SUMMARY OF DEATHS AMONG THAIS TRAVELLING ABROAD

Kamolthip Atsawawaranunt[1], Sopon Iamsirithaworn[2], Thanawadee Thantithaveewat[2], Ketsarin Sirichuanjun[1], Amornchai Trikunakornwong[1], Manthana Sinsap[1], Kanjana Powpat[1], Aree Meekun[1], Anek Mungaomklang[3] and Vichan Pawun[1]

[1]Institute for Urban Disease Control and Prevention, Bangkok; [2]Department of Disease Control, Ministry of Public Health, Nonthaburi Province; [3]The Office of Disease Prevention and Control 4, Saraburi Province, Thailand

Abstract. Each year some Thai citizens travelling abroad die during travel. In this study we aimed to determine the causes of death among Thais travelling abroad in order to establish evidence-based country advisories for Thai travellers in an effort to reduce this mortality. We retrospectively reviewed a summary of the death certificates of Thai nationals who died while travelling abroad during 2015-2018. The summary was obtained from the Department of Consular Affairs, Ministry of Foreign Affairs, Thailand. During the study period records were available for 2324 people; 57.4% male. The mean (+standard deviation; range) age of study subjects was 52 (±17; 1-103) years. Most subjects died from ill-defined causes (48.6%), followed by neoplasms (15.7%), diseases of the circulatory system (13.6%), injuries (13.6%), infections (7.6%) and gastrointestinal bleeding/perforations (0.9%) respectively. Of the subjects who died from injuries, the leading causes of injury deaths were vehicular accidents (19.4%), falls (11.7%) and suicides (8.3%). Among younger subjects, defined as being aged 18-44 years, injuries were the leading cause of death, accounting for 26.4% of deaths. Among older subjects, defined as being aged >45 years, neoplasms (22.3%) and diseases of circulatory system (15.4%) were the leading causes of death. Thai deaths occurring in low-/middle-income countries (LMIC) were significantly more likely to be caused by infections (p<0.001), falls (p<0.001) and other injuries (p<0.001). Thai deaths occurring in high-income countries (HIC) were significantly more likely to be caused by cardiovascular disease (p<0.001) and neoplasms (p<0.001). In summary, there is a lack of data regarding causes of death for many Thai deaths occurring overseas. These deaths differ by age and destination. In conclusion, pre-travel advice should be tailored to the traveller adjusting for age and destination. Further studies are needed to determine if adjusting for these factors can significantly reduce the incidence of deaths among Thais travelling abroad.

Keywords: cause of death, Thai travellers, Thai citizens, death abroad, death overseas, mortality

Correspondence: Kamolthip Atsawawaranunt, Institute for Urban Disease Control and Prevention, 24/56 Phahon Yothin Road, Bang Khen District, Bangkok 10220, Thailand
Telephone: +66 (08) 0600 0691 E-mail: kamolthip_atsawa@hotmail.com

INTRODUCTION

In 2012, more than 1 billion people travelled internationally and this number has increased yearly (UNWTO, 2016). The number of Thai international travellers increased by 19.0% from an estimated 5.7 million in 2012 (Department of Tourism, 2012) to 6.8 million in 2015 (Department of Tourism, 2015). East Asia, being the most frequently visited region for Thais has become the fastest growing region for Thai tourism. The five most frequently visited countries by Thai citizens are Malaysia, Laos, Japan, China and Singapore (Department of Tourism, 2015). At least 100,000 permit registrations for Thais to work abroad are filed each year; the most popular countries for Thais to work in are China, South Korea, Japan, Singapore, Israel and the United Arab Emirates (Ministry of Labour, 2016).

The main cause of death among international travellers has been reported to be motor vehicle accidents (FIA Foundation, 2010). However, cardiovascular diseases were reported to be the leading cause of death among older travellers (Prociv, 1995; Paixao *et al*, 1991). A study of causes of death among American citizens travelling abroad reported the most common cause to be cardiovascular disease (49.0%), followed by unintentional injury (22.0%); infectious diseases accounted for 1.0% of deaths; 59.0% of deaths occurred outside medical facilities, including 80.0% of injury deaths and 73.0% of cardiovascular deaths (Hargarten *et al*, 1991). Travellers aged 25-54 years were more likely to die from unintentional injuries in developing countries than older travellers or those travelling in developed countries (Hargarten *et al*, 1991). Another study of American travellers reported the leading causes of injury death were motor vehicle accidents, homicides and drownings (Guse *et al*, 2007). The overall age-adjusted proportional mortality ratio (PMR) for injury fatalities among Americans abroad compared to Americans in the United States was 1.6 (95% confidence interval (CI): 1.6-1.7) (Guse *et al*, 2007). The PMR for injury fatalities for the United States compared with Africa has been reported to be 2.7 and comparing the United States with Southeast Asia has been reported to be 1.6, raising concerns about motor vehicle safety and other types of injuries in those parts of the world (Guse *et al*, 2007).

The system of reporting deaths among Thais travelling abroad is similar

to that of the United States, Australia, New Zealand and Singapore (US DOS, n.d.; Australian Department of Foreign Affairs and Trade, n.d.; New Zealand Government, n.d.; Singapore Government, n.d.; Department of Consular Affairs, 2019). Thais who die overseas must have their death registered first in the country of death. The next-of-kin or legal representative must then contact the nearest Thai embassy, high commission or consulate to register for a Thai death certificate. There are 66 Thai embassies and 28 consulates in 67 countries (Ministry of Foreign Affairs, 2014) world-wide. For those who do not register with a Thai embassy or consulate, the Thai death certificate may be applied for through the Legalization Division, Department of Consular Affairs, Ministry of Foreign Affairs, Thailand who will then assist in obtaining the death certificate. The Thai mission will provide assistance with burial, cremation or repatriation arrangements of the deceased (Department of Consular Affairs, 2016).

Pre-travel consultation provides travellers with advice regarding being healthy during travel. It involves performing an individual risk assessment, discussing anticipated health risks and other management measures. The consultation includes an assessment to determine the need for immunizations, prophylactic and/or other medications, such as those used to prevent malaria or high-altitude sickness. Travellers are informed about risks, such as injuries, food and waterborne infections, vector-borne diseases, respiratory tract infections, bloodborne and sexually transmitted infections. Health professionals often concentrate on infectious disease prevention, paying less attention to other travel risks.

In this study, we aimed to determine the causes of death among Thais travelling abroad in order to establish evidence-based country advisories for Thai travellers in an effort to reduce this mortality.

MATERIALS AND METHODS

Study design and study population

We conducted a retrospective review of causes of death among Thais who died while travelling abroad during 2015-2018.

Data retrieval

The data for this study were obtained from the Department of Consular Affairs, Ministry of Foreign Affairs, Thailand. The recorded data were obtained from the death certificates issued by the officials in the country of death which were registered and translated at Thai embassies or consulates to obtain Thai death certificates. The Thai death certificate was the source used for our study.

Data analysis

For each subject age, gender, region and country of death, time of death and cause of death were recorded. The causes

of death were then categorized by group (WHO, 2011): infections, diseases of the circulatory system, neoplasms, injuries, gastrointestinal bleeds and/or perforations and ill-defined. Diseases of the circulatory system were then sub-classified into cardiovascular, cerebrovascular and others. Injury deaths were subclassified into: vehicular accidents, drownings, falls, poisonings, homicides, suicides and others. Countries of death were clustered based on World Bank geographic regions and income groups (World Bank, 2021) (Table 1).

The data were analyzed using the Statistical Package for Social Sciences (SPSS) for Windows, version 24 (IBM Corp, Armonk, NY). Qualitative data were analyzed using frequencies and percentiles and quantitative data were analyzed using means and standard deviations. Descriptive data were compared using the Chi-Square test.

Ethical considerations

This study was approved by the Department of Disease Control, Ethics Committee for Research in Human Subjects on 10 April 2020 (reference number 61043).

RESULTS

A total of 2324 subjects were included in the study, 57.4% male. The age of the subject was available in 1203 subjects. The mean (±standard deviation; range) age of study subjects was 52 (±17; 1-103) years. The location of death was unknown in 52.2% of subjects, 27.0% occurred in a healthcare facility and 20.7% occurred outside a healthcare facility. The countries where most deaths occurred were South Korea (12.0%), the Philippines (11.3%), the United States of America (9.3%), Saudi Arabia (8.0%) and China (6.7%).

About half (48.6%) of deaths were due to ill-defined causes that could not be classified with the ICD-10 classification system, including deaths due to old age, natural causes or other ill-defined causes. Among subjects with a known cause of death, the most common causes of death were neoplasms (15.7%), diseases of the circulatory system (13.6%), injuries (13.6%), infections (7.6%) and gastrointestinal bleeds and/or perforations (0.9%). Among deaths caused by diseases of the circulatory system, 45.7% were due to cardiovascular diseases, 36.3% were due to cerebrovascular diseases and 18.0% were due to other circulatory system diseases. Among injury deaths, 42.5% were due to ill-defined/other causes, 19.4% were due to vehicular accidents, 11.7% were due to falls, 8.3% were due to suicides, 7.3% were due to drownings, 5.4% were due to poisonings and 5.4% were due to homicides (Fig 1).

The most common cause of death among subjects aged <5 years was injuries (28.6%), among subjects aged 5-17 years was infections (30.0%), among subjects aged 18-24 years was injuries (65.5%), among subjects age 25-44 years was injuries, among subjects aged 45-64

Table 1

Countries classified by World Bank regions and income groups (World Bank, 2021)

Region and income category	Country
East Asia and Pacific; low-middle income	Cambodia, China, Fiji, Indonesia, Kiribati, Democratic People's Republic of Korea, Lao PDR, Malaysia, Marshall Islands, Micronesia, Mongolia, Myanmar, Nauru, Papua New Guinea, Philippines, Samoa, Solomon Islands, Thailand, Timor-Leste, Tonga, Tuvalu, Vanuatu, Vietnam
Latin America and Caribbean-high income	Antigua and Barbuda, Aruba, The Bahamas, Barbados, British Virgin Islands, Cayman Islands, Chile, Curacao, Panama, Puerto Rico, St Kitts and Nevis, Trinidad and Tobago, Turks and Caicos Islands, Uruguay
Latin America and Caribbean-low to middle income	Argentina, Belize, Bolivia, Brazil, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Paraguay, Peru, St Lucia, St Vincent and the Grenadines, Suriname, Venezuela
Middle East and North Africa-high income	Bahrain, Israel, Kuwait, Malta, Oman, Qatar, Saudi Arabia, United Arab Emirates
North America-high income	Bermuda, Canada, United States
Sub-Saharan Africa-high income	Seychelles
Europe and Central Asia-low to middle income	Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Georgia, Kazakhstan, Kosovo, Kyrgyz Republic, Moldova, Montenegro, North Macedonia, Romania, Russian Federation, Serbia, Tajikistan, Turkey, Turkmenistan, Ukraine, Uzbekistan
Middle East and North Africa-low to middle income	Algeria, Djibouti, Egypt, Iran, Iraq, Jordan, Lebanon, Libya, Morocco, Syrian Arab Republic, Tunisia, West Bank and Gaza, Yemen
South Asia-low to middle income	Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka

Table 1 (cont)

Region and income category	Country
Sub-Saharan Africa-low to middle income	Angola, Benin, Botswana, Burkina Faso, Burundi, Cabo Verde, Cameroon, Central African Republic, Chad, Comoros, Democratic Republic of Congo, Republic of Congo, Côte d'Ivoire, Equatorial Guinea, Eritrea, Eswatini, Ethiopia, Gabon, The Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, São Tomé and Principe, Senegal, Sierra Leone, Somalia, South Africa, South Sudan, Sudan, Tanzania, Togo, Uganda, Zambia, Zimbabwe
East Asia and Pacific-high income	Australia, Brunei Darussalam, China, French Polynesia, Japan, Republic of Korea, New Caledonia, New Zealand, Northern Mariana Islands, Palau, Singapore
Europe and Central Asia-high income	Andorra, Austria, Belgium, Channel Islands, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Faroe Islands, Finland, France, Germany, Gibraltar, Greece, Greenland, Hungary, Iceland, Ireland, Isle of Man, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Monaco, Netherlands, Norway, Poland, Portugal, San Marino, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, United Kingdom

years was neoplasms (23.3%) and among subjected aged >65 years was neoplasms (20.8%) (Table 2).

Those who died from a neoplasm were significantly more likely to be female (28.2% female vs 6.4% male, $p<0.001$) while those who died of injuries were significantly more likely to be male (16.4% male vs 9.8% female, $p<0.001$).

The percentage of deaths due to ill-defined causes was highest among subjects who died in a Middle Eastern or North African high-income country (MENA-HIC), accounting for 82.1% of all deaths. The percentage of deaths due to ill-defined causes was lower among subjects who died in European or Central Asian high-income countries (ECA-HIC), accounting for 35.3% of all deaths. Among subjects with an identifiable cause of death, injuries were the leading cause of death among subjects who died in East Asian and the Pacific - low - and middle-income countries (EAP-LMIC), accounting for 22.9% of all deaths, followed by diseases of the circulatory system (12.1%) and infections (11.1%). Diseases of the circulatory system were the main cause of death in East Asian and the

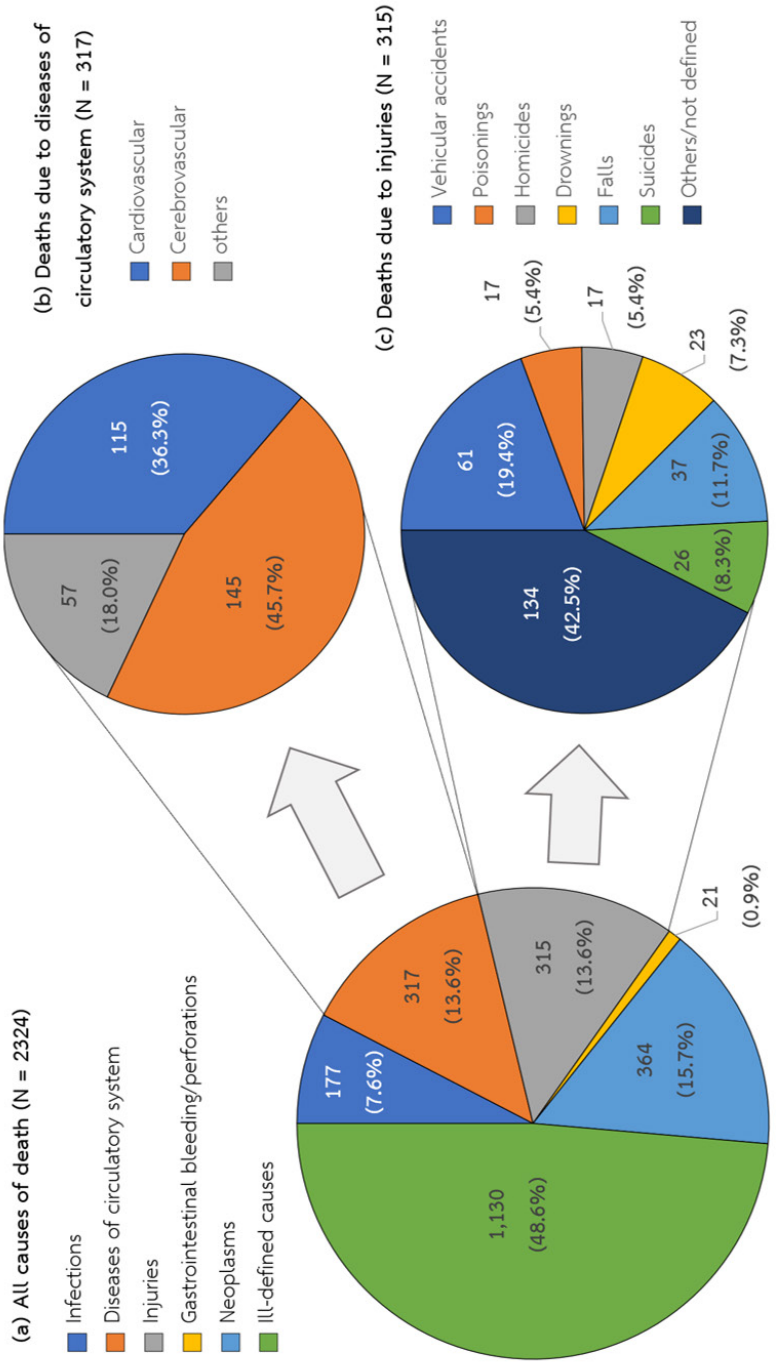

Fig 1 - Causes of death among study subjects

Table 2

Causes of death by age group among study subjects (N=2320)

Causes of death	Age groups of study subjects in years, n (%)						Total (%)
	<5	5-17	18-24	25-44	45-64	≥65	
Infections	1 (14.3)	3 (30.0)	0 (0.0)	33 (8.8)	46 (9.6)	19 (6.3)	102 (8.5)
Diseases of the circulatory system	0 (0.0)	2 (20.0)	1 (3.4)	41 (10.9)	71 (14.9)	49 (16.2)	164 (13.6)
Neoplasms	0 (0.0)	1 (10.0)	3 (10.3)	23 (6.1)	111 (23.3)	63 (20.8)	201 (16.7)
Gastrointestinal bleeding/ perforations	0 (0.0)	0 (0.0)	0 (0.0)	4 (1.1)	3 (0.6)	2 (0.7)	9 (0.7)
Injuries	2 (28.6)	2 (20.0)	19 (65.5)	88 (23.3)	48 (10.1)	3 (1.0)	162 (13.5)
Ill-defined causes	4 (57.1)	2 (20.0)	6 (20.7)	188 (49.9)	198 (41.5)	167 (55.1)	565 (47.0)
Total	7 (100)	10 (100)	29 (100)	377 (100)	477 (100)	303 (100)	1,203 (100)

Pacific - high income countries (EAP-HIC) (16.5%), Middle-eastern and North African - high-income countries (MENA-HIC) (7.6%) and South Asian - low-and middle-income countries (SA-LMIC) (17.9%). Neoplasm deaths were highest among those who died in ECA-HIC and North American - high-income countries (NA-HIC) (Figure 2). Deaths occurring in low- and middle-income countries (LMIC) were significantly more likely to be due to infections (p<0.001), falling injuries (p<0.001) and other injuries (p<0.001). Deaths in high-income countries (HIC) were significantly more likely to be due to cerebrovascular diseases (p<0.001) and neoplasms (p<0.001) (Table 3).

DISCUSSION

Neoplasms were the leading causes of death among our study subjects, unlike previous studies from the United States, Canada, Australia and Scotland where cardiovascular events were the leading causes of death (Hargarten *et al*, 1991; MacPherson *et al*, 2000; Paixao *et al*, 1991; Prociv, 1995). However, since more than half of deaths among our study subjects were ill-defined, it is possible that circulatory system diseases may have accounted for more of these deaths.

The Global Burden of Disease (GBD) 2016 Working Group classified countries based on the quality of death statistics data with North and South America, Europe, Australia and New Zealand be classified as providing high quality data and Asia and Africa as providing lower quality data (GBD 2016 Causes of Death Collaborators, 2017). We also found this to be true in our study where the cause of death was given using an ill-defined term. The percentages of subjects with an in ill-defined term used for the cause of death varied by country from 35.3% to 82.1%.

In our study, the most common causes of death among younger subjects were infections and injuries and among older subjects were neoplasms and circulatory system diseases, similar to the findings of previous studies (Guse *et al*, 2007; Paixao *et al*, 1991; Prociv, 1995).

In our study, the causes of death varied by the per capita income of the destination country, with injuries being a more common cause of death in poorer countries, similar to a study from the United States (Guse *et al*, 2007).

In our study it was difficult to determine the proportions of death due to various conditions due to inadequate data, such as the use of ill-defined terms, the length of the visit, the purpose of the visit, the activities during the visit and the underlying health of the subject.

Pre-travel consultations for Thai citizens planning to travel abroad need to assess risk factors tailored to plans and the age and health of the traveller. Advice should be focused on infectious disease and injury prevention for younger travellers and those travelling to less developed countries and on neoplasms and circulatory

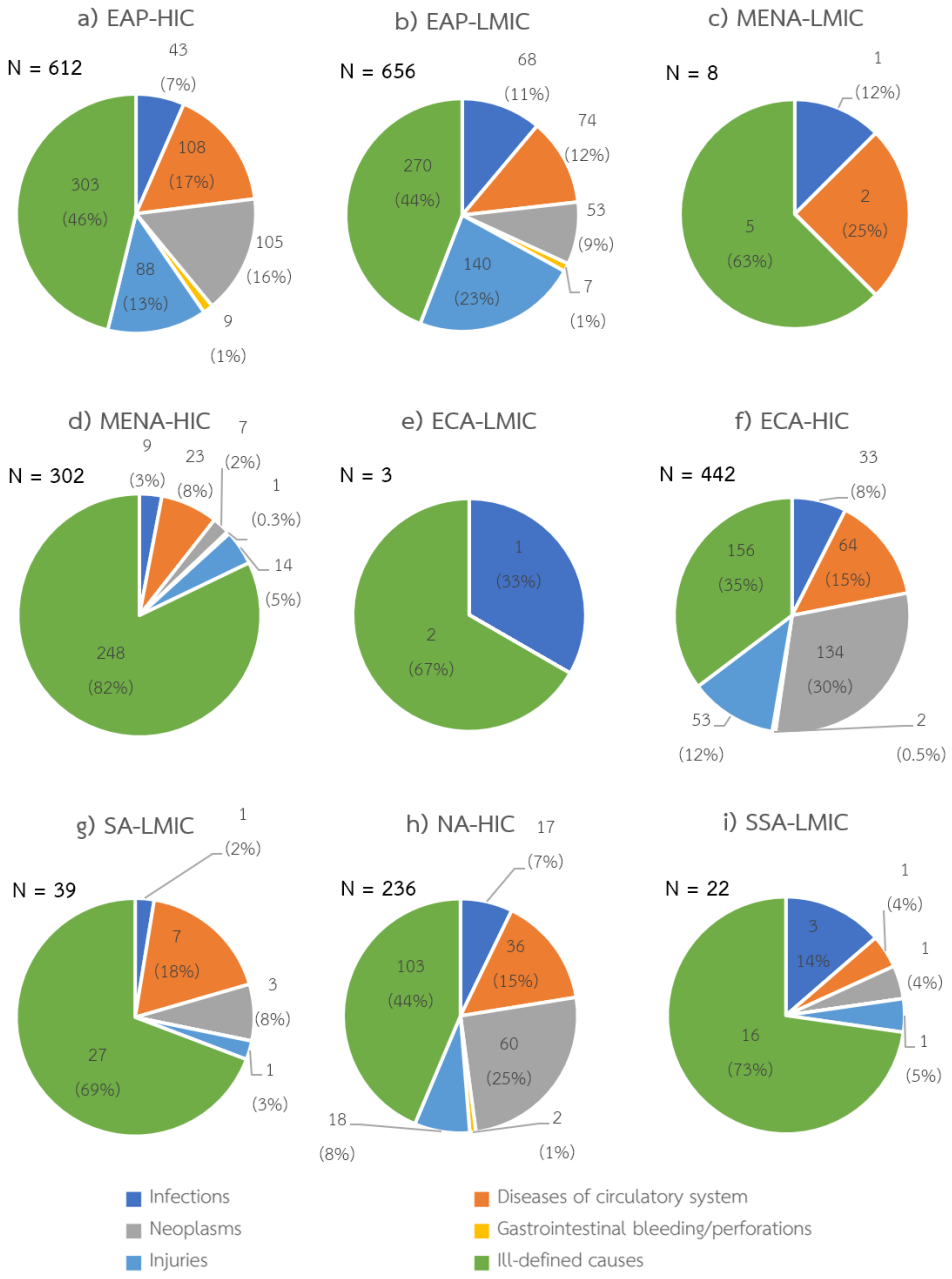

Fig 2 - Causes of death by travel destination and per capita income of destination (N= 2,320)

EAP: East Asia and the Pacific; ECA: Europe and Central Asia; HIC: high-income countries; LMIC: low to middle-income countries; MENA: Middle East and North Africa; NA: North America; SA: South Asia; SSA: Sub-Saharan Africa

Table 3

Associations among causes of death and country groups by per capita income (N=2320)

Causes of death	LMIC *n* (%)	HIC *n* (%)	*p*-value
Infections	77 (10.9)	102 (6.2)	<0.001
Diseases of the circulatory system (all)	86 (12.5)	231 (14.1)	0.299
Cardiovascular diseases	47 (6.8)	68 (4.2)	0.007
Cerebrovascular diseases	22 (3.2)	123 (7.5)	<0.001
Other circulatory system diseases	17 (2.5)	40 (2.4)	0.971
Neoplasms	58 (8.4)	306 (18.7)	<0.001
Gastrointestinal bleeding/perforations	7 (1.0)	14 (0.9)	0.707
Injuries (all)	142 (20.6)	173 (10.6)	<0.001
Vehicular accidents	24 (3.5)	37 (2.3)	0.091
Drownings	12 (1.7)	11 (0.7)	0.017
Falls	21 (3.1)	16 (1.0)	<0.001
Poisonings	9 (1.3)	8 (0.5)	0.034
Homicides	7 (1.0)	10 (0.6)	0.294
Suicides	7 (1.0)	19 (1.2)	0.763
Other injuries	62 (9.0)	72 (4.4)	<0.001
Ill-defined causes	320 (46.5)	810 (49.5)	0.187
Total	730 (100.0)	1796 (100.0)	

Chi-square test used to obtain the *p*-value

HIC: high-income countries; LMIC: low to middle income countries

disease for older travellers and those travelling to more developed countries. More accurate data would help to better guide travellers and Thai embassies and consulates should try to ensure the best evaluation is done to provide this data.

ACKNOWLEDGEMENTS

The authors thank the members of the Department of Consular Affairs, Ministry of Foreign affairs, Thailand for providing the data used in this study. We extend our sincere thanks to all the staff of the Institute of Preventive Medicine and Institute for Urban Disease Control and Prevention who made this project a success.

CONFLICT OF INTEREST DISCLOSURE

The authors declare no conflicts of interest.

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