
4. Hospital information

4.1 Admission rate by referral system (1997-2023)

Table 50 Injuries and admissions by referral system (1997-2023)

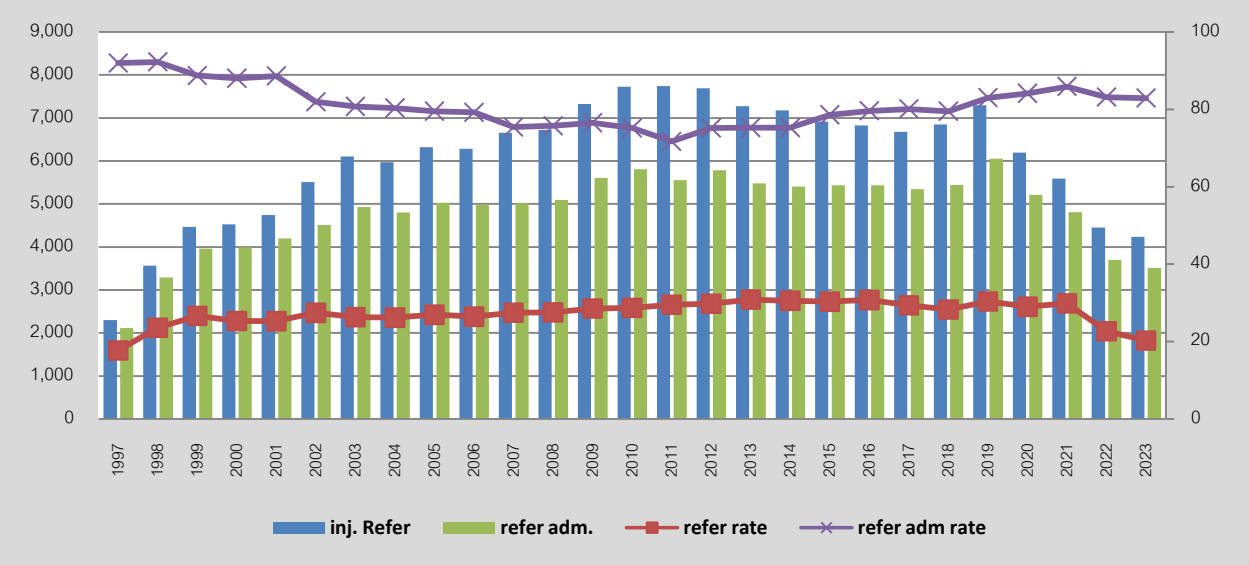
Year	all injury	all inj adm.	adm. rate	Refer & admission			
				Inj & referred		refer & admission	
				inj. Refer	refer rate	refer adm.	refer adm rate
1997	13,020	4,305	33.06	2,300	17.67	2,116	92
1998	15,139	5,872	38.79	3,567	23.56	3,292	92.29
1999	16,747	6,181	36.91	4,463	26.65	3,962	88.77
2000	17,903	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	78.6
2016	22,215	8,283	37.29	6,824	30.72	5,434	79.63
2017	22,757	8,646	37.99	6,675	29.33	5,348	80.12
2018	24,207	9,233	38.14	6,847	28.29	5,444	79.51
2019	24,025	10,576	44.02	7,294	30.36	6,055	83.01
2020	21,361	9,438	44.18	6,192	28.99	5,210	84.14
2021	18,752	8,752	46.67	5,593	29.83	4,806	85.93
2022	19,628	8,474	43.17	4,448	22.66	3,700	83.18
2023	20,940	8,579	40.97	4,235	20.22	3,512	82.93

Figure 68 Injury admissions and admission rate



The numbers of injuries were increasing and then 2019 tend to decreased. And the numbers of traumatic admission were also slightly decreasing.

Figure 70 The number and rate of referral injuried patients and admission rate



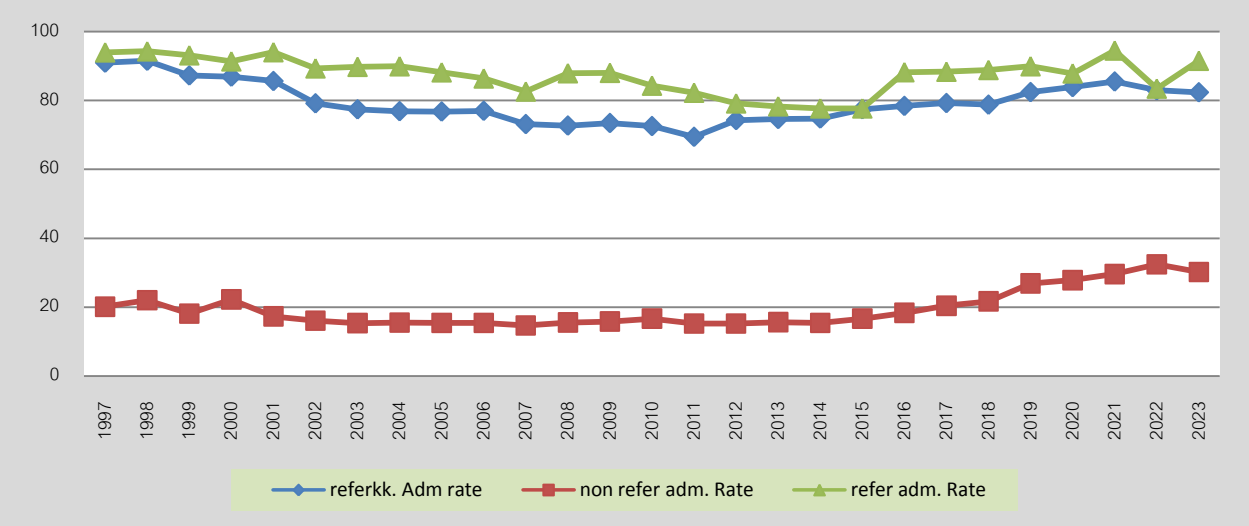
The number of injuries referral were decreasing since 2019. The injuries referral admission rate were slightly decreasing. Focusing on the admission of the referral, it was found that the proportion of the referral admission when comparing with the total admission were very high. This meant that most of the traumatic referred were admissions 70-90 percentage.

Table 51 Admission rate by referral system (1997-2023)

Year	in KhonKaen						other province		
	refer in kk.	refer kk. adm.	referkk. 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	73.2	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	69.5	18,464	2,822	15.28	1,334	1,098	82.31
2012	6,374	4,740	74.36	18,147	2,776	15.3	1,317	1,043	79.2
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
2017	6,071	4,814	79.3	15,761	3,222	20.44	604	534	88.41
2018	6,387	5,035	78.83	17,020	3,695	21.71	460	409	88.91
2019	6,774	5,587	82.48	16,449	4,426	26.91	520	468	90
2020	5,861	4,919	83.93	14,929	4,159	27.86	331	291	87.92
2021	5,376	4,599	85.55	12,952	3,836	29.62	239	226	94.56
2022	4,197	3,484	83.01	11,926	3,868	32.43	200	167	83.50
2023	3,947	3,253	82.42	16,438	4,971	30.24	214	196	91.59

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 71 Admission rate by refer and non-refer



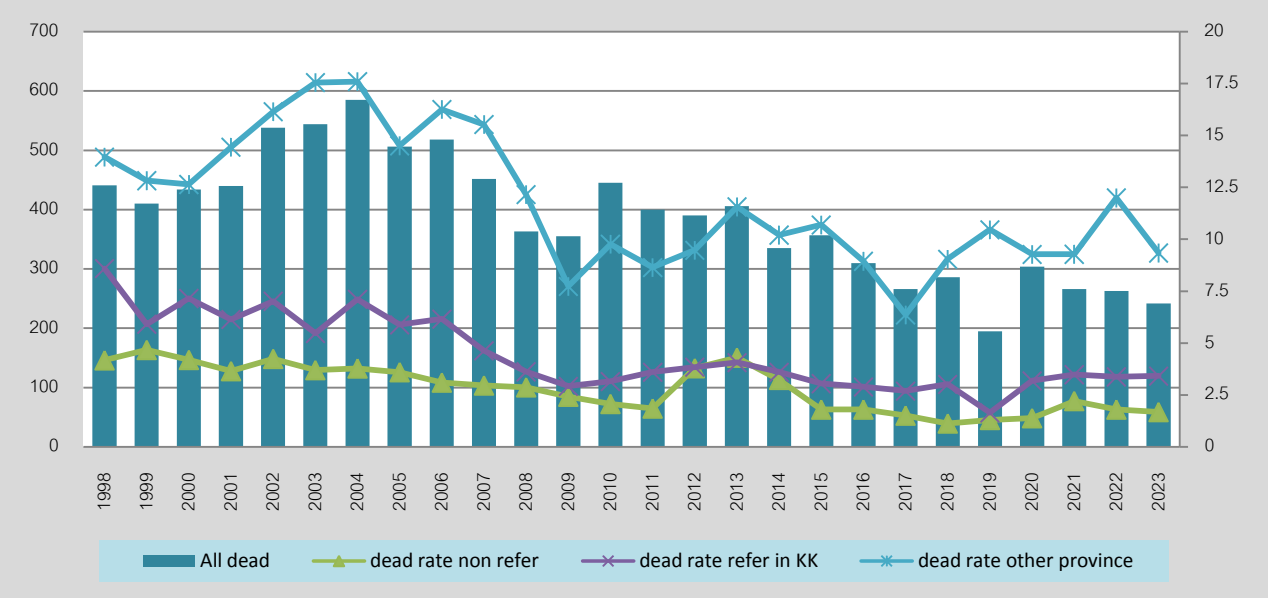
Focusing on the admission of the referral, it was found that the referral other province admission rate had the highest around 80-94 **%**. The referral in khon kaen province admission rate was the second around 70-91 **%.** And the non-referral admission rate was the lowest**.**

4.2 Death rate of referral and non-referral (1997-2023)

Table 52 Death of injuries by referral and non-referral (1997-2023)

year	all adm.	All dead	KhonKaen 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	8.6	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	4.2	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	17.6
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	3.8	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	10.7
2016	8,238	310	2,765	50	1.81	4,719	137	2.9	715	64	8.95
2017	8,646	266	3,222	49	1.52	4,814	130	2.7	534	34	6.37
2018	9,233	286	3,695	42	1.14	5,035	152	3.02	409	37	9.05
2019	10,576	195	4,426	58	1.31	8,857	146	1.65	468	49	10.47
2020	9,438	304	4,159	58	1.39	4,919	157	3.19	291	27	9.28
2021	8,752	266	3,836	85	2.22	4,584	160	3.49	226	21	9.29
2022	8,474	263	3,868	70	1.81	4,197	142	3.38	200	24	12.00
2023	8,579	242	4,971	84	1.69	3,947	135	3.42	214	20	9.35

Figure 72 Death 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 in creasing while the death rate from other two groups was slightly declining.

4.3 Death rate and survival rate by traffic and non traffic-cause

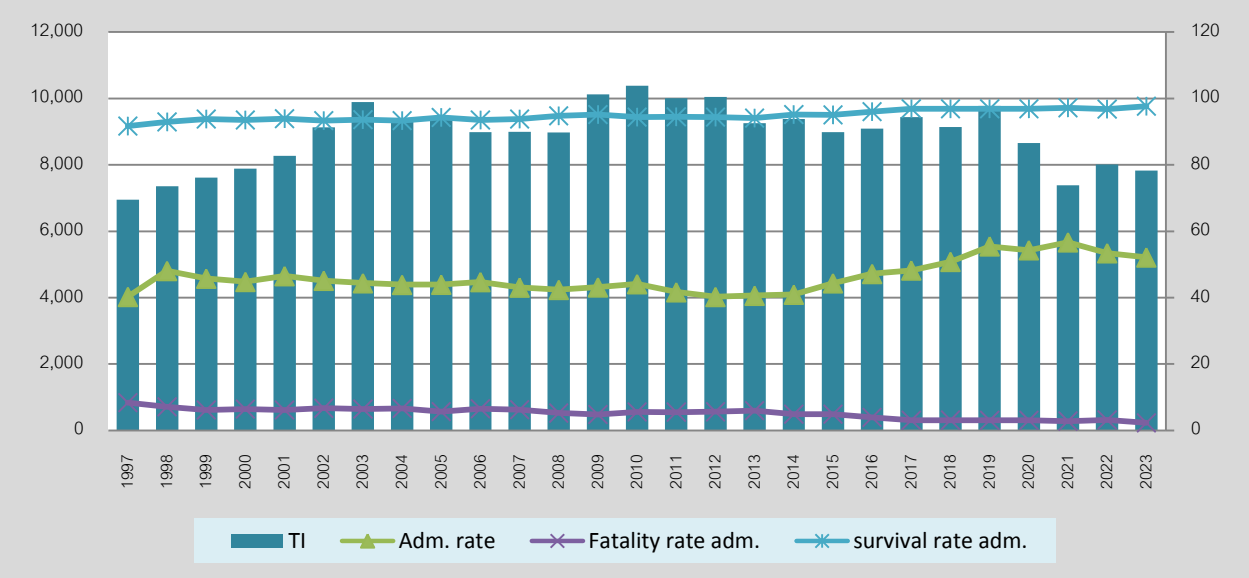
4.3.1 Traffic injuries

Table 53 Traffic injuries and survival rate (1997-2023)

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	7,938	96	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	44.1	255	5.57	4,323	94.43
2011	10,007	280	2.8	9,727	97.2	4,169	41.66	229	5.49	3,940	94.51
2012	10,047	270	2.69	9,776	97.3	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	4.9	3,788	95.1
2016	9,087	215	2.37	8,872	97.63	4,286	47.17	168	3.92	4,118	96.08
2017	9,440	185	1.96	9,255	98.04	4,553	48.23	138	3.03	4,415	96.97
2018	9,142	188	2.06	8,954	97.94	4,645	50.81	144	3.1	4,501	96.9
2019	9,769	211	2.16	9,558	97.84	5,421	55.49	166	3.06	5,255	96.94
2020	8,658	199	2.30	8,459	97.70	4,703	54.32	144	3.06	4,559	96.94
2021	7,384	156	2.11	7,228	97.89	4,187	56.70	117	2.79	4,070	97.21
2022	8,007	168	2.10	7,839	97.90	4,277	53.42	134	3.13	4,143	96.87
2023	7,828	138	1.76	7,690	98.24	4,082	52.15	94	2.30	3,988	97.70

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

Figure 73 Traffic injuries and survival rate (1997-2023)



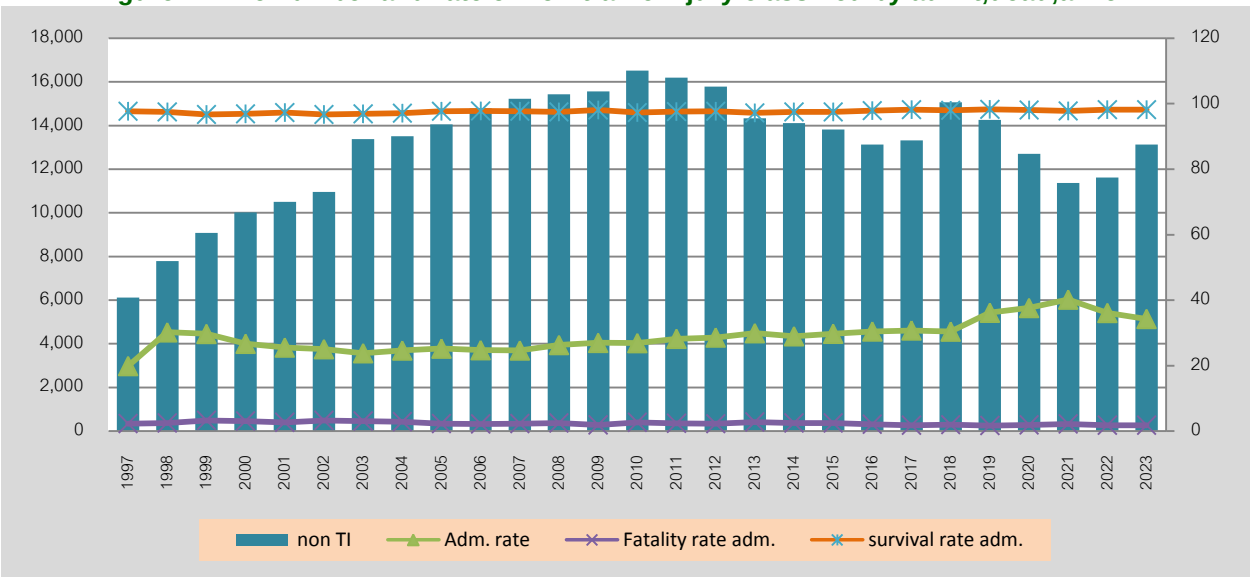
In traffic injuries, it was found that the admission rate was 40-56 %. The survival rate was 95-98 **%**. The fatality rate was 1.9-4.7 % and seemed to have no significantly changed.

4.3.2 Non traffic injuries

Table 54 Number of non-traffic injuries classified by admit, dead, alive (1997-2023)

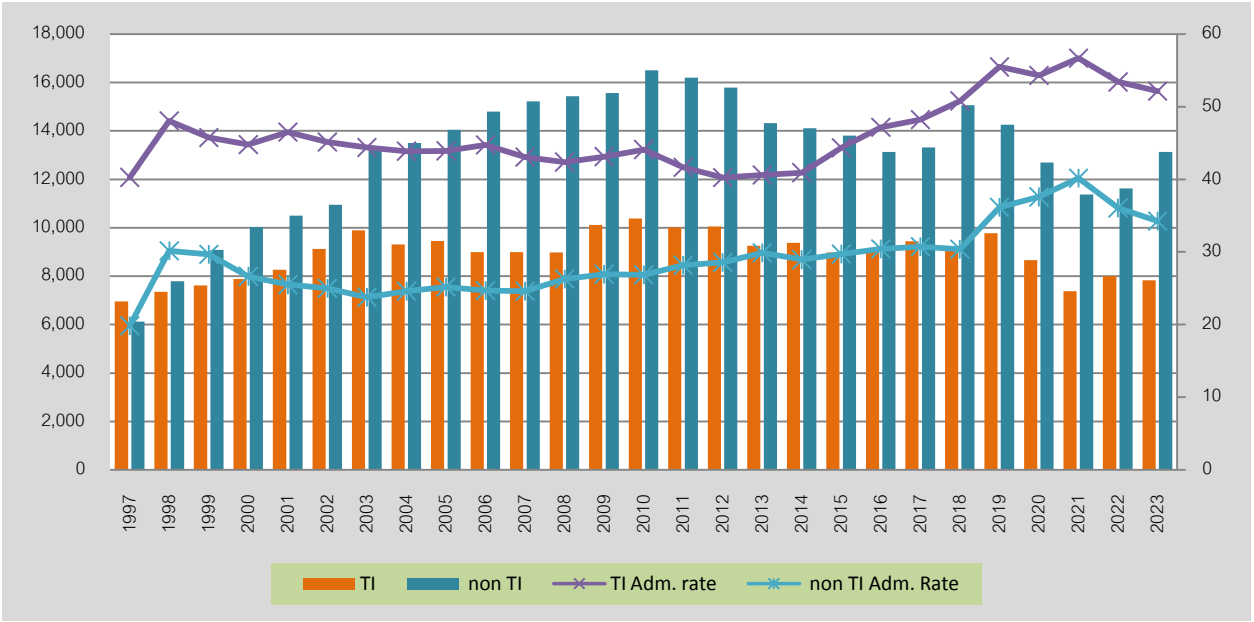
Year	non TI	Death	Death rate	Alive	survival rate	Adm.	Adm. rate	Adm. Dead	Death rate adm.	Adm. Alive	survival rate adm.
1997	6,119	45	0.74	6,074	99.3	1,215	19.86	28	2.3	1,187	97.7
1998	7,789	189	2.43	7,600	98.9	2,349	30.16	59	2.51	2,290	97.49
1999	9,087	139	1.53	8,948	98.8	2,696	29.67	88	3.26	2,608	96.74
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	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	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	13,908	99	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	29.9	120	2.8	4,165	97.2
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
2017	13,317	81	0.61	13,236	99.4	4,093	30.74	75	1.83	4,018	98.17
2018	15,065	98	0.65	14,967	99.3	4,579	30.39	89	1.94	4,490	98.06
2019	14,256	105	0.74	14,151	99.3	5,154	36.15	87	1.69	5,067	98.31
2020	12,702	105	0.83	12,597	99.17	4,735	37.59	90	1.90	4,645	98.10
2021	11,368	110	0.97	11,258	99.03	4,565	40.16	99	2.17	4,466	97.83
2022	11,622	94	0.81	11,528	99.19	4,193	36.08	75	1.79	4,118	98.21
2023	13,131	104	0.79	13,027	99.21	4,497	34.25	81	1.80	4,416	98.20

Figure 74 The number and rate of non-traffic injury classified by admit,dead,alive



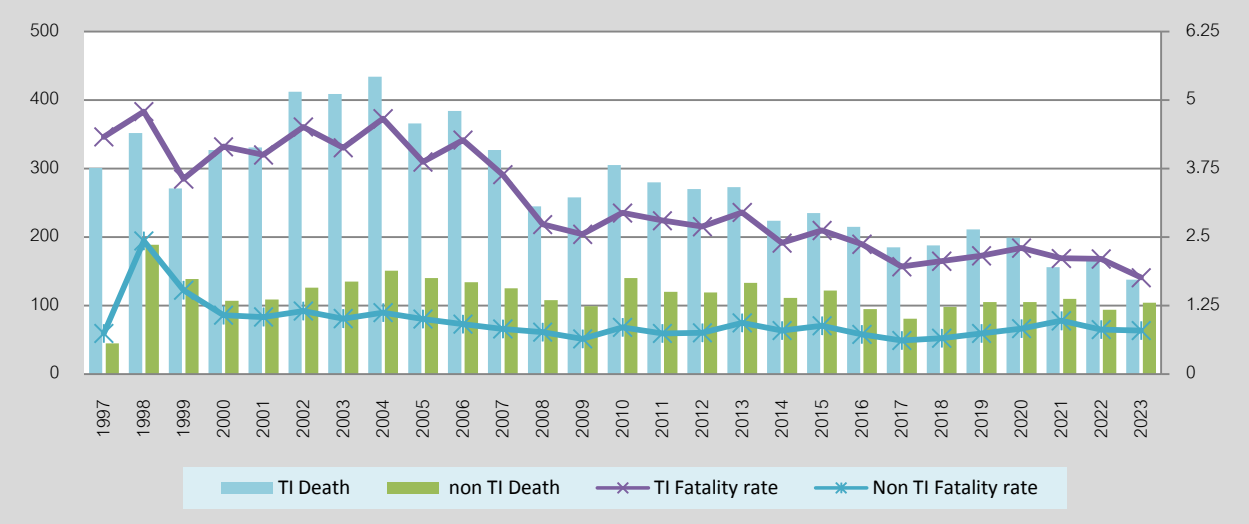
The number of non-traffic injury was classified into group of admission, death, and alive. It was found that the number of admission was trended to be increasing. The number of death had no significantly changed.

Figure 75 Admission rate by traffic and non-traffic injuries



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

Figure 76 Death rate by traffic and non-traffic injuries



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

Quality of care

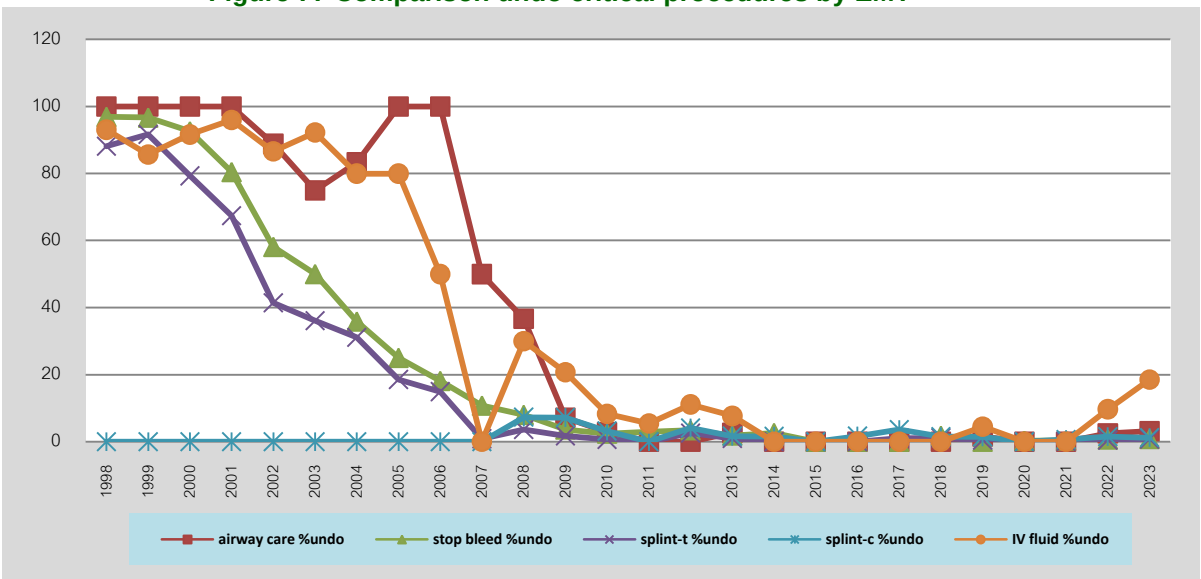
Critical procedures performed by EMT and volunteers

Table 55 Critical procedures performed by EMT (1997-2023)

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	6	187	96.89	9	67	88.16	-	-	-	4	54	93.1
1999	0	1	100	1	29	96.67	1	11	91.67	-	-	-	1	6	85.71
2000	0	4	100	4	50	92.59	6	23	79.31	-	-	-	1	11	91.67
2001	0	5	100	18	74	80.43	14	29	67.44	-	-	-	1	24	96
2002	1	8	88.89	44	61	58.1	24	17	41.46	-	-	-	2	13	86.67
2003	3	9	75	91	91	50	39	22	36.07	-	-	-	1	12	92.31
2004	1	5	83.33	68	38	35.85	31	14	31.11	-	-	-	1	4	80
2005	0	5	100	93	31	25	57	13	18.57	-	-	-	1	4	80
2006	0	3	100	113	25	18.12	74	13	14.94	-	-	-	3	3	50
2007	2	2	50	116	14	10.77	110	1	0.9	-	-	-	2	0	0
2008	19	11	36.67	483	42	8	318	12	3.64	152	12	7.32	28	12	30
2009	39	3	7.14	291	11	3.64	226	4	1.74	116	9	7.2	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	166	5	2.92	123	0	0	58	0	0	35	2	5.41
2012	26	0	0	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	150	4	2.6	105	0	0	63	1	1.56	34	0	0
2015	25	0	0	152	0	0	138	0	0	71	0	0	30	0	0
2016	25	0	0	120	0	0	100	0	0	59	1	1.67	27	0	0
2017	29	0	0	91	0	0	91	1	1.09	53	2	3.64	25	0	0
2018	33	0	0	111	2	1.77	91	1	1.09	65	1	1.52	31	0	0
2019	64	1	1.54	200	0	0	206	1	0.48	135	2	1.46	64	3	4.48
2020	56	0	0	366	1	0.27	303	0	0	247	0	0	32	0	0
2021	51	0	0	1089	4	0.37	887	1	0.11	629	4	0.63	24	0	0
2022	79	2	2.47	1204	8	0.66	1017	5	0.49	721	11	1.50	28	3	9.68
2023	122	4	3.17	1468	12	0.81	1252	10	0.79	826	10	1.20	44	10	18.52

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 for2years2) 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 77 Comparison undo critical procedures by EMT

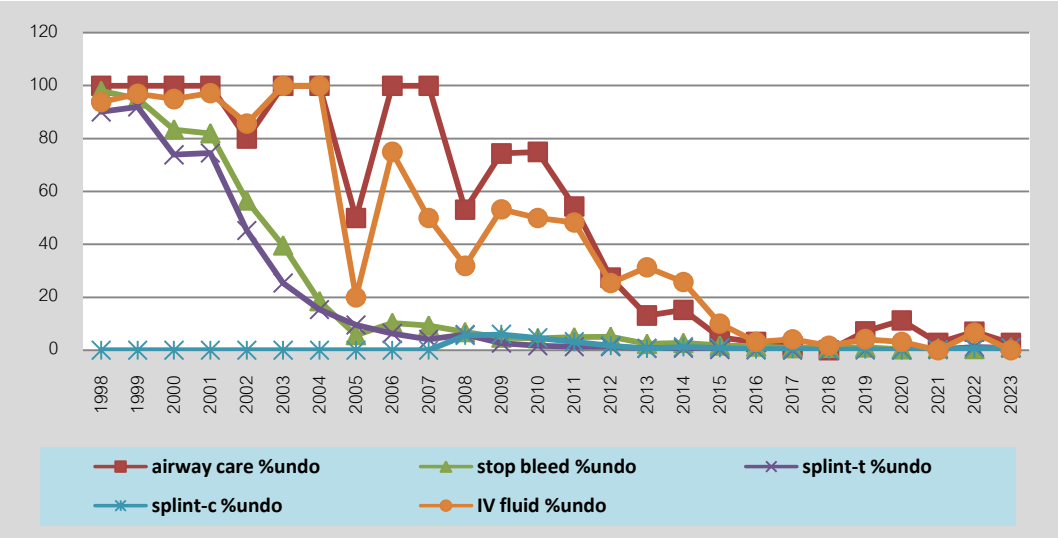


The trend of undo critical procedures was decreasing especially in case of EMT care whose experienced advance life support team and full option of advance equipments.

Table 56 Critical procedures performed by Volunteer (1997-2023)

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	4	204	98.08	7	64	90.14	-	-	-	3	46	93.88
1999	0	15	100	9	177	95.16	4	46	92	-	-	-	1	32	96.97
2000	0	10	100	21	106	83.46	12	34	73.91	-	-	-	1	19	95
2001	0	21	100	25	114	82.01	15	44	74.58	-	-	-	1	35	97.22
2002	2	8	80	56	73	56.59	23	19	45.24	-	-	-	3	18	85.71
2003	0	8	100	93	61	39.61	44	15	25.42	-	-	-	0	9	100
2004	0	2	100	66	15	18.52	22	4	15.38	-	-	-	0	2	100
2005	2	2	50	165	10	5.71	85	9	9.57	-	-	-	4	1	20
2006	0	4	100	183	21	10.29	133	9	6.34	-	-	-	1	3	75
2007	0	5	100	205	21	9.29	140	6	4.11	-	-	-	3	3	50
2008	15	17	53.13	845	62	6.84	541	34	5.91	253	15	5.6	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	1,464	69	4.5	1,138	19	1.64	518	25	4.6	33	33	50
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	27.4	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	0.7	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	0.9	36	4	10
2016	63	2	3.08	1,570	22	1.38	1,182	1	0.08	604	2	0.33	31	1	3.13
2017	68	1	1.45	1,685	13	0.77	1,298	0	0	795	4	0.5	47	2	4.08
2018	75	0	0	1,547	14	0.9	1,309	0	0	745	1	0.13	58	1	1.69
2019	78	6	7.14	1,708	18	1.04	1,379	1	0.07	880	3	0.34	69	3	4.17
2020	71	8	11.26	1,463	5	0.34	1,213	2	0.16	835	0	0	32	1	3.12
2021	35	1	2.78	660	5	0.75	660	2	0.30	440	1	0.23	14	0	0
2022	40	3	6.98	700	3	0.43	640	8	1.23	424	3	0.70	28	2	6.67
2023	36	1	2.70	360	4	1.10	336	3	0.88	216	2	0.92	7	0	0.00

Figure 78 Comparison undo critical procedures 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.

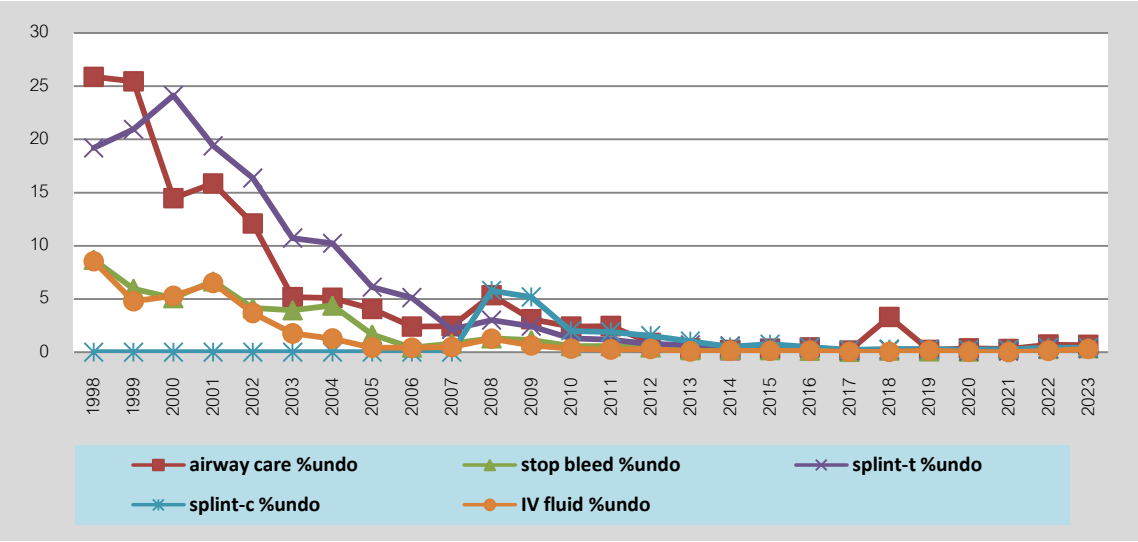
Critical procedures performed during the referral

Table 57 Critical procedures performed by referral system (1997-2023)

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	8.7	1,225	291	19.2	NA	NA	NA	1,596	149	8.54
1999	366	125	25.46	1,796	114	5.97	1,366	362	20.95	NA	NA	NA	1,771	89	4.78
2000	567	96	14.48	1,846	99	5.09	1,437	457	24.13	NA	NA	NA	1,880	105	5.29
2001	472	89	15.86	1,848	132	6.67	1,588	382	19.39	NA	NA	NA	1,882	131	6.51
2002	647	89	12.09	2,005	87	4.16	1,708	334	16.36	NA	NA	NA	2,119	81	3.68
2003	622	34	5.18	2,261	93	3.95	1,899	228	10.72	NA	NA	NA	2,345	42	1.76
2004	596	32	5.1	2,222	102	4.39	1,950	222	10.22	NA	NA	NA	2,324	30	1.27
2005	663	28	4.05	2,495	42	1.66	2,292	149	6.1	NA	NA	NA	2,529	11	0.43
2006	730	18	2.41	2,548	11	0.43	2,352	127	5.12	NA	NA	NA	2,618	11	0.42
2007	597	15	2.45	2,663	22	0.82	2,608	57	2.14	NA	NA	NA	2,730	13	0.47
2008	1,184	67	5.36	3,345	44	1.3	3,134	97	3	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	2.4	3,973	23	0.58	3,783	49	1.28	1,567	32	2	4,500	15	0.33
2011	1,670	42	2.45	3,854	22	0.57	3,510	41	1.15	1,395	27	1.9	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	0.5	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
2017	1,338	2	0.15	3,313	1	0.03	2,656	3	0.11	1,332	3	0.22	4,619	1	0.02
2018	117	4	3.31	3,339	5	0.15	2,727	6	0.22	1,356	4	0.29	4,525	1	0.02
2019	1,409	3	**0.21**	3,732	3	**0.08**	2,848	7	**0.25**	1,789	5	**0.28**	5,096	7	**0.14**
2020	1,105	4	**0.36**	3,265	2	**0.06**	2,481	2	**0.08**	1,732	4	**0.23**	4,465	2	**0.04**
2021	1,037	3	**0.29**	2,935	5	**0.26**	2,542	2	**0.08**	1,549	4	**0.26**	4,128	0	**0**
2022	997	7	**0.70**	2,254	7	**0.31**	2,072	6	**0.29**	1,385	6	**0.43**	3,108	4	**0.13**
2023	1,187	8	**0.67**	2,071	8	**0.38**	1,940	6	**0.31**	1,398	6	**0.43**	3,082	9	**0.29**

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

Figure 79 Percentage of undo critical procedures 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.

Severity of injury
Trauma project monitor for quality improvement in Trauma care
Table 58 KPI for quality improvement in trauma care (Admission) 2006 – 2023

Key performance indicator	Mean	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Death rate of PS>0.75	<0.5	2.71	2.17	1.67	1.36	1.79	1.66	1.85	1.6	1.39	1.41	1.26	0.94	1.17	1.37	1.16	1.04	1.04	0.83
Death rate of ISS ≥15	<20	31.63	27.44	27.12	23.37	27.1	24.96	20.0	24.9	20.3	19.0	13.0	14.2	14.6	14.0	13.4	12.3	13.5	10.3
Death rate 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	0.81	1.07	1.08	0.98	0.95	0.86	0.67
Death rate of all injury	<10	6.77	5.9	3.89	3.4	4.05	3.96	4.58	4.26	3.62	3.67	3.03	2.46	2.53	2.39	2.47	2.36	2.47	1.15
Death rate of HI GCS >10	<0.5	0.69	0.49	1.83	1.37	1.8	2.27	1.73	2.78	1.37	1.35	0.99	0.86	1.06	1.26	0.97	0.93	0.68	0.61

Figure 80 KPI for quality improvement in admission trauma care 2006 – 2023

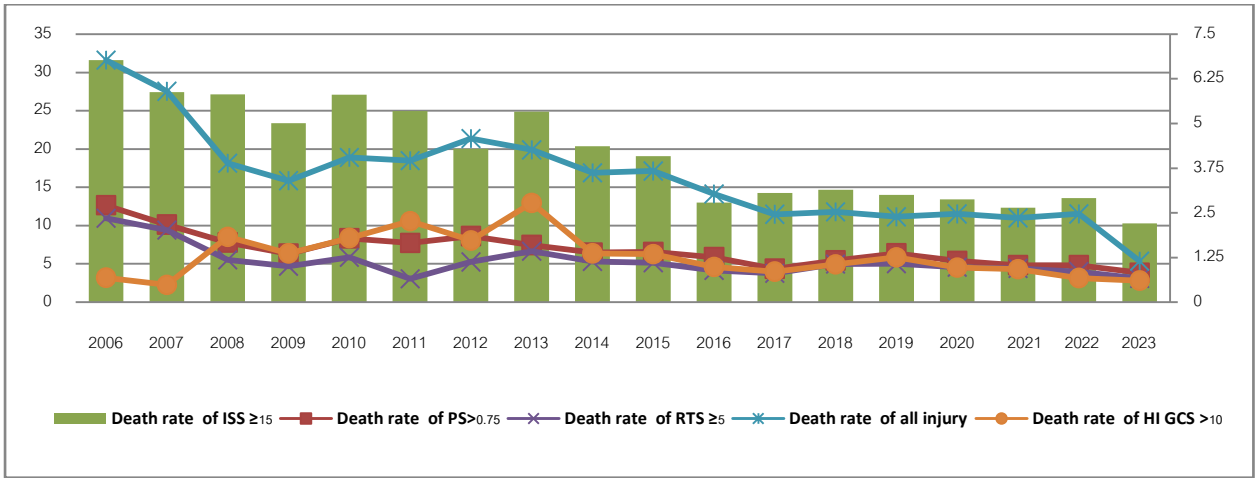
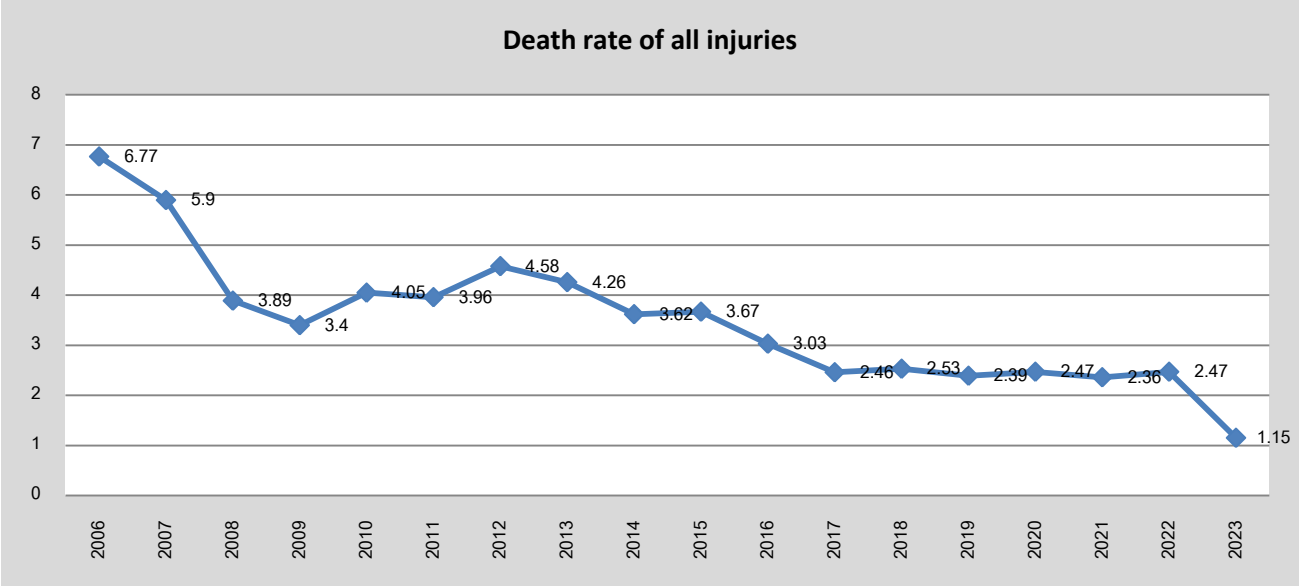
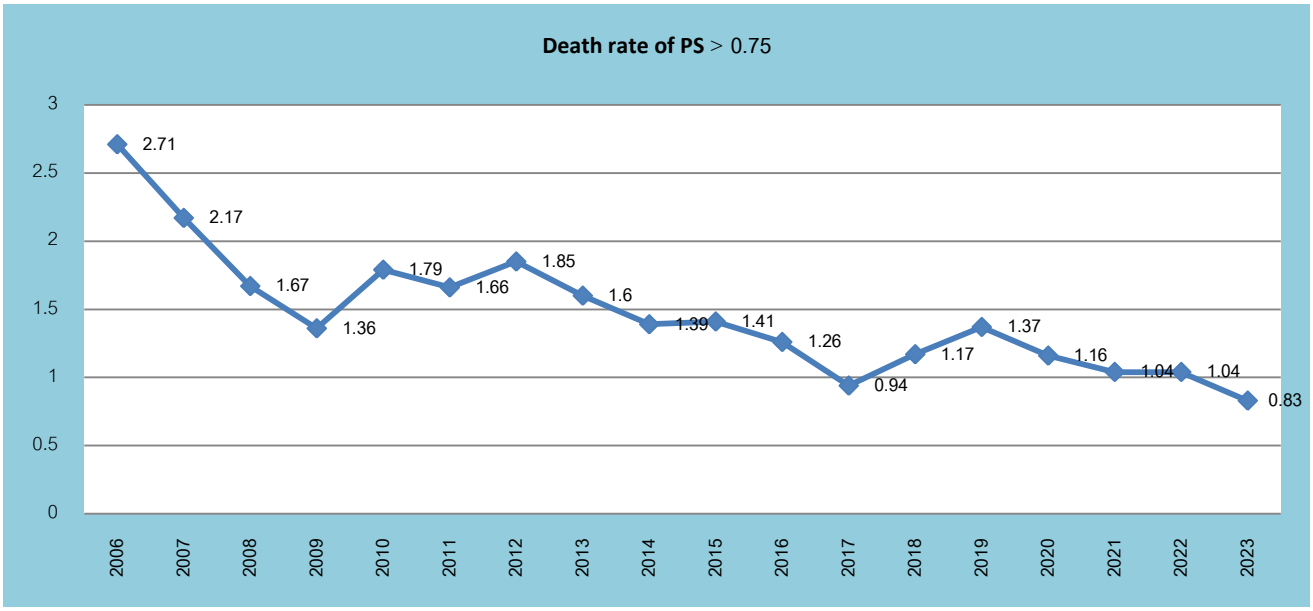


Figure 81 Death rate of All injuries Admission 2006 – 2023



Death rate of all injuries was decreasing year by year.

Figure 82 Death rate of PS>0.75 Admission 2006 – 2023

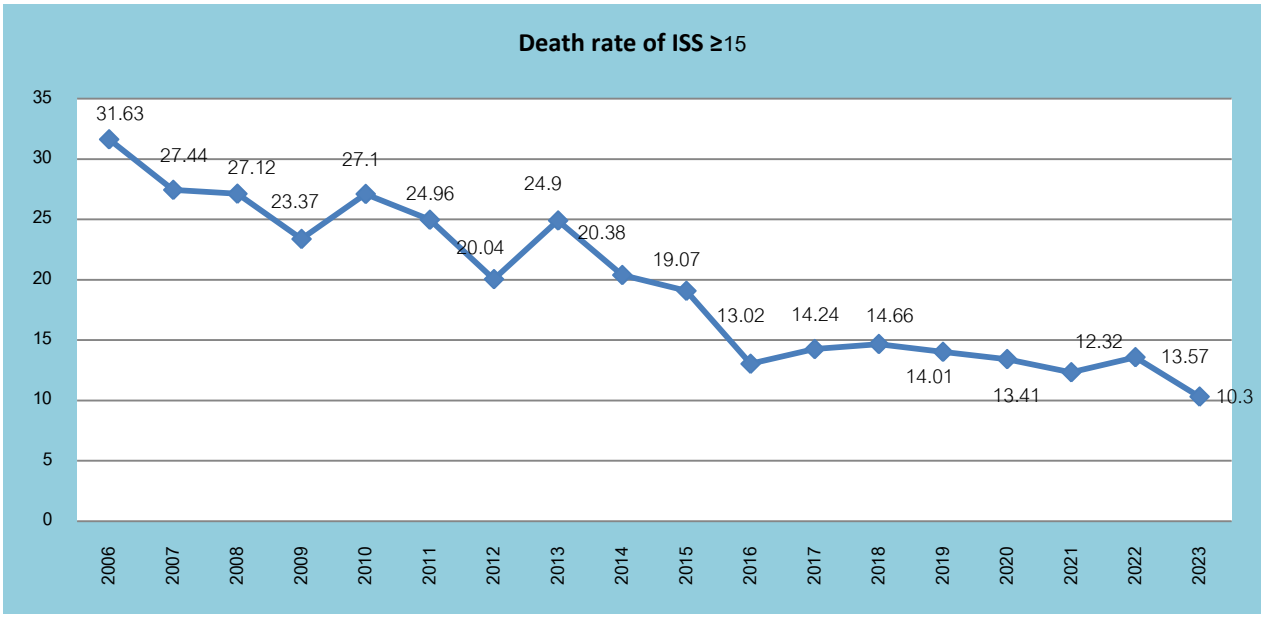


Knowing the probability of survival score (Ps score) enables the health service provider to group the patient according to the severity of injury and to evaluate the result of treatment as follows:

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)

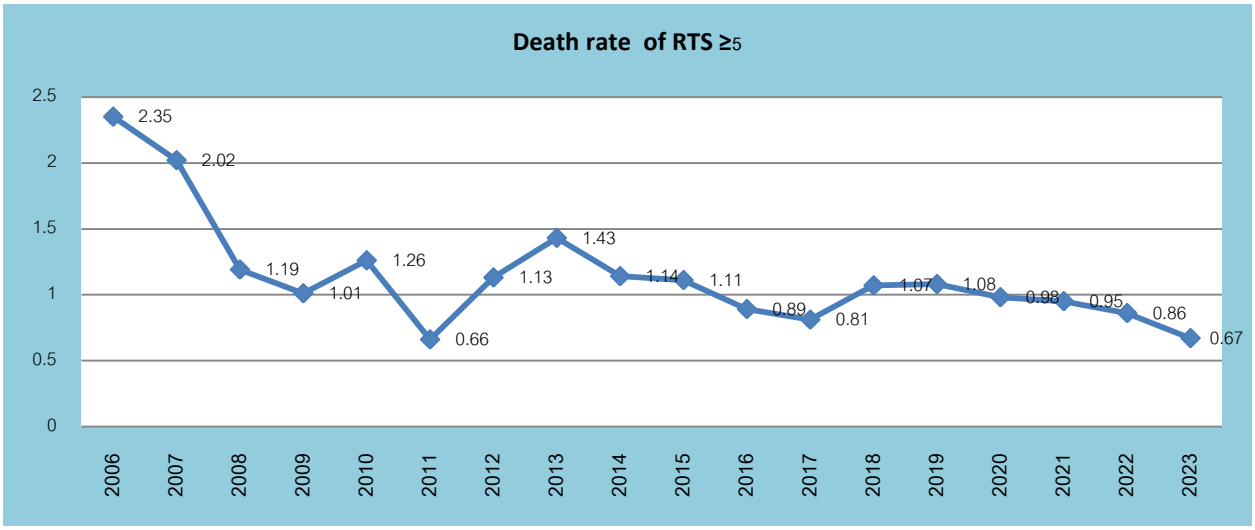
Therefore the Ps >0.75 was applied to assess how quality of care in hospital is. And from the figure; it was shown the preventable death was reducing significantly every year.

Figure 83 Death rate of ISS≥15 Admissions 2006 – 2023



The Injury Severity Score (ISS) is an anatomical scoring system that provides an overall score forpatientswithmultipleinjuries.EachinjuryisassignedanAbbreviatedInjuryScale(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 84 Death rate of RTS≥5 Admissions 2006 – 2023

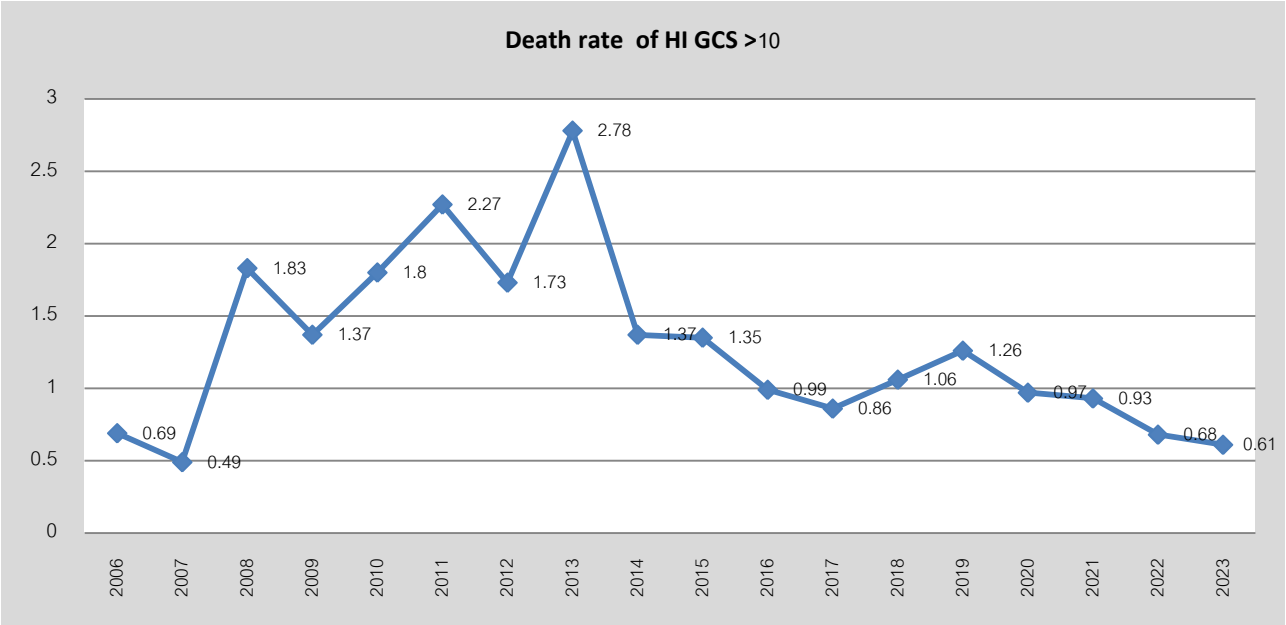


The Revised Trauma Score (RTS) is one of the more common physiologic scores. It uses 3 specific physiologic parameters, as follows: (1)Glasgow Coma Scale(GCS),(2)systolic blood pressure(SBP),and

(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 85 Death rate of HI which GCS>10 Admissions 2006-2023



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