Injury Mortality in Vietnam: Patterns and Trends, 2005-2013

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ABSTRACT

Context: Injury is a growing public health problem worldwide. Deaths due to injuries account for 10% of the world's mortality. More than 90% of the world's injury-related deaths occur in low- and middle-income countries such as Vietnam. The public health burden has been recognized by government; however, there is a need to study and better understand the epidemiology and trends for injuries and injury-related mortality to be able to better address this burden.

Objectives: In this article, we analyze the patterns and trends in injury mortality from 2005 to 2013 in Vietnam.

Design: All registered deaths from injuries from January 2005 to December 2013 were extracted from the Ministry of Health death recording system (A6). Mortality rates per 100 000 population per year were calculated. A linear regression model was used to estimate the injury mortality trends.

Results: In the 9-year period, 313 101 deaths due to injuries were recorded in the A6 system; this accounts for about 10% of all deaths. The leading causes of injury-related death were road traffic injuries among the entire population, while drowning was the leading cause of death among children. Other unintentional injuries including occupational, fall, poisoning, and exposure to electric current also accounted for a substantial proportion of the burden of injury. There is a significant reduction trend found in drowning among children 0 to 18 years of age and significant increasing trends in intentional injury causes.

Conclusions: While injuries have been recognized as a public health problem in Vietnam in the last decade, as seen by our analysis, there is a need for concerted action to reduce their burden. Of particular concern is the increasing prominence of intentional injuries. Improved data systems, increasing the awareness in the community, and making appropriate policies and implementing them, as well as implementing effective, evidence-based interventions are all key to decreasing this burden. This is an important study describing injury mortality in Vietnam for the period 2005-2013. The results of the study show that injury death remains an important public health issue that needs more attention from government and relevant agencies.

KEY WORDS: injury, injury mortality, injury trend, pattern, Vietnam

Injury is a growing public health problem worldwide. Globally, more than 5 million people die each year as a result of injuries. More than 90% of the world's injury-related deaths occur in low- and middle-income countries.[1] Traumatic injuries account for 8.5% of mortality and 12% of the global burden of diseases in terms of disability-adjusted life years lost.[2]

Injuries are among the leading causes of premature death and disability in Vietnam. A report from the Ministry of Health in Vietnam shows that there are about 35 000 deaths, while up to a million people are injured annually (Ministry of Health, 2015). Injuries rank as the fifth leading cause of death/disability in Vietnam and are expected to rise to the second leading cause by 2020.[3] Results of the Vietnam National Injury Survey 2010 showed that injury rates in Vietnam were high; the rate of fatal injury was 38.6/100 000; road traffic injury was the leading cause of fatal injury with a rate of 16.6/100 000 (more than 15 000 deaths).[4] Injury due to falls was the second leading cause of injury-related death in Vietnam, particularly

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The authors extend their thanks to the individuals and the organizations that were involved in collecting data used in this study paper.

The authors declare that there is no conflict of interest.

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DOI: 10.1097/PHH.0000000000000718

among the elderly. Drowning followed as the third leading cause of fatal injury and was a problem especially among children younger than 19 years but more importantly, those aged 0 to 9 years. Ninety-seven percent of all nonfatal injuries were unintentional, and 2.8% were intentional. Fatal injuries were intentional (4.7%) and unintentional (88%). Death due to injury made up more than 10% of all fatalities and was the fifth (out of 20) leading cause of death in Vietnam.

Although mortality data are recorded in Vietnam but they are rarely used for various reasons, their data were not being used effectively.[5] Mortality statistics often generated from cross-sectional population-based surveys and trend analysis is usually not carried out. This study was done to get a more complete picture of the status of injury mortality, its epidemiology, and trends from 2005 to 2013 in Vietnam. We further performed a detailed analysis of the leading causes of injury-related mortality. The results will serve to guide injury control and prevention activities in Vietnam.

Methods

Data sources

Data for this study were obtained from Vietnam A6 mortality reporting system of the Ministry of Health. This system relies on commune health centers and provides basic demographic data, information on the cause of death that is recorded in an official book named A6. Data from the A6 book are collected by the district-level health centers and then forwarded to provincial and central-level authorities. While there weaknesses have been noted in the Civil Registration and Vital System in Vietnam,[5] studies have shown that the A6 system is the most reliable source of mortality data in Vietnam, particularly for injury-related mortality.[6,7]

All deaths attributed to injuries during the period of January 2005 to December 2013 were extracted from the system and included in the analysis. Causes of injury-related deaths were classified according to the *International Classification of Diseases, Tenth Revision* (*ICD-10*).[8] We disaggregated the data by age (<18 and 18+ year of age), sex, and geographical economic regions of Vietnam as shown in the Figure (Red River Delta, Northeast, North Central, South Central, Central Highland, Southeast, Mekong River Delta).

Data analysis

Age- and gender-specific mortality rates per 100 000 person-years were calculated using the methods suggested by Rothman et al.[9] Injury mortality rates were calculated by cause of injury and region as well. Population data were achieved from Vietnam General Statistic Office, direct standardization method was applied to adjust the population difference among years, and the census 2009 data were used as the reference. Time trends were calculated using simple linear regression analysis with time (year) as the independent variable; $P < .05$ was selected as the level of statistical significance. Stata software version 14 was used to analyze data.

Ethical considerations

The study was approved by the ethical committee of the Hanoi University of Public Health, Vietnam. Data obtained from the reporting system did not have any personal identifiers; privacy and confidentiality of all information were maintained.

Results

In the period from 2005 to 2013, a total of 313 101 deaths from injuries were recorded. Injury-related deaths account for approximately 11% of all deaths due to all causes. These proportions drop below 10% in 2012 and 2013, but this downward trend is not statistically significant.

Over the past 9 years, men have accounted for roughly three-quarters of the total injury-related deaths. The mortality rate for females has changed in the period of 2005-2013 but the trend is not identified.

The distribution of injury mortality among economic geographic areas has remained relatively stable over the years. Two regions with high mortality rates are Red River Delta and Northeast, which are consistently at 18% to 20%. The Central Highland region contributes the lowest proportion but is showing a statistically significant increasing trend in injury mortality from 5.8% in 2005 to 9.2% in 2013 ($P < .01$). The Southeast region of the country is the only one with a decreasing trend in injury mortality over the study period, with the proportion of injury mortality going from 15.6% in 2005 to 11.6% in 2013 ($P < .01$) (Table 1).

The *leading cause* of death from injury was road traffic injuries (RTIs), accounting for 40.3% to 44.5% of all injury-related deaths during the period 2005-2013 in Vietnam; the *second* was drowning, accounting for 15.8% to 18.6%; and the *third* was self-inflicted, accounting for 8.1% to 13.1%. These top 3 causes are jointly responsible for 68.6% to 71.4% of all injury-related deaths. Other leading causes of injury-related deaths include occupation-related, exposure to electric current, choking/suffocation, and fall. Proportions of the leading causes of injury-related

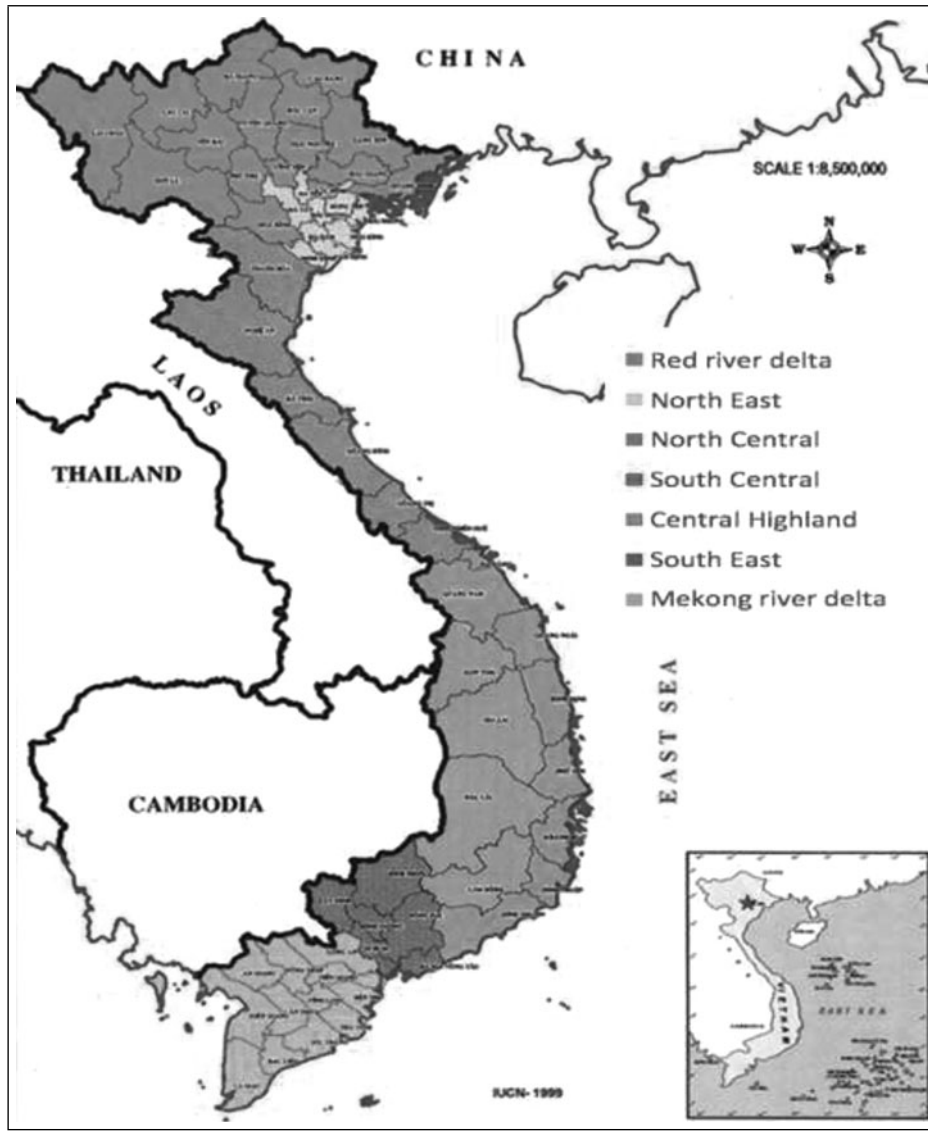

FIGURE Economic Regions of Vietnam (From Geography Institute, Vietnam)

deaths have not significantly changed throughout the study period ($P > .05$). However, statistically significant reduction in trend was seen for drowning ($P < .01$) and exposure to electric current ($P < .05$). Conversely, there was a statistically significant upward trend in occupational-related injury deaths during the period of 2005-2013 ($P < .01$) (Table 2).

In general, the overall injury mortality rate in Vietnam varies from 33.1 to 42.7 per 100 000 people per year for the study period. While the rate seems to be decreasing in the last 4 to 5 years, this trend is not statistically significant. However, when broken down by age, injury mortality in children 0 to 18 years of age ranged from 19.5 to 27.3 per 100 000 children per year, a reduction that was found to be statistically significant ($P < .01$). On the contrary, injury mortality among adults (older than 18 years) ranged from 35.4 to 51.4, but no clear trends were found in this study (Table 3).

Road traffic injuries are the leading cause of death in Vietnam with mortality rate ranging from 11.79 to 20.90 per 100 000 population per year. The second leading cause of injury-related death is drowning and the third cause is self-inflicted. Of note is the increasing trend observed for mortality due to self-inflicted injuries (4.21-5.32 per 100 000 population per year, $P < .01$) and occupational-related injuries (1.95-2.34 per 100 000 population per year, $P < .05$) (Table 4).

Fatal injuries in children 0 to 18 years of age account for about 20% of total fatalities due to injury.

TABLE 1
Basic Information of Injury-Related Death in Vietnam During 2005-2013

	2005 n (%)	2006 n (%)	2007 n (%)	2008 n (%)	2009 n (%)	2010 n (%)	2011 n (%)	2012 n (%)	2013 n (%)
All deaths	263 724	273 383	318 386	312 059	317 625	340 002	358 492	377 103	364 405
Injury-related death	27 248 (10.3)	28 595 (10.5)	37 528 (11.8)	33 666 (10.8)	34 740 (10.9)	36 810 (10.8)	37 498 (10.5)	37 096 (9.8)	34 306 (9.4)
Gender									
Male	20 157 (74.0)	21 384 (74.8)	28 484 (75.9)	25 192 (74.8)	26 416 (76.0)	27 300 (74.2)	28 327 (75.5)	27 973 (75.4)	26 113 (76.1)
Female	7091 (26.0)	7211 (25.2)	9044 (24.1)	8474 (25.2)	8324 (24.0)	9510 (25.8)	9171 (24.5)	9123 (24.6)	8193 (23.9)
Age, y									
0-18	6069 (22.3)	6333 (22.1)	7180 (19.1)	6581 (19.5)	6317 (18.2)	6883 (18.7)	6873 (18.3)	6427 (17.3)	5773 (16.8)
>18	21 179 (77.7)	22 262 (77.9)	30 348 (80.9)	27 084 (80.4)	28 423 (81.8)	29 927 (81.3)	30 625 (81.7)	30 669 (82.7)	28 533 (83.2)
Region									
Red River Delta	5073 (18.6)	5217 (18.2)	6537 (17.4)	6542 (19.4)	5925 (17.1)	7349 (20.0)	7278 (19.4)	7313 (19.7)	6883 (20.1)
Northeast	5082 (18.7)	5205 (18.2)	7130 (19.0)	6431 (19.1)	6976 (20.1)	6615 (18.0)	6957 (18.6)	6676 (18.0)	6315 (18.4)
North Central	4292 (15.8)	4529 (15.8)	5606 (14.9)	3872 (11.5)	6314 (18.2)	5821 (15.8)	5700 (15.2)	5275 (14.2)	5029 (14.7)
South Central	3014 (11.1)	3189 (11.2)	4662 (12.4)	4388 (13.0)	3568 (10.3)	3901 (10.6)	4141 (11.0)	4060 (10.9)	3294 (9.6)
Central Highland	1588 (5.8)	1924 (6.7)	2693 (7.2)	2344 (7.0)	2430 (7.0)	2617 (7.1)	3110 (8.3)	2947 (7.9)	3163 (9.2)
Southeast	4105 (15.1)	4146 (14.5)	5014 (13.4)	4095 (12.2)	4985 (14.3)	4290 (11.7)	4049 (10.8)	4326 (11.7)	3975 (11.6)
Mekong River Delta	4094 (15.0)	4385 (15.3)	5886 (15.7)	5994 (17.8)	4542 (13.1)	6217 (16.9)	6263 (16.7)	6499 (17.5)	5647 (16.5)

This proportion varies from year to year from 22.3% in 2005 to 16.8% in 2013; this downward trend is statistically significant ($P < .01$). Pattern of injury mortality is quite different among this age group as compared with the adult population (older than 18 years). For those 0 to 18 years of age, drowning is the leading cause, with mortality rates ranging from 15.58 (2005) to 10.3 (2013) per 100 000 children per year; this trend was statistically significant ($P < .01$). Road traffic injury was the second leading cause of death in those 0 to 18 years of age. Road traffic injury–related deaths accounted for a quarter to half of the injury-related deaths among children in 2005-2012 but, as of 2013, had increased to nearly the same level as drowning deaths; however, this trend is not statistically significant. Reduction trends were also found in exposure to electric current ($P < .001$), poisoning ($P < .05$), burn ($P < .01$), and exposure to animated mechanical forces ($P < .01$).

Among adults (older than 18 years), RTI is the leading cause of injury-related death, followed by self-inflicted, drowning, occupational-related, and exposure to electric current. In this study, we did not

TABLE 2
Proportion of Standardized Overall Injury Mortality by Causes in Vietnam During 2005-2013

Cause	2005	2006	2007	2008	2009	2010	2011	2012	2013
Road traffic (V01-V09)	40.3%	41.6%	44.5%	40.3%	42.4%	40.7%	43.4%	42.4%	41.1%
Drowning (W65-W74)	18.6%	18.3%	17.1%	17.8%	16.9%	16.1%	16.8%	15.8%	16.4%
Self-inflicted (X60-X84)	9.7%	10.3%	8.1%	10.4%	10.1%	10.6%	11.2%	12.1%	13.1%
Occupation related (W20-W49)	5.0%	5.0%	4.4%	4.2%	5.9%	5.3%	5.2%	5.6%	5.8%
Exposure to electric current (W85-W99)	5.1%	4.6%	4.2%	4.6%	3.8%	4.4%	3.9%	4.1%	4.0%
Fall (W00-W19)	2.6%	2.4%	3.7%	3.6%	3.4%	3.3%	2.7%	3.1%	2.9%
Poisoning (X40-X49)	2.7%	2.5%	3.9%	3.2%	2.5%	2.4%	1.7%	2.3%	2.0%
Interpersonal violence (X85-Y09)	2.1%	2.1%	1.9%	1.9%	2.2%	2.2%	2.2%	2.2%	2.0%
Exposure to animate mechanical forces (W50-W64)	0.7%	0.6%	0.8%	0.8%	0.8%	0.8%	0.5%	0.6%	0.5%
Burn (X00-X09, X10-X19)	0.7%	0.5%	0.7%	0.8%	0.6%	0.6%	0.7%	0.7%	0.6%
Choking/suffocation (W75-W84)	0.3%	0.4%	0.4%	0.6%	0.2%	0.6%	0.6%	0.7%	0.5%
Others (X58-X59)	5.9%	5.8%	5.2%	6.3%	5.7%	7.7%	5.9%	5.3%	5.4%
	100%	100%	100%	100%	100%	100%	100%	100%	100%

TABLE 3
Injury Mortality Rates (100 000 per Year) by Gender, Age Group, and Region in Vietnam During 2005-2013

	Year											
	2005	2006	2007	2008	2009	2010	2011	2012	2013	Regression Coefficient *B*	*t*	*P*
Total	33.1	34.3	44.6	39.6	40.4	42.3	42.7	41.8	38.2	0.7	1.5	.174
Gender												
Male	49.7	52.2	68.7	60.0	62.1	63.5	65.2	63.7	58.9	1.1	1.5	.167
Female	16.9	17.0	21.1	19.6	19.1	21.6	20.6	20.3	18.0	0.3	1.2	.283
Age group, y												
0-18	26.9	27.3	24.9	22.8	22.3	24.4	24.3	22.9	19.5	−0.7	−0.4	.009
>18	35.4	37.0	54.7	48.2	49.3	51.0	51.4	50.5	47.4	1.4	0.2	.097
Region												
Red River Delta	28.4	29.0	37.0	38.4	32.1	39.3	37.3	38.3	36.1	1.0	2.3	.052
Northeast	42.7	43.3	62.5	57.1	57.2	53.6	59.2	53.0	50.3	0.8	0.1	.382
North Central	42.6	45.0	58.5	42.0	61.2	57.5	53.8	51.4	50.3	0.9	1.0	.337
South Central	35.3	37.1	51.3	54.0	40.7	44.1	49.4	45.2	37.5	0.3	0.4	.736
Central Highland	33.3	39.6	66.2	62.9	47.5	50.3	59.7	54.9	67.0	2.6	2.0	.088
Southeast	33.2	32.3	37.0	34.0	35.4	29.6	30.9	28.6	27.8	−0.8	−2.7	.029
Mekong River Delta	24.3	25.9	34.1	33.4	26.4	36.0	37.8	37.4	32.5	1.3	2.5	.042

find a reduction in trends for injury mortality among adults, but increasing trends were noted in mortality due to self-inflicted injuries ($P < .001$) and choking/suffocation ($P < .01$) (Table 5).

Discussion

To the best of our knowledge, this is the first study in Vietnam to systematically look at the pattern and trend of injury mortality using government and long-term data. The data used in this study were extracted from the A6 mortality reporting system. Despite limitations such as manual collection and paper-based records, it is considered the most reliable source of mortality data in Vietnam, with previous studies finding a high level of completeness and accuracy of these data as compared with other sources[6,7] Our results show that injuries are still one of the leading causes of death in Vietnam, especially among children aged 0 to 18 years. Injury-related deaths still account for about 10% of the nation's overall death toll and this trend has not changed for many years. This pattern is similar to many other low- and middle-income countries.[8,10-12]

TABLE 4
Cause-Specific Injury-Related Mortality Rate (100 000 per Year) in Vietnam During 2005-2013

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	*B*	*t*	*P*
Road traffic (V01-V09)	11.79	12.89	20.90	16.90	17.94	18.18	19.53	18.52	16.64	0.58	1.68	.136
Drowning (W65-W74)	7.25	7.46	8.03	7.45	7.14	7.19	7.58	7.25	6.65	−0.07	−1.59	.156
Self-inflicted (X60-X84)	4.21	4.21	3.83	4.37	4.50	4.75	5.02	5.26	5.32	0.17	6.12	.000
Occupational related (W20-W49)	1.95	2.02	2.08	1.76	2.49	2.36	2.35	2.45	2.34	0.06	2.69	.031
Exposure to electric current (W85-W99)	1.98	1.90	1.96	1.93	1.78	1.96	1.77	1.80	1.63	−0.03	−3.42	.011
Fall (W00-W19)	1.00	0.96	1.74	1.51	1.42	1.49	1.22	1.35	1.17	0.01	0.39	.709
Poisoning (X40-X49)	1.07	1.04	1.82	1.32	1.07	1.08	0.78	0.98	0.83	−0.05	−1.56	.162
Interpersonal violence (X85-Y09)	0.82	0.85	0.90	0.78	0.93	0.99	0.98	0.95	0.82	0.01	1.14	.292
Exposure to animate mechanical forces (W50-W64)	0.28	0.25	0.37	0.33	0.33	0.35	0.21	0.28	0.19	−0.01	−1.24	.254
Burn (X00-X09, X10-X19)	0.29	0.21	0.32	0.33	0.25	0.26	0.31	0.30	0.23	0.01	−0.12	.905
Choking/suffocation (W75-W84)	0.13	0.18	0.18	0.25	0.10	0.26	0.28	0.30	0.21	0.01	2.01	.084
Others (X58-X59)	2.29	2.35	2.44	2.62	2.41	3.45	2.66	2.32	2.19	0.01	0.25	.811

TABLE 5
Cause-Specific Injury-Related Mortality Rate (100 000 per Year) by Age Group in Vietnam During 2005-2013

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	*B*	*t*	*P*
0-18												
Drowning	15.58	15.65	12.96	12.26	11.90	11.80	12.34	11.55	10.34	−0.582	−5.15	.001
Road traffic	4.40	4.90	6.00	4.70	5.20	6.20	6.50	5.80	9.10	0.400	3.27	.014
Self-inflicted	1.64	1.71	1.05	1.29	1.46	1.59	1.66	1.66	2.51	0.080	1.76	.122
Exposure to electric current	1.16	1.15	0.93	0.94	0.75	0.86	0.59	0.66	0.58	−0.075	−7.52	.000
Poisoning	0.62	0.56	0.82	0.56	0.36	0.38	0.30	0.47	0.37	−0.041	−2.52	.040
Occupational related	0.58	0.51	0.45	0.36	0.41	0.46	0.49	0.34	1.14	0.032	1.04	.334
Fall	0.44	0.50	0.56	0.45	0.50	0.40	0.37	0.40	0.70	0.005	0.33	.748
Interpersonal violence	0.43	0.40	0.33	0.30	0.36	0.42	0.34	0.39	0.36	−0.003	−0.05	.600
Burn	0.38	0.23	0.31	0.31	0.22	0.24	0.20	0.20	0.09	−0.025	−4.08	.005
Choking/suffocation	0.31	0.41	0.34	0.50	0.16	0.52	0.51	0.57	0.09	−0.001	−0.03	.981
Animate mechanical forces	0.27	0.26	0.27	0.20	0.23	0.25	0.13	0.18	0.14	−0.016	−3.83	.006
Other	1.09	1.06	0.93	0.91	0.74	1.24	0.91	0.69	0.79	−0.033	−1.59	.156
Older than 18 y												
Road traffic	14.58	15.96	28.63	23.17	24.21	23.95	25.70	24.40	20.36	0.721	1.27	.244
Self-inflicted	5.18	5.17	5.27	5.95	6.00	6.27	6.61	6.92	6.70	0.239	9.62	.000
Drowning	4.11	4.31	5.47	4.98	4.81	4.98	5.32	5.26	4.84	0.091	1.74	.125
Occupational related	2.47	2.61	2.92	2.48	3.52	3.28	3.23	3.43	2.93	0.095	2.25	.060
Exposure to electric current	2.29	2.18	2.49	2.44	2.28	2.49	2.32	2.32	2.14	0.008	−0.48	.649
Poisoning	1.24	1.22	2.34	1.71	1.42	1.42	1.00	1.22	1.05	−0.061	−1.20	.271
Fall	1.21	1.14	2.35	2.06	1.88	2.02	1.63	1.79	1.41	0.021	0.38	.718
Interpersonal violence	0.97	1.02	1.20	1.03	1.20	1.27	1.28	1.22	1.04	0.022	1.48	.182
Animate mechanical forces	0.28	0.25	0.42	0.40	0.39	0.40	0.25	0.32	0.22	−0.007	−0.64	.543
Burn	0.25	0.20	0.33	0.35	0.27	0.27	0.36	0.35	0.30	0.010	1.63	.148
Choking/suffocation	0.07	0.09	0.09	0.12	0.08	0.13	0.17	0.17	0.28	0.021	4.56	.003
Other	2.75	2.85	3.22	3.50	3.24	4.52	3.48	3.08	2.88	0.549	−0.61	.559

Injury-related mortality was found to be 3 times higher among males than among females. This could be attributed to the fact that males are more likely to be involved in road traffic crashes, may be more exposed to riskier work environments, and involved more in interpersonal violence. This finding is consistent with other population-based studies conducted in Vietnam[4,13,14] and studies from other countries such as China, Egypt, Uganda, and Tanzania.[8,11,15,16]

In Vietnam, the injury mortality pattern is characterized by 2 leading causes of death: road traffic injury (16.6 per 100 000 population per year) and drowning (8.8 per 100 000 population per year). However, both rates are lower than rates found in previous population-based studies in Vietnam.[4,13] These studies reported rates of 11.79 and 16.64 for RTI fatalities and 7.25 and 6.64 for drowning. The pattern found through our analysis, however, is consistent to what has been reported from several countries in Asia such as Thailand, China, Malaysia, and Bangladesh.[8,12,17-19]

Road traffic injuries are responsible for more than 10 000 deaths each year in Vietnam. Despite many activities and programs on road safety implemented in Vietnam by the government as well as NGOs, findings from our study indicate that RTIs in Vietnam are still unacceptably high. While the mortality rate has reduced by about 3% since 2007 when the compulsory helmet law was implemented, this trend is not statistically significant. This is also very similar to the global trend,[20] and more needs to be done to reduce RTI-related mortality in Vietnam. One main problem related to helmet use in Vietnam is the increasing use of substandard helmets as has been found in several previous studies.[21] The correct use of standard helmets has been found to reduce the risk of death by 29% and head injuries by 67%.[22] It is, therefore, imperative that road safety efforts in Vietnam include a focus on this issue to reduce the burden of deaths and serious injuries from RTIs.

Since 2001, the results of the Vietnam Multi Center Injury Survey have highlighted drowning as a leading

cause of death among children.[12,13] However, deaths from drowning in Vietnamese children remain alarmingly high, with about 3000 children dying per year nationwide. The mortality rate of drowning in Vietnam is similar to that in other countries in the region such as Bangladesh, China, Malaysia, Thailand, and Cambodia.[17,23,24] The good news for Vietnam is that the rate of childhood drowning is on a downward trajectory over the period 2005-2013. Reduction in drowning rates of 3% per year in adults and 4% per year in children has been observed. While this change is relatively small, the reductions might be attributed to the increased focus on drowning prevention in Vietnam by the government.[25,26] However, we have not been able to confirm the effectiveness of intervention in this study.

Occupational-related injuries are also a cause of relatively high mortality rates for the community in Vietnam. The mortality rate among men is 6 to 8 times higher than that of women. These figures are also very similar to those globally, as well as those within the region.[8,20,27] However, it should be noted that some other injury causes might fall into this category and so the trend and pattern might be affected.

Exposure to electric current is another leading cause of injury-related deaths in Vietnam annually. Deaths due to this cause are more concentrated in the midland and mountainous areas of the North and North Central Coast. These are regions where a large proportion of the population is living in rural areas where the electrical system in the home has not been set up with safety standards and the use of electricity in fishing is common. This finding is quite similar to other studies done in Bangladesh, China, and Philippines where the issues of safe homes and use of electricity in fishing were found.[12,20,27]

Self-inflicted and interpersonal violence are the second leading cause of intentional injury-related death recorded in Vietnam. Of note is the increasing trend observed for mortality related to self-inflicted injuries in Vietnam. This is more of a concern among males, whereby mortality rate due to self-inflicted injuries is twice as high as that among females. This trend is somewhat similar to the global trend of intentional injury as highlighted in the *Global Status Report on Violence Prevention*, which highlights many distinct and contradictory trends in suicides or interpersonal violence.[20,28] It is difficult to determine the reason behind the increasing trend of self-inflicted injuries in Vietnam, but previous studies have found that acute life stressors, depression, and anxiety were strongly associated with suicide attempt or ideation.[29,30]

This study attempts to analyze the patterns and trends of injury mortality in Vietnam using data from the A6 system. While, as mentioned previously, the system is the most reliable source of mortality data in Vietnam, and has many documented strengths, it also has some limitations: (i) issues such as missing data and unmatched codes limited our ability to disaggregate data into more detail for some variables such as age and locations; (ii) since other data systems in Vietnam are quite limited, especially for mortality data, we were not able to validate or compare our findings with other data sources. In addition to these limitations related to the data source used, it is important to note that the trend analyses in this study ought to be considered to be at the exploratory level. There is need to examine these trends in light of policy and programmatic activities implemented in Vietnam, as well as adjustments that need to be made to account for secular trends. Despite these limitations, this study provides the first ever analysis of injury mortality patterns and trends in Vietnam over time. Our study highlights injury mortality in Vietnam as an issue that remains a significant public health problem.

Implications for Policy & Practice

- The results of this study show that despite the positive changes in some specific causes of injury-related death, the overall injury patterns in Vietnam have not changed much.
- The leading causes of injury-related death in Vietnam are still road traffic injury among the entire population and drowning among children.
- Other unintentional injuries including occupational-related injuries, falls, poisoning, and exposure to electric current still contributed to the huge burden of injury-related mortality.
- There are significant increasing trends among intentional injuries such as self-inflicted and interpersonal violence and this needs urgent attention.
- Although Vietnam has started many injury prevention programs, these efforts ought to continue, and be amplified, with special attention to the leading causes of injury-related death: RTI and drowning among children.
- A multifaceted approach focusing on evidence-based policies, increasing awareness of community, implementing evidence-based injury prevention and control programs, establishment or improvement of injury surveillance systems, and data-reporting systems is necessary to decrease the burden of injuries.

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