NON-NATURAL DEATH TRENDS IN THE UNITED STATES

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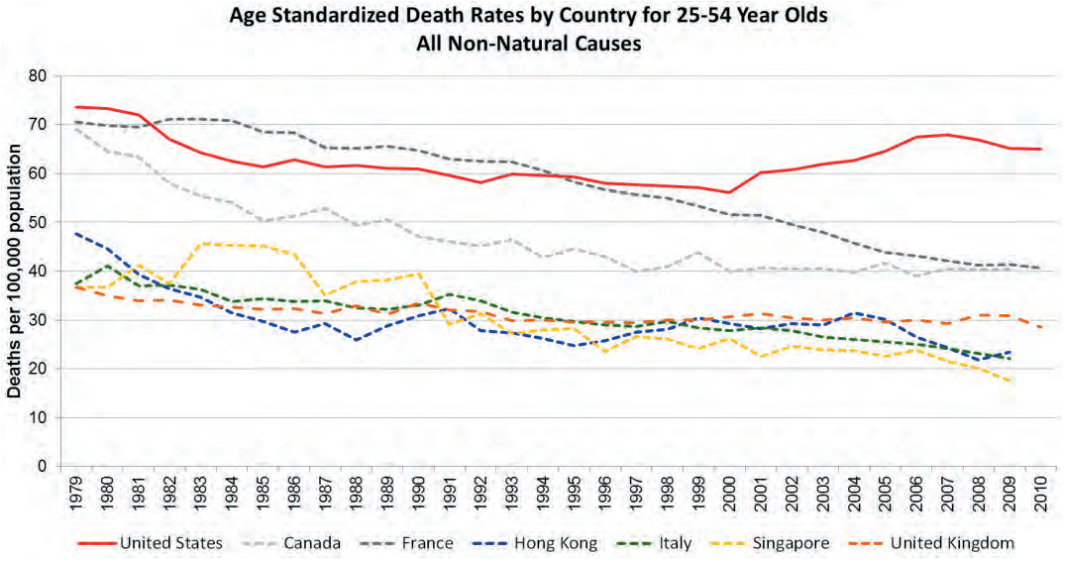
Executive Summary *Non-natural causes of death include motor vehicle accidents, falls, suicides, homicides, drowning, poisoning, complications from medical or surgical treatments, and exposure to smoke and fire. Although these deaths total less than 10% of total all-cause mortality, actual non-natural deaths have been increasing for more than 2 decades. For actuaries and underwriters, this is necessitating the need for a heightened focus upon and understanding of this trend's many sub-trends and aspects. In this article, US mortality experience for non-natural causes of death is analyzed. Results are compared to those of six additional developed countries, and the impact of improving the US mortality results to the levels of peer countries is also presented.*

The Centers for Disease Control and Prevention lists several principal causes of non-natural deaths in the United States: accidental poisoning, motor vehicle accidents, unintentional falls, suicide by firearms or other means, homicide by firearms or other means, accidental drowning, complications from medical or surgical treatments, and accidental exposure to smoke and fire. These causes might seem more inherently preventable than deaths due to natural or medical causes. However, statistical evidence would seem to challenge this assumption.

Among individuals in the US between ages 25 - 54, deaths due to non-natural causes accounted for nearly 30% of all deaths in recent years. In comparison, for those ages 55 and older, deaths due to non-natural causes were less than 5% of total deaths.

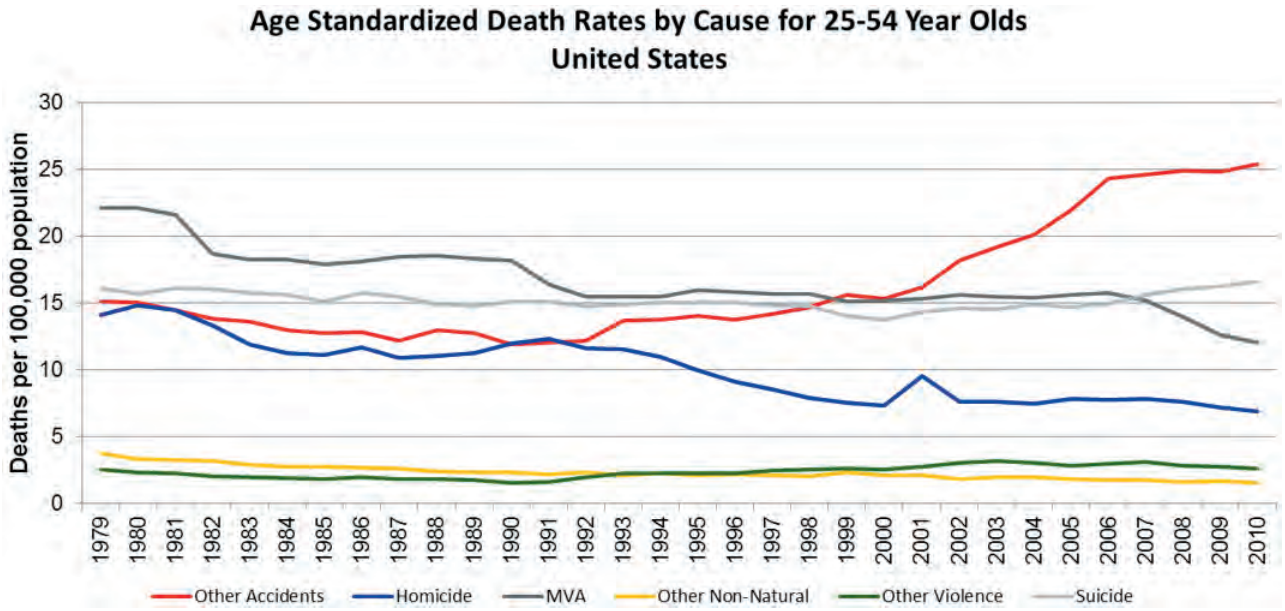
Over the past 30 years, according to data from the World Health Organization (WHO) and the Global Burden of Disease Study[1] (GHDx), non-natural deaths have generally been decreasing worldwide. In the US,

Figure 1



Data provided by WHO. Analysis, interpretations and conclusions are attributable to RGA.

Figure 2



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however, non-natural deaths began to rise about 15 years ago, and the annual rate of increase for these deaths has been accelerating.

Figure 1 (previous page) illustrates non-natural death rate trends from 1979-2010 for the US and for six additional nations with developed insurance markets – Canada, France, Hong Kong, Italy, Singapore and the United Kingdom – each of which has death rates representing broader market trends. France, for example, once had the highest non-natural death rate among large developed countries, but has improved well past the United States. Hong Kong, Singapore, Italy and the UK all have relatively low non-natural death rates, and Canada's experience has been mid-level but improving.

Figure 2 (above) looks at age-standardized death rates in the US in the 25-54 age cohort for the six major categories of non-natural death: homicide, motor vehicle accidents, suicide, other non-natural deaths, other violent deaths and other accidents.

As Figure 2 illustrates, US non-natural deaths for this cohort declined slowly and steadily from 1979 through 1992, but then mortality rates due to "other accidents" began a sustained surge which accelerated for several years and then in 2006 began to rise more slowly. This surge is largely driven by the rising epidemic of opioid use and abuse, an epidemic acutely impacting this cohort.

During 1992 to 2000, the increase in "other accidents" is more than offset by the fall in homicides, resulting in an overall decreasing trend for the US observed in Figure 1. In addition to 9/11 deaths, the deterioration beyond 2000 is largely driven in the increase in "other accidents" coupled with the steady increase in suicides.

If the US could achieve modest reductions in non-natural mortality mirroring current results for peer countries, more than 30,000 deaths per year could be avoided for the 25-54-year-old age group, which would constitute a reduction of 10% to 15% for these ages. A deeper look at US non-natural mortality trends for the top four categories – other accidents, suicides, motor vehicle accidents and homicides – might provide insight into where the US has lost ground to other countries over recent years.

Other Accidents

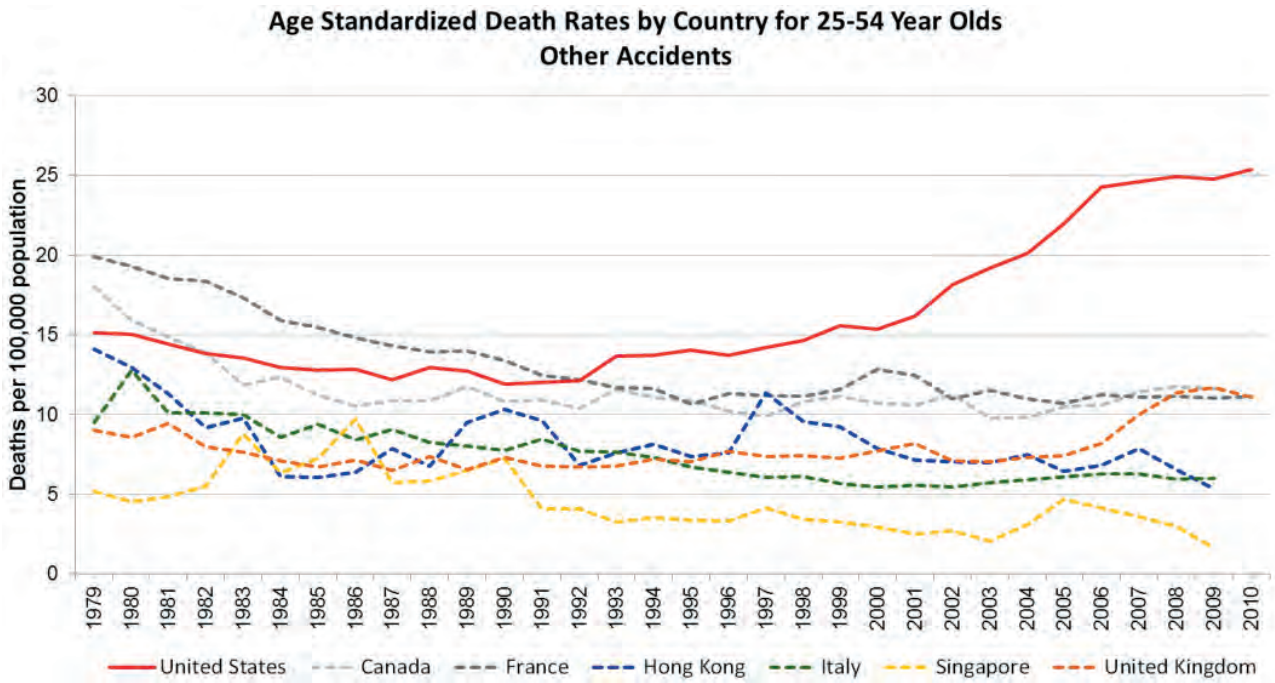
Most of the non-natural cause mortality deterioration for US individuals ages 25-54 is occurring in the "other accidents" category, which is also now the largest contributor to total non-natural deaths. Figure 3 (next page) shows the mortality rate trends from 1979 to 2010 for seven developed insurance markets worldwide – the US, Canada, France, Hong Kong, Italy, Singapore and the UK.

The US rate has clearly been climbing fast since the early 1990s, whereas rates in the other countries have been flat, and some have even declined slightly.

The increases in the US non-natural death rate since 1992 have been driven mostly by accidental drug overdoses, primarily of opioids.

The development and expansion of Prescription

Figure 3



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Drug Monitoring Programs (PDMPs) in all but one state (Missouri) over the past 15 years has yielded promising results, in that it is now far more difficult for patients to engage in risky behaviors, such as acquiring and filling multiple prescriptions for drugs such as methadone, buprenorphine, oxycodone and hydrocodone. Deaths due to abuse of prescription opioids have leveled off and have even declined as these programs have grown in scope and effectiveness. Unfortunately, some opioid users, especially those with chronic pain, are switching to illegal opioids such as heroin, with devastating mortality outcomes. As a result, the overall impact of "other accidents" on total non-natural mortality trends continues unabated.

The current problem of opioid addiction is very real in the US. Once considered an addiction solely of the young and the underclass, it has extended to college-educated, middle-aged individuals. Indeed, abuse of prescription opioids such as methadone, buprenorphine, oxycodone and hydrocodone in the US has been classed by the CDC as an epidemic. Figure 4 (next page) illustrates the alarming trend.

If a way can be found to reverse opioid addiction and abuse and reduce mortality levels for this category to those of the early 1990s (approximately the experience of France in 2013), approximately 12,000 deaths of those aged 25 to 54 could be avoided.

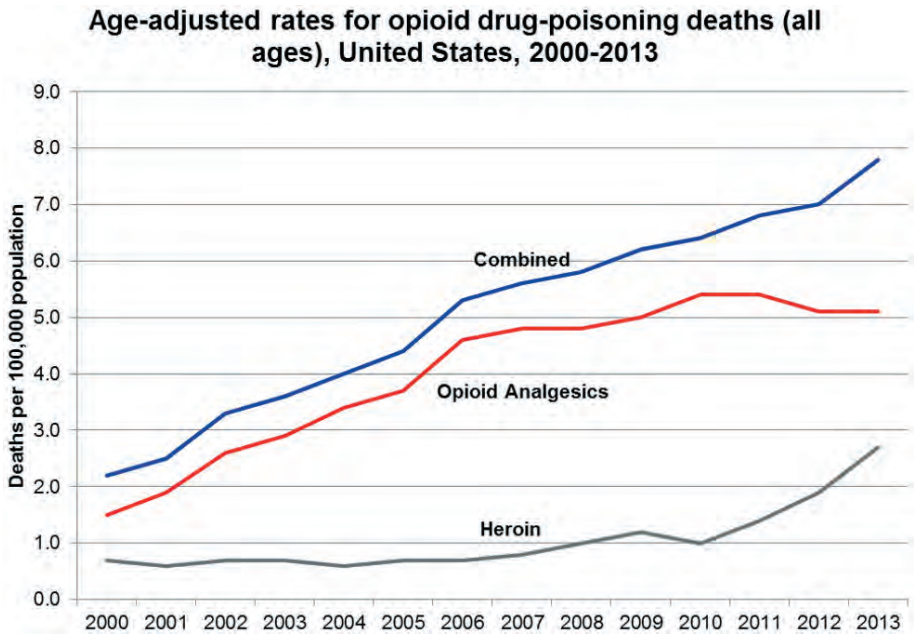
Suicide

The second largest contributor to US non-natural deaths among individuals age 25-54 is suicide. Among the 10 leading causes of death in the US, suicide is the only cause that is increasing over the last decade.

Suicide rates are highly influenced by cultural factors, and some countries have seen enormous fluctuations over recent years. South Africa experienced fluctuations in suicide rates among 25-54-year-olds from under 10 per 100,000 in the early 1990s to over 60 per 100,000 in the early 2000s to under 20 per 100,000 according to 2013 data. The countries in this study do not vary at that rate, but some trends are evident. US suicide rates have been climbing slowly yet steadily over the past 15 years, while the six other developed insurance markets presented have remained flat or dropped slightly. The suicide rates in Hong Kong have been a bit volatile, but since its mid-2004 peak, rates have mostly declined. [See Figure 5 next page]

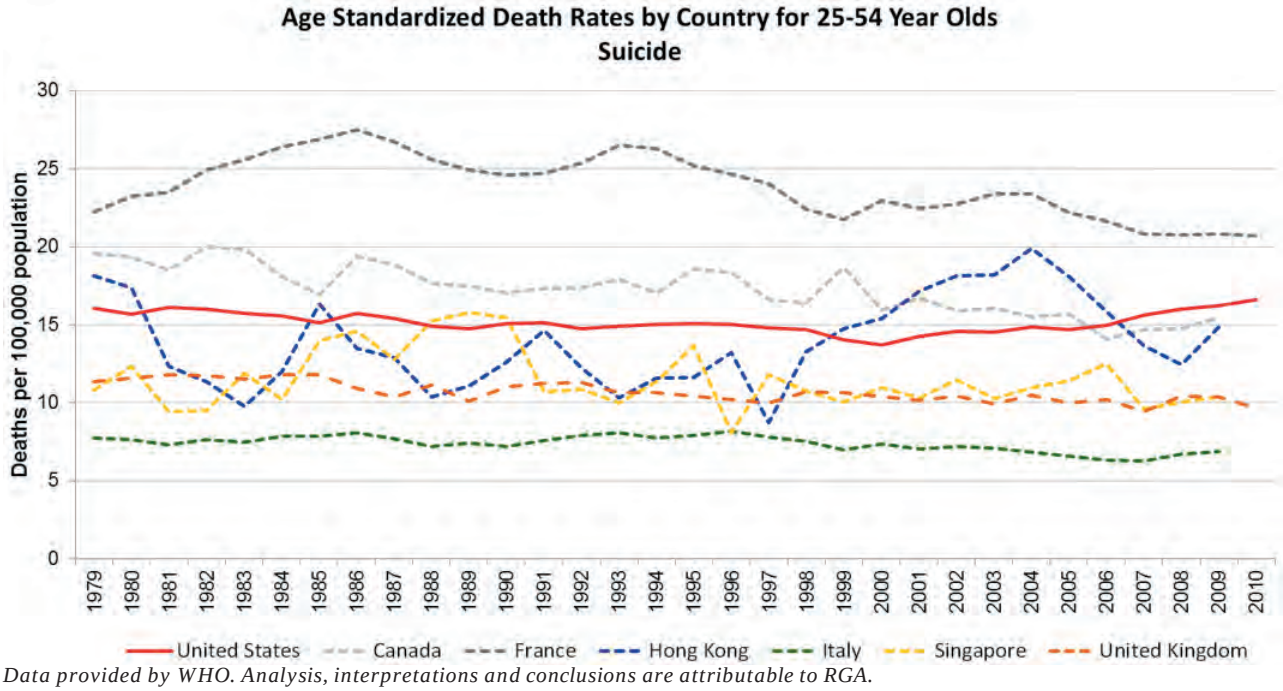
In previous research, we have shown that in the insured population, the contestability period can have a slight impact on when people die by suicide.[2] In the US the contestability period is typically 2 years and Figure 6 (page 58) shows that suicides spike (as a percent of all deaths) in month 25 and then remain elevated. Of course, it could also be argued that among people with life insurance, people with suicidal ideation have some extra time where intervention could occur as they are delaying their decision to act.

Figure 4



Source: CDC/NCHS, National Vital Statistics System, Mortality

Figure 5



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If US suicide levels reduced to those seen in Italy, more than 10,000 individuals age 25-54 every year would not die.

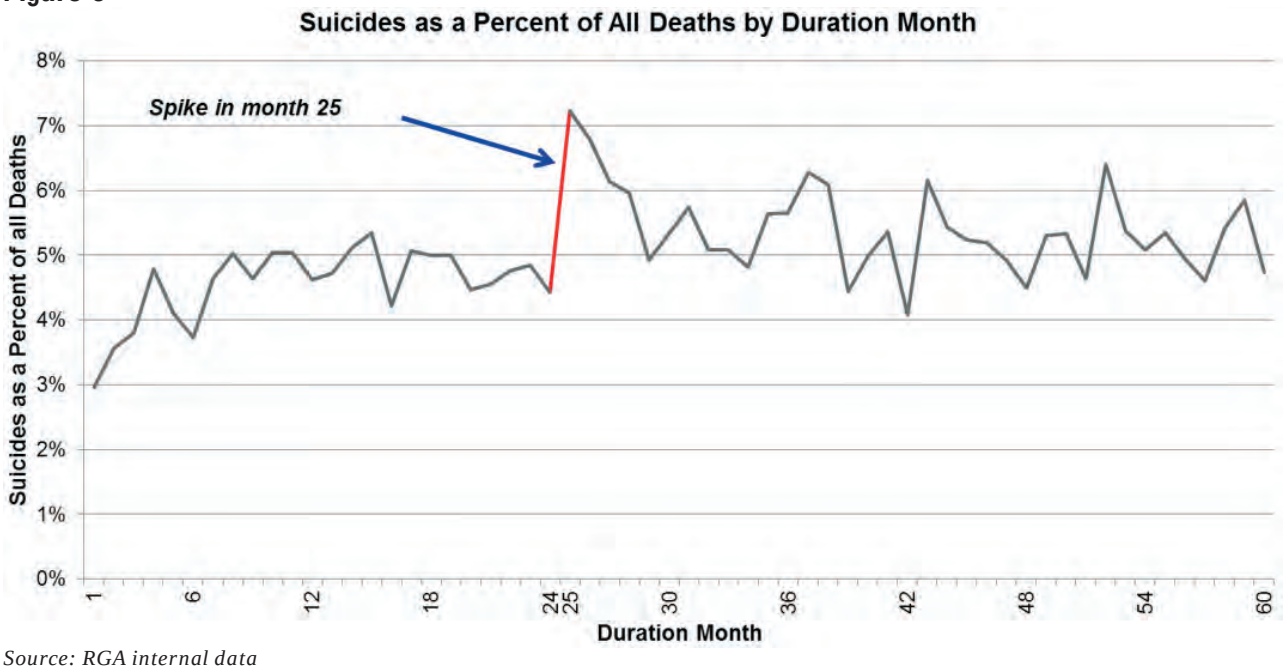
Motor Vehicle Accidents

The US automobile culture is legendary: few countries in the world have as many cars or even drivers, per capita, as the US.[3] Logically, this might mean US residents are more vulnerable to deaths by motor vehicle accidents than are residents of other countries. This is particularly true for some of the comparison countries in this report where driving is less common. A comparison of the number of motor vehicle deaths per 100,000 population in the seven developed country insurance markets might seem to validate this hypothesis.

[See Figure 7 next page]

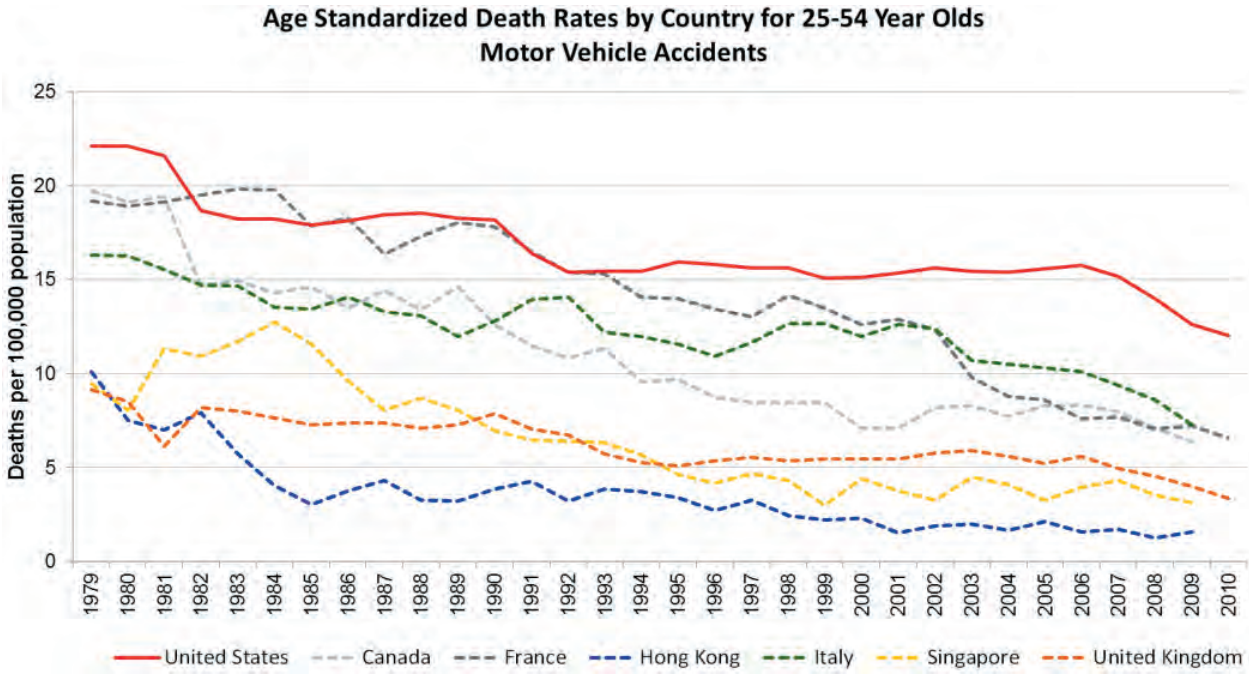
Motor vehicle death rates have been dropping over this study period for all seven countries, due to the range of legal and safety measures enacted over the

Figure 6



Source: RGA internal data

Figure 7



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years, such as speed limit changes, safer road construction, safer cars, alcohol and drug restrictions, and better utilization of safety equipment, especially safety belts.

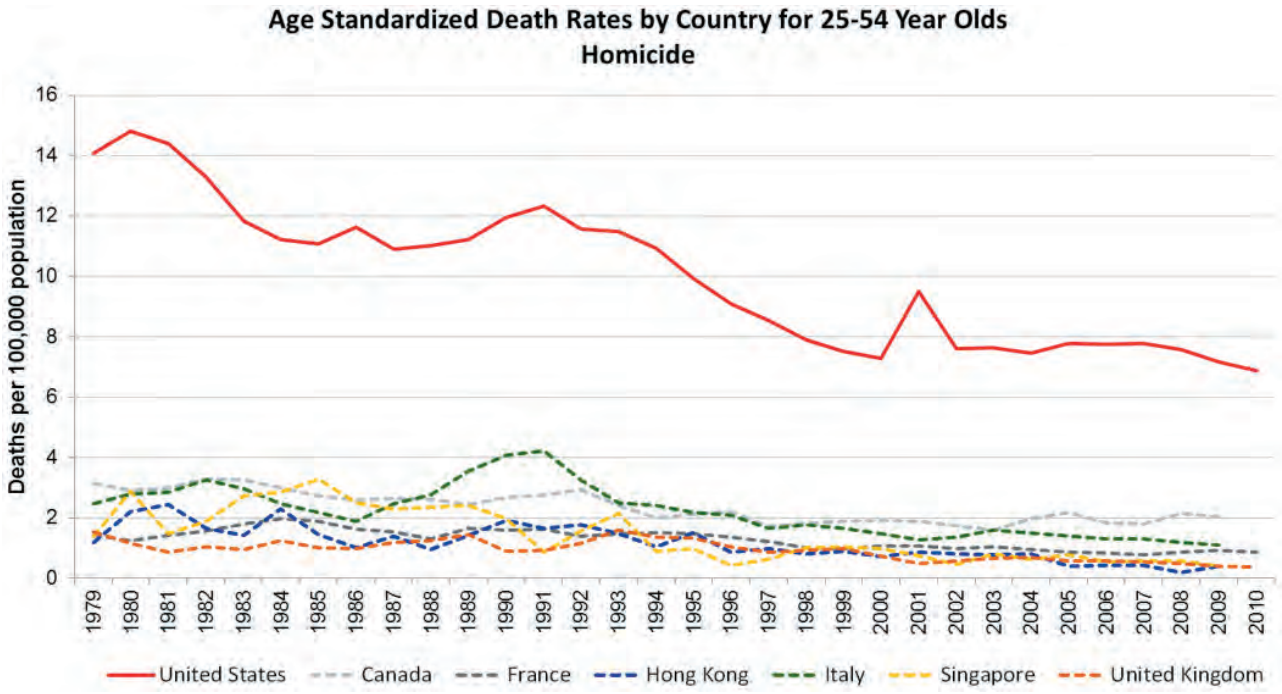
Due to automobile usage differences from country to country, it is difficult to choose a model country to which the US could aspire. Canada may be a realistic analogue, as the two countries have some similarities in terms of automobiles owned per capita as well as oil usage per capita (serving as a proxy for gasoline consumption).[4]

If the US could attain the current Canadian rate of motor vehicle accident deaths among 25-54-year-olds, roughly 7,000 deaths per year might be avoided.

Homicides

Homicides produce far more deaths in the US than in other countries covered in this report. As shown in Figure 8 (next page), although the US mortality rate has been declining over the 30-year period studied,

Figure 8



Note: The 2001 spike for the U.S. was due to the 9-11 terrorist attacks.
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the US death rate per 100,000 population is still significantly higher than those of the six other developed insurance markets.

The high rate may be influenced by the pervasive gun culture in the US. The US has the highest rate of gun ownership by civilians worldwide, with many more guns than people. The next highest rate of gun ownership among high-income, North American and European nations belongs to Finland, owning about 45% of the guns that Americans own per capita.[5] Meanwhile, 20% of homicides in Finland are committed with firearms, compared to over 70% in the US.

The US easily has the highest murder rate of any high-income North American or European nation. Using 2013 data for those qualifying countries, Finland had the second highest rate of homicides. The US, however, was still almost three times worse.

If the US could reduce its murder rate to that of Finland, approximately 5,500 deaths of individuals age 25-54 each year could be averted.

Conclusion

While over the past 15 years, other countries are experiencing steady or even improving non-natural cause mortality rates, the US rate has been increasing. The major factor of the US increase is due to the rising number of deaths from opioids, whether legally or illegally acquired.

Most state governments have implemented prescription drug monitoring programs to stem the tide of the epidemic, and the early results have shown some success. Suicides are also driving the poor results to an extent, but there has been much less support for mental health or suicide prevention initiatives at government level. Meanwhile, significant strides have been made in reducing both motor vehicle accident deaths and homicides, though the US still lags behind other comparable countries with respect to these causes.

Notes

1. GHDx: Global Burden of Disease Study 2013. Global Burden of Disease Study 2013 (GBD 2013) Results by Location, Cause and Risk Factor. Seattle, United States: Institute for Health Metrics and Evaluation (IHME), 2016.
2. McKinley, Jason (2016). Suicide Facts and Prevention. *Reinsurance News*, Issue 84. pp 32-35.
3. Global status report on road safety 2015, WHO Library Cataloguing-in-Publication Data, 2015.
4. Index Mundi: Country Comparison, Oil consumption per capita. Accessed September 2016, www.indexmundi.com/g/r.aspx?v=91000.
5. Gunpolicy.org Facts, accessed August 2016, www.gunpolicy.org/firearms/compare/194/rate_of_civilian_firearm_possession/11,18,31,48,50,65,66,69,71,232,86,87,88,105,112,125,136,149,172,177,178,192.

About the Authors

Scott Rushing, FSA, has over 20 years industry experience and is the Head of Global Research at RGA Reinsurance Company. His current responsibilities include oversight of the biometric research, market research, distribution research and actuarial research functions of RGA's Global R&D unit. Scott's previous roles include leading RGA's Predictive Analytics team, Head of US Experience Analytics, and reinsurance pricing and product development roles. He is a frequent presenter at industry conferences and has published research on numerous topics such as credit, prescription histories, motor vehicle records and all-cause mortality, seasonal impacts on mortality, and post-level term mortality and lapse experience. Scott earned his bachelor's degree in Actuarial Science from Drake University and his master's degree in Statistics from the University of Missouri – Columbia. He is a Fellow of the Society of Actuaries (FSA) and a Member of the American Academy of Actuaries (MAAA).

Jason McKinley, FSA, is an Associate Actuary in Global Research & Development for RGA based in Chesterfield, MO. He began his career as a biologist, transitioned to social work and then turned his focus to actuarial science. Jason specializes in determining mortality risk for various rating factors and risk factor combinations. He has several published articles to his credit, covering topics ranging from post-level term experience to general aviation to suicide and even to NASCAR safety. Jason is a recovering St. Louis Rams fan who once upon a time was paid for freelance articles on NFL topics as well.

(Left) The ALU Survey Group at the ALU Annual Meeting (left to right): Carol Flanagan, John Hancock; Roberta Scott, Woodmen Life; (not pictured) Coordinator Kristin Ringland, SCOR Global Life Americas; John Sherman, AIG Global Consumer Insurance.

(Right) At the 2016 ALU Annual Meeting, the **Underwriting Development and Continuing Education Group needs laptops, pens, paper and large coffees to plan the 2017 ALU Webinar Series.**