***Southeast-Asian J. of Sciences*** Vol. 3, No. 1 (2014) pp. 87-92

# AGEING AND FATAL WORK-RELATED INJURIES: A CASE STUDY FROM VIETNAM

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**Abstract**

## 1. Background

In the United States, the estimated fatal work-related injury rate was 3.2 per 100,000 population in 2012 and the total registered number of deaths was 4,383. The cause of death comprise six main groups: transportation accidents (41%), violence and other injuries by persons or animals (17%), contact with objects and equipment (16%), falls, slips, or trips (15%), exposure to harmful substances or environments (7%) and fires and explosions (3%) (US Department of Labor, 2013b). The highest rate of fatal work-related injury were among the occupations of (1) construction, (2) transportation, (3) agriculture, forestry, fishing, and hunting (US Department of Labor, 2013b). Concerningly, these three over-represented occupational groupings comprise 60% (or 29.4 of 49

**Key words:** ageing, work-related injury, epidemiology, public health.

million people ages 15 and older) of Vietnam's labor force. (GSO, 2010). Consequently, fatal work-related injuries are a major concern in Vietnam.

In Vietnam, a national mortality reporting system has functioned under the auspices of the Ministry of Health since 1992. Commune-level health officials record basic demographic data and information on causes of death, which is stored in an official book, namely the A6 book. The A6 book with its using guideline is designed for mortality registration on causes of death as a mandatory routine work completed by a trained head of commune health station in Vietnam. In 2006, there were 10,769 official established commune health stations of 671 district health centers within 64 provinces nationwide that was the government network of health care system. The data from the A6 is collated by the district-level health service and is then forwarded to the provincial and central-level governments. The commune-level officials maintain the reporting system and in turn, are able to actively use the information gained to plan commune-level health services. The system performs well in terms of its completeness and classification of injury-related deaths (Stevenson et al., 2012). Since the introduction of "doi moi" (or economic reform) in 1986, Vietnam has placed significant emphasis on economic development. Consequently, the percentage of the population living on less than a dollar a day has fallen from 39.9% to 4.1% over a 15 year period from 1993 to 2008. Life expectancy is currently 70.2 years for men and 75.6 years for women (GSO, 2010; UN, 2010). Therefore, the working population is aging rapidly and there are more old people working. This study examines the relationship between age and the risk of fatal work-related injuries in Vietnam in 2007.

## Methods

Data on fatal work-related injuries across Vietnam in 2007 was assessed from give source mortality database for all causes of death. Both demographic data and lists of all deaths occurred in 2007 were obtained from all commune health stations (n=10,769) and District Health Centers (n=671) for all provinces (n=64) in Vietnam. Five indicators, including name, age, sex, date of death and the cause of death, were collected for each case. We also collected the address, name and telephone number of heads of commune health stations for further verification of obtained information, if necessary. The present study method has been described elsewhere (Ngoan, 2006; Ngoan et al., 2007). All cases of accidental death were coded to the ICD-10 including: death due to transport accident (V01-V99); falls (W00-W19); exposure to inanimate mechanical forces (W20-W49); drowning and submersion (W65-W84); exposure to electrocution (W85-W99); exposure to smoke, fire/flames (X00-X19); lightning (X30-X39); and all other external causes coded as S01-T99, W50-W64,X50-X59, Y10-Y89. Fatal work-related injuries were defined as the fatal injury that occurred dur-

ing work hours. Age groups were categorized as 20-29, 30-39, .. and 80+. In Vietnam, road traffic injury, occurring while traveling to and from work, is not recognized as a work-related injury. The mortality rates ratio and 95% confident interval (RR and 95%CI) were estimated for age groups using logistic regression analysis performed in STATA 10 (STATA, 2008).

## Results

For ages 20 or older, the study covered a population of 45,564,950 (22,326,826 males and 23,238,125 females). In 2007, we had reports on 1,814 cases of fatal work-related injuries (1,607 males and 207 females) nationwide. Causes of fatal work-related injuries included death due to falls (117 cases); exposure to inanimate mechanical forces (197 cases); drowning and submersion (26 cases); electrocution (88 cases); exposure to smoke, fire / flames (8 cases); lighting (5 cases), other causes (206 cases, and un-specified causes (1,167 cases) (Table 1). The estimated fatal work-related injury rate per 100,000 population was 3.98 (7.20 in males and 0.98 in females). Among working age groups, the highest rate per 100,000 population was seen for the age group 50-59: 5.31 (9.01 in males and 1.77 in females). Among retired age groups, the highest mortality rates per 100,000 were seen for 70-79: 2.45 (3.30 in males and 1.63 in females), (Table 2). The risks of fatal work-related injury were significantly increased for the age group 50-59: RR=1.34, 95%CI=1.14-1.56, P for trend = 0.005 in both sexes, (RR=1.21, 95%CI=1.03-1.43, P for trend $< 0.01$ in males and RR=2.67, 95%CI=1.75-4.09), P for trend $< 0.01$ in females (The age group 20-29 was the reference) (Table 3).

## Discussions

As the world's population ages, occupational health and the prevention of work-related injuries is essential, especially in Vietnam and other less-developed countries where occupational health and safety is limited. Our study highlights a significant association between older age groups and the risk of fatal work-related injuries in Vietnam. That is, the present population covered both industry and non-industry sectors at household, local and state level. The study recorded cases of fatal work-related injuries in 2007 in Vietnam for the ages 20 and older and 1,814 cases were reported. The age group of 50-59 has the highest mortality rate of fatal work-related injuries for both male and female. Between age groups 20-29 to 50-59, the mortality rate for work-related injury significantly increases. Over 50% of Vietnam's labor force in 2009 worked in agriculture, forestry, and fishing (GSO, 2010), which have been commonly categorized as self-managed. Thus, farmers aged 60 and older still work and have a high fatal work-related injury rate (from 1.60 per 100,000 to 2.45 per

100,000). Our results of mortality rate might be underestimated as much as 41%, because road traffic injury that occurred while traveling to and from work, which accounted for 41% of all fatal work-related injuries in the US in 2012, was not recognized as a work-related injuries in our study. Nevertheless, the mortality rate of fatal work-related injury of 3.98 per 100,000 in 2007 in Vietnam was higher than that in the US in 2012, which was 3.2 per 100,000 (US Department of Labor, 2013a; US Department of Labor, 2013b). These results have indicated that the problem of fatal work-related injury is a significant public health problem in Vietnam (and is likely to be equally high in other less developed countries).

The present study has certain limitation. Due to a small number of registered cases of fatal work-related injuries by six main specific causes of death, the present study results of RR and 95%CI by age groups were not available for the specific causes of death. In conclusion, despite of some minor limitation, the association between ageing or old age and the risk of fatal work-related injuries is significantly associated in our study population in Vietnam.

## Recommendations

A national census of fatal work-related injuries is recommended to improve injury control at both national and international levels. A program of occupational health and safety to prevent fatal work-related injuries for working old people is highly recommended in Vietnam and less developed countries.

**Table 1 Distribution of cases by causes and concurrent time within 2007**

| Cause and ICD-10 | Male | | Female | | Total | |
|---|---|---|---|---|---|---|
| | Number | % | Number | % | Number | % |
| Falls (W00-W19) | 101 | 6.3 | 16 | 7.7 | 117 | 6.4 |
| Exposure to inanimate mechanical forces (W20-W49) | 166 | 10.3 | 31 | 15.0 | 197 | 10.9 |
| Drowning (W65-W84) | 24 | 1.5 | 2 | 1.0 | 26 | 1.4 |
| Electrocution (W85-W99) | 83 | 5.2 | 5 | 2.4 | 88 | 4.9 |
| Burn (X00-X19) | 7 | 0.4 | 1 | 0.5 | 8 | 0.4 |
| Lighting (X30-X39) | 1 | 0.1 | 4 | 1.9 | 5 | 0.3 |
| Other causes (S01-T99, W50-W64,X50-X59, Y10-Y89) | 188 | 11.7 | 18 | 8.7 | 206 | 11.4 |
| Un-specified causes | 1,037 | 64.5 | 130 | 62.8 | 1,167 | 64.3 |
| Total | 1,607 | 100.0 | 207 | 100.0 | 1,814 | 100.0 |

**Acknowledgements** We deeply appreciated health officers of 10,769 Commune Health Stations of 671 District Health Centers within all 64 provinces/cities

**Table 2 Mortality rate per 100,000 by sex and age group**

| | Population by sex and age | | | Cases | | | Rate per 100,000 | | |
|---|---|---|---|---|---|---|---|---|---|
| Age group | Male | Female | Total | Male | Female | Total | Male | Female | Total |
| 20-29 | 6,972,341 | 7,256,926 | 14,229,267 | 518 | 48 | 566 | 7.43 | 0.66 | 3.98 |
| 30-39 | 6,067,419 | 6,315,068 | 12,382,487 | 448 | 44 | 492 | 7.38 | 0.70 | 3.97 |
| 40-49 | 3,996,120 | 4,159,227 | 8,155,346 | 345 | 39 | 384 | 8.63 | 0.94 | 4.71 |
| 50-59 | 2,065,301 | 2,149,599 | 4,214,899 | 186 | 38 | 224 | 9.01 | 1.77 | 5.31 |
| 60-69 | 1,796,524 | 1,869,852 | 3,666,376 | 57 | 14 | 71 | 3.17 | 0.75 | 1.94 |
| 70-79 | 1,061,236 | 1,104,552 | 2,165,788 | 35 | 18 | 53 | 3.30 | 1.63 | 2.45 |
| 80+ | 367,885 | 382,901 | 750,786 | 8 | 4 | 12 | 2.17 | 1.04 | 1.60 |
| Unknown | | | | 10 | 2 | 12 | | | |
| Total | 22,326,826 | 23,238,125 | 45,564,950 | 1,607 | 207 | 1,814 | 7.20 | 0.89 | 3.98 |

**Table 3 Mortality rates ratio by sex and age group**

| Age group | Male | | | Female | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|
| | Cases | Rates ratio | 95% CI | Cases | Rates ratio | 95% CI | Cases | Rates ratio | 95% CI |
| 20-29 | 518 | 1.00 | *Reference* | 48 | 1.00 | *Reference* | 566 | 1.00 | *Reference* |
| 30-39 | 448 | 0.99 | 0.88-1.13 | 44 | 1.05 | 0.70-1.59 | 492 | 1.00 | 0.89-1.13 |
| 40-49 | 345 | 1.16 | 1.01-1.33 | 39 | 1.42 | 0.93-2.16 | 384 | 1.18 | 1.04-1.35 |
| 50-59 | 186 | 1.21 | 1.03-1.43 | 38 | 2.67 | 1.75-4.09 | 224 | 1.34 | 1.14-1.56 |
| | *P for trend = 0.005* | | | *P for trend = 0.000* | | | *P for trend = 0.000* | | |

(in 2007) for their active registration for work-related injuries and other all causes of death (A6 Mortality book) that was the source of data for the present study. The study was partly supported by an AusAID Research and Development Grant. This work, a part of project of fatal injuries occurred among cancer survivors in Vietnam, has also been partly supported by a UICC American Cancer Society Beginning Investigators Fellowships Funded by the American Cancer Society

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