

By Jessica Y. Ho

# Mortality Under Age 50 Accounts For Much Of The Fact That US Life Expectancy Lags That Of Other High-Income Countries

DOI: 10.1377/hlthaff.2012.0574  
HEALTH AFFAIRS 32,  
NO. 3 (2013): 459–467  
©2013 Project HOPE—  
The People-to-People Health  
Foundation, Inc.

**ABSTRACT** Life expectancy at birth in the United States is among the lowest of all high-income countries. Most recent studies have concentrated on older ages, finding that Americans have a lower life expectancy at age fifty and experience higher levels of disease and disability than do their counterparts in other industrialized nations. Using cross-national mortality data to identify the key age groups and causes of death responsible for these shortfalls, I found that mortality differences below age fifty account for two-thirds of the gap in life expectancy at birth between American males and their counterparts in sixteen comparison countries. Among females, the figure is two-fifths. The major causes of death responsible for the below-fifty trends are unintentional injuries, including drug overdose—a fact that constitutes the most striking finding from this study; noncommunicable diseases; perinatal conditions, such as pregnancy complications and birth trauma; and homicide. In all, this study highlights the importance of focusing on younger ages and on policies both to prevent the major causes of death below age fifty and to reduce social inequalities.

**Jessica Y. Ho** (yjho@sas.upenn.edu) is a doctoral candidate in demography and sociology at the University of Pennsylvania, in Philadelphia.

**A**verage life expectancy at birth in the United States is among the lowest of all high-income countries. Not only can Americans expect to live fewer years, on average, but they are less healthy than their counterparts in other high-income countries, experiencing a greater burden of disease during their lives.<sup>1,2</sup> The United States also ranks poorly in national comparisons of death rates in most age groups, and both its life expectancy and age-specific mortality rankings have deteriorated over time.<sup>3</sup> And although US life expectancy has continued to increase over time, improvements have come at a slower pace than in peer countries.

In 2007 American males' life expectancy at birth was 75.6 years—the lowest among a set of seventeen high-income countries and 3.7 years less than the world leader, Switzerland (see the online Appendix).<sup>4</sup> American females had the

second-lowest life expectancy at birth at 80.8 years—5.2 years less than the world leader, Japan. Even if the United States were able to achieve the rate of increase of the world leaders<sup>5</sup> and the other countries did not experience any further gains, it would take nearly fifteen years for American males and more than two decades for American females to catch up to the leaders.

Life expectancy improvements in the United States lag behind those in other countries despite the strong economic growth and high levels of per capita health care spending in the United States.<sup>6</sup> With the exception of a recently released Institute of Medicine report, *U.S. Health in International Perspective: Shorter Lives, Poorer Health*,<sup>7</sup> previous studies seeking to explain why the United States performs poorly relative to other developed countries have focused primarily on health and mortality differences at older ages.

For example, the National Research Council Panel on Understanding Divergent Trends in Longevity in High-Income Countries<sup>8</sup> focused exclusively on ages above fifty and found that Americans in this age group rank poorly in terms of life expectancy and experience higher levels of chronic disease and disability. These studies explored possible underlying factors—including smoking, obesity, educational and geographic inequalities, and the US health care system—and found that although smoking has played a major role in Americans' life expectancy disadvantage at age fifty, the health care system has not. Uncertainty remains about the role that obesity and inequality play in the US life expectancy disadvantage.

Although research and policy discussions have concentrated mainly on older-age mortality, the importance of mortality differentials at younger ages should not be dismissed. Many studies have documented relationships at the individual and population levels between poor health and mortality experienced at younger ages and later in life.<sup>9–11</sup> These findings suggest that reducing premature mortality at younger ages may improve health and reduce mortality at older ages.

Americans experience the highest or second-highest mortality rates in every age group below fifty among a set of seventeen high-income countries. In contrast, Americans perform very well in terms of older-age mortality, ranking in the top half of countries in nearly all age groups above age seventy-five and attaining the second-lowest death rates for both males and females at ages 95–99.<sup>3</sup> These observations suggest the need for increased attention to mortality conditions at younger ages.

How much of the difference in life expectancy at birth between the United States and other developed countries is due to mortality among people below age fifty? To answer this question, this study used decomposition methods to estimate the proportion of the overall US life expectancy shortfall attributable to mortality differences below and above fifty. I also used so-called cause-deleted life table techniques, which produced a counterfactual scenario of what mortality rates in each country would look like in the absence of a particular cause of death. Doing so helped identify the major causes of death contributing to excess years of life lost below age fifty in the United States relative to other high-income countries.

## Study Data And Methods

**COMPARISON COUNTRIES** I compared the United States to sixteen high-income countries: Australia, Austria, Canada, Denmark, Germany,

Finland, France, Italy, Japan, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom. This group of countries is a subset of Organization for Economic Cooperation and Development countries that are most comparable to the United States.

These are all wealthy countries that have achieved high levels of development for a long period of time. These countries also made the transition from high to low mortality levels in the same period as the United States did, and their cause-of-death profiles are more similar to that of the United States than are those of countries that transitioned more recently or are still in the process of transitioning. Although the study countries are similar on these indicators, they still exhibit variations on key factors such as social welfare systems.

Other criteria for sample inclusion were sufficient population size to ensure stability of estimates (above 4.5 million), acceptable levels of data quality as assessed by Colin Mathers and colleagues,<sup>12</sup> and availability through the Human Mortality Database.<sup>13</sup>

**DATA SOURCES** I evaluated mortality differences among high-income countries during 2006–08. Because data availability differed across countries, I extracted the latest year of data obtainable during this time period for each country, to cover the most recent period possible and to maximize the inclusion of comparison countries. Sensitivity analyses indicated that results were robust to the year specification.<sup>4</sup>

I used all-cause mortality data for all countries from the Human Mortality Database,<sup>13</sup> which is maintained by the University of California, Berkeley, and the Max Planck Institute for Demographic Research, in Germany, and is one of the most commonly used, highest-quality sources of detailed population and mortality data around the world. Cause-specific mortality data were obtained from the World Health Organization Mortality Database<sup>14</sup> and Statistics Canada.<sup>15</sup>

Major cause-of-death categories of interest were specified in accordance with the Global Burden of Disease classification<sup>16</sup> and the standard categories used in the US National Vital Statistics Reports.<sup>17</sup> I combined data from the Human Mortality Database and World Health Organization to obtain cause-specific death rates by age, sex, and country.<sup>4</sup>

**DECOMPOSITION AND CAUSE-DELETED LIFE TABLE METHODS** I employed decomposition methods to determine how much of the overall US life expectancy shortfall is due to mortality differences below and above age fifty.<sup>18</sup> I decomposed the gap in life expectancy at birth between the United States and each of the sixteen

comparison countries, as well as between the United States and the composite (average) of the comparison countries.

The remainder of the analysis focused on ages below fifty because I found that these ages contribute the bulk of American males' overall life expectancy shortfall and make a substantial contribution to the shortfall for American females. I used cause-deleted life tables<sup>18</sup> to estimate what the expected number of years lived between birth and age fifty out of a maximum possible fifty years would be in the absence of each cause of death category. The key outcome measure was years of life lost from specific causes of death.<sup>4</sup>

The causes of death considered were a set of exhaustive and mutually exclusive categories. These were intentional injuries (homicide and suicide); unintentional injuries (transport and nontransport injuries); cardiovascular disease; all noncommunicable diseases excluding cardiovascular disease; HIV; all communicable diseases excluding HIV; maternal conditions; perinatal conditions; and a residual category capturing all other causes of death.

By comparing these cause-specific contributions to years of life lost below age fifty among these seventeen countries, I determined the key causes of death contributing to mortality differentials among people below age fifty between the United States and its peer countries. I performed these analyses for each country, and separately for males and females in each country.

**LIMITATIONS** There are some important limitations to this study. First, health is a multidimensional construct and covers many domains of life, including the physical, affective, cognitive, social, and functional. Mortality measures alone do not capture the full range of health. However, linkages between mental and physical health exist, and it is likely that conditions contributing to Americans' high levels of excess mortality (that is, the higher mortality Americans experience relative to their counterparts in the comparison countries) also contribute to greater morbidity in the US population.

Additionally, this study relied on the cross-country comparability of mortality data. The countries under analysis all have well-developed, complete vital registration systems.<sup>12</sup> World Health Organization recommendations regarding the coding of underlying causes of death have made cause-of-death coding more uniform across countries.<sup>19</sup> Although some variation in coding remains, this is mitigated through the use of broader but still informative cause-of-death categories. Minor variations in coding would not change the results substantially.<sup>20</sup>

In addition, focusing the analysis on ages below fifty avoids much of the difficulty associated

with ascertaining cause of death among the elderly.

## Study Results

**CONTRIBUTION OF MORTALITY BELOW AGE 50** A rich body of literature examines youth health and mortality, and particularly the burden of injury-related deaths in the United States. In cross-national comparisons, however, there is an increasing tendency to overlook mortality occurring at younger ages and concentrate on chronic diseases, because these high-income countries have largely transitioned from high-mortality conditions characterized by deaths from infectious diseases and injuries to low-mortality conditions characterized by deaths from chronic diseases. Additionally, most deaths in these countries now occur above age fifty.

My decomposition results, however, indicate that mortality differences below age fifty are crucial in explaining overall life expectancy differentials between the United States and other high-income countries.

Two-thirds of the difference between the United States and the mean of the other countries in male life expectancy at birth is attributable to mortality differentials below age fifty (Exhibit 1). Mortality differentials below age fifty account for more than half of the gap in life expectancy at birth between American males and males in fourteen of the sixteen comparison countries.<sup>4</sup>

For the remaining two countries, Australia and Canada, these contributions are 41 percent and 49 percent, respectively. Thus, among males, mortality differentials below age fifty make a substantial contribution (always in excess of two-fifths) to the US overall life expectancy shortfall.

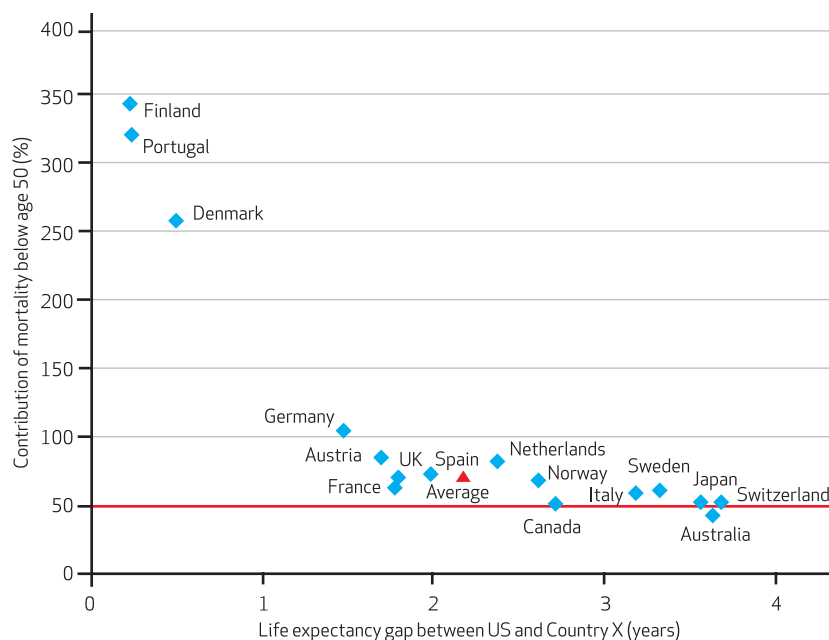
Among females, two-fifths of the gap between the United States and the mean of the comparison countries in life expectancy at birth is explained by mortality differences below age fifty (Exhibit 2). Mortality differences below age fifty account for more than a third of the difference in life expectancy at birth between American females and females in ten of the sixteen comparison countries.

An intuitive way of interpreting these results is that even if mortality above age fifty were equal among all countries, on average 67 percent and 41 percent of the gap in life expectancy at birth between the United States and other countries would remain for males and females, respectively. Thus, mortality below fifty should not be overlooked in examining US life expectancy shortfalls.

**CAUSE-OF-DEATH CONTRIBUTIONS** The major

## EXHIBIT 1

**Contribution Of Mortality Differences Below Age 50 To The Gap In Life Expectancy At Birth Between The United States And 16 Developed Countries, Males, 2007**



**SOURCE** Author's analysis based on data from the Human Mortality Database. **NOTES** The red triangle indicates the average of the sixteen comparison countries. If a country lies above the red 50% line, more than half of its advantage in life expectancy at birth relative to the United States is attributable to mortality differences below age 50. The United States lies at the origin. Percentages in excess of 100% result from cases where life expectancy at age fifty is higher in the United States than in the comparison country; see the online Appendix for more details (to access the Appendix, click on the Appendix link in the box to the right of the article online). For example, if the United States experienced Finnish mortality rates above age fifty (that is, if only differences in mortality below age fifty remained), the gap in life expectancy at birth between the United States and Finland would grow to 345 percent of its current value.

drivers of differences in life expectancy at birth between females in the United States and those in the comparison countries are noncommunicable diseases, especially cardiovascular disease; transport injuries, which includes deaths from land, water, air, and space transport injuries; and nontransport injuries.<sup>21</sup> With the addition of homicide, the same causes of death explain the majority of American males' shortfall in life expectancy at birth.<sup>22</sup>

Given the importance of mortality below age fifty in explaining the US overall life expectancy shortfall, I now focus on identifying the causes of death responsible for Americans' excess mortality at ages 0–50.

American males and females lose more years of life below age fifty than do males and females in all other comparison countries.<sup>23</sup> If no deaths occurred before age fifty, the average years of life lost before fifty would be zero. However, a person who dies at age two loses forty-eight years below age fifty; a person who dies at age twenty loses thirty years below age fifty, and so on. On

average, American males lose 1.36 years of life below age fifty, while males in the comparison countries lose 0.77 years. American females lose 0.80 years below age fifty, while females in the comparison countries lose 0.45 years.

As expected, females lose fewer years of life below age fifty than males. Notably, the other English-speaking countries (Australia, Canada, and the United Kingdom) along with the United States tend to lose more years of life at younger ages than do other countries.<sup>4</sup> This fact has two implications.

First, factors common to social structures in these countries may be contributing to this phenomenon. For example, the United States, Canada, and Australia are characterized as liberal welfare states, rather than as corporatist-statist or social democratic.<sup>24</sup> Liberal welfare states generally have less generous provision of social safety nets and less comprehensive social welfare policies compared to other types of states.

Second, studies comparing the United States and the United Kingdom in effect examine differences between the United States and another relatively low-performing country. These studies often find large health differences,<sup>2,25</sup> which suggests that comparisons between the United States and its higher-performing peers would be even more dramatic.

Exhibits 3 and 4 show the contributions of specific causes of death to excess American mortality below age fifty for males and females relative to the composite of the comparison countries. Among males, unintentional injuries (transport and nontransport injuries), intentional injuries (homicide and suicide), noncommunicable diseases, and perinatal conditions make the largest contributions to Americans' excess years of life lost below age fifty (Exhibit 3). Together, these four categories account for 88 percent of American males' excess years of life lost below age fifty.

Injuries are the largest contributor, with transport and nontransport injuries contributing 18 percent and 16 percent, respectively. Most transport injuries are motor vehicle fatalities. Nontransport injuries consist of deaths from accidental poisoning; falls; accidental firearm discharge; accidental drowning; and exposure to smoke, fire, and flames.

Among American males below age fifty in 2007, 64 percent of these deaths were from accidental poisoning, with 91 percent of the accidental poisonings stemming from drug overdoses. Just under half of the noncommunicable disease contribution comes from cardiovascular disease. American males also perform poorly in terms of mortality from most other noncom-

municable diseases (such as diabetes, respiratory diseases, and digestive diseases) but not cancer. Communicable diseases, including HIV, make relatively small contributions.

Among American females, unintentional injuries, noncommunicable diseases, and perinatal conditions are the main contributors to excess years of life lost below age fifty (Exhibit 4). Along with homicide (7 percent), these categories account for 85 percent of American females' excess years of life lost below age fifty. Suicide is not included in this figure because American females actually lose fewer years of life from suicide below age fifty than females in the comparison countries.

Transport and nontransport injuries make substantial contributions at 16 percent and 14 percent, respectively. Accidental poisoning deaths accounted for 72 percent of nontransport injury deaths among American females below age fifty in 2007. Noncommunicable diseases contribute just under a third to American females' excess mortality below age fifty, with nearly a third of this coming from cardiovascular disease. American females perform poorly in terms of most noncommunicable diseases, particularly cardiovascular, respiratory, and digestive diseases.

In summary, transport injuries, nontransport injuries, noncommunicable diseases, homicide, and perinatal conditions are the key contributors to US mortality shortfalls below age fifty for both males and females.<sup>26</sup>

## Discussion

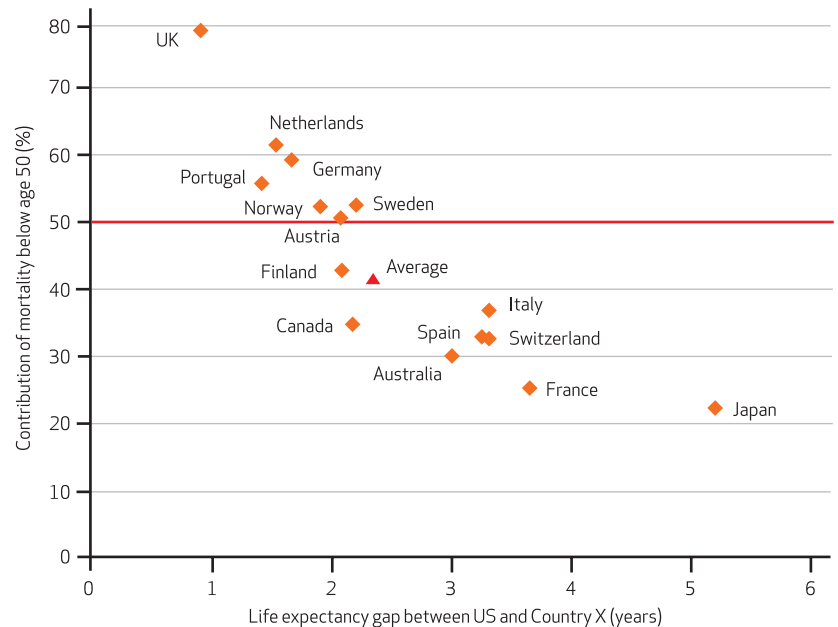
Previous cross-national studies have focused on older ages without attention to the contribution of younger ages to this country's poor life expectancy ranking among high-income countries. This study demonstrates that deaths occurring below age fifty account for two-thirds and two-fifths of the overall life expectancy shortfall of American males and females, respectively.

The main causes of death responsible for this result are unintentional injuries, noncommunicable diseases, perinatal conditions such as birth trauma and pregnancy complications, and homicide. Unintentional injuries and perinatal conditions make similar contributions for males and females, but homicide is more important for males while noncommunicable diseases are more important for females.

Prior studies have noted that cross-national variations in the definition of a *live birth* may result in underestimates of infant mortality in other countries relative to the United States. Efforts to standardize the definitions of *live birth* and *infant death* across countries attenuate but

### EXHIBIT 2

**Contribution Of Mortality Differences Below Age 50 To The Gap In Life Expectancy At Birth Between The United States And 15 Developed Countries, Females, 2007**



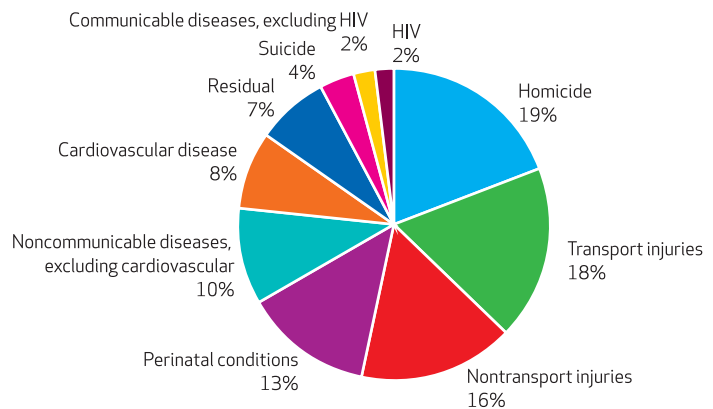
**SOURCE** Author's analysis based on data from the Human Mortality Database. **NOTES** The red triangle indicates the average of the sixteen comparison countries. If a country lies above the red 50% line, more than half of its advantage in life expectancy at birth relative to the United States is attributable to mortality differences below age fifty. The United States lies at the origin. Denmark is not shown here because the life expectancy of American females exceeds that of Danish females.

do not eliminate the US disadvantage in infant mortality.<sup>27</sup>

**IMPACT OF HOMICIDE** Homicide accounts for roughly a fifth of excess US years of life lost

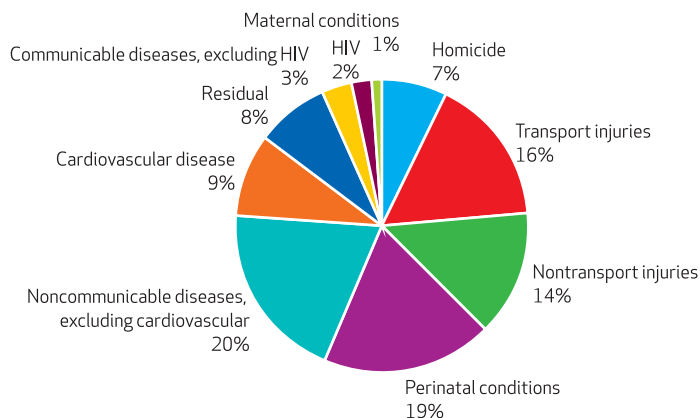
### EXHIBIT 3

**Contribution Of Cause-Of-Death Categories To Difference In Years Of Life Lost Below Age 50 Between The United States And The Mean Of Other Countries Studied, Males, 2006-08**



**SOURCE** Author's analysis based on data from the Human Mortality Database and the World Health Organization Mortality Database.

## EXHIBIT 4

**Contribution Of Cause-Of-Death Categories To Difference In Years Of Life Lost Below Age 50 Between The United States And The Mean Of Other Countries Studied, Females, 2006-08**


**SOURCE** Author's analysis based on data from the Human Mortality Database and the World Health Organization Mortality Database. **NOTES** Suicide is not shown, because suicide mortality below age fifty among American females is lower on average compared to that of their counterparts in the comparison countries.

for males and under a tenth for females. Homicide is the cause of death that is most strongly linked to income inequality and social disorganization.<sup>28,29</sup> The United States is clearly an outlier in the proportion of its homicides that are attributable to firearms. In 2007, 73 percent of homicides occurring below age fifty in the United States were due to homicide by firearm. Among the comparison countries, the average was 25 percent, ranging from 1.5 percent (Japan) to 52 percent (Italy).<sup>30</sup>

**UNINTENTIONAL INJURIES** The most striking finding from this study is the sizeable contribution of unintentional injuries, which make the largest single contribution of any cause-of-death category. Unintentional injuries account for roughly a third of US excess mortality among both males and females below age fifty. Within this category, transport (mainly motor vehicle fatalities) and nontransport (mainly drug overdose) injuries make roughly equal contributions.

**►MOTOR VEHICLE ACCIDENTS:** A recent report by the Transportation Research Board<sup>31</sup> found that the fatality rate per 100 million vehicle kilometers traveled is similar in the United States and a set of fifteen comparison countries. In fact, until 2004 the fatality rate in the United States was lower than the composite.

But the annual number of kilometers driven in the United States far exceeds that in the comparison countries, with the difference widening over time and reaching roughly 1.4 trillion kilometers or more than 870 billion miles driven in 2007.<sup>31</sup>

Thus, the higher US burden of motor vehicle fatalities is not due to higher death rates per kilometer driven, but rather to greater amounts of driving.

Furthermore, the total population of the fifteen comparison countries exceeds that of the United States, which suggests that the difference in annual kilometers driven per capita would be even more dramatic if the US population equaled that of the comparison-country composite.

**►DRUG OVERDOSES:** Drug overdoses have increased dramatically in recent years and were responsible for 91 percent of unintentional poisoning deaths in the United States in 2009.<sup>33</sup> Prescription painkillers, such as methadone, hydrocodone, and oxycodone, followed by heroin and cocaine, were the most commonly implicated drugs in overdose deaths.<sup>33,34</sup>

The World Health Organization's World Mental Health Surveys conducted between 2001 and 2005 suggest that the United States is an outlier in terms of lifetime (ever) use of drugs.<sup>35</sup> Compared to seven other high-income countries, the United States had the highest levels of cocaine use: 16.2 percent versus 0.3–4.1 percent among the comparison countries.<sup>35</sup> Addressing this problem at young ages is important given that the median ages of drug use, abuse, and dependence all occur prior to age twenty and that such behavior can profoundly affect health outcomes later in life.<sup>36</sup>

**►LINKS TO MENTAL HEALTH:** These main contributors to US excess mortality below age fifty have linkages to mental health. Studies have found that several chronic conditions, including diabetes, hypertension, and heart disease, are associated with affective disorders.<sup>37</sup> Also, longitudinal studies indicate that several mental disorders are associated with an increased risk of later substance use.<sup>38</sup>

Among respondents in eight high-income countries, Americans had the highest prevalence of anxiety, mood, impulse control, and substance disorders in the prior year, according to surveys from 2001–03.<sup>39</sup> Such findings highlight the importance of considering a wide range of health outcomes and the linkages among them.

**POLICY IMPLICATIONS** The results of this study have important policy implications as we look to the future and try to pinpoint causes of US life expectancy shortfalls.

**►FOCUS ON YOUNGER AGES:** Americans reach middle age sicker than their counterparts in other high-income countries. Future policies should focus on preventing the development of chronic diseases and negative health behaviors early in life.

Noncommunicable diseases develop over time, influenced by factors such as smoking,

obesity, diet, and sedentary lifestyle and by adverse exposures that are experienced very early in life or that accumulate over a lifetime. Similarly, perinatal conditions such as birth trauma and pregnancy complications are related to maternal health before and during pregnancy. Many causes of death implicated in lagging US life expectancy may be responsive to policies aimed at reducing residential segregation, urban poverty, and other socioeconomic inequalities.<sup>40-42</sup>

►**ADDRESS INCOME INEQUALITY:** As discussed before, homicide is the cause of death most strongly related to income inequality.<sup>28,29</sup> Americans also have greater access to guns than do residents of most other high-income countries. Several studies have found that gun ownership and availability are associated with greater risk of violent death among children and adults within the United States.<sup>43-45</sup>

►**FOCUS ON TRAFFIC SAFETY:** Progress in the United States in reducing mortality from traffic fatalities (per kilometer traveled) has been slower than that of other high-income countries. A recent report<sup>31</sup> drawing on the experience of successful benchmark nations such as Australia,

France, and Sweden in reducing traffic fatalities recommends that the United States follow their example of implementing comprehensive safety programs. These include improvements in road design and traffic management and greater regulation of speeding, alcohol and drug use, and seat belt and helmet use.

►**REDUCE DRUG OVERDOSES:** Deaths from prescription drug overdose have risen steadily. Among the measures recommended by the Centers for Disease Control and Prevention are more research on the factors leading to drug overdose and the implementation of prescription drug monitoring programs.<sup>34</sup>

## Conclusion

This study suggests that if the goal is to reduce the US life expectancy shortfall, more attention should be paid to health and mortality conditions at younger ages. The poor US performance across a diverse set of diseases and conditions suggests that the focus should be on social and contextual factors that shape day-to-day life in the United States and have the potential to affect outcomes across many domains. ■

The author presented some of her results to an Institute of Medicine panel, which incorporated them into the first chapter of its report, *Understanding Cross-National Health Differences among High-Income Countries*, released January 9, 2013.

This article differs from that report in its exclusive focus on life expectancy and mortality differences and its demonstration of the different contributions that mortality below age fifty makes to the gap between Americans' overall life expectancy and

that of people in other high-income countries. Unlike the Institute of Medicine report, this article also contrasts how particular causes of death differ in their contribution to those mortality differences.

## NOTES

- 1 Thorpe KE, Howard DH, Galactionova K. Differences in disease prevalence as a source of the U.S.-European health care spending gap. *Health Aff (Millwood)*. 2007; 26(6):w678-86. DOI: 10.1377/hlthaff.26.6.w678.
- 2 Banks J, Muriel A, Smith JP. Disease prevalence, disease incidence, and mortality in the United States and in England. *Demography*. 2010; 47(Suppl 1):s211-31.
- 3 Ho JY, Preston SH. U.S. mortality in an international context: age variations. *Popul Dev Rev* 2010;36(4): 749-73.
- 4 To access the Appendix, click on the Appendix link in the box to the right of the article online.
- 5 Oeppen J, Vaupel J. Broken limits to life expectancy. *Science*. 2002;296: 1029-31.
- 6 Reinhardt UE, Hussey PS, Anderson GF. U.S. health care spending in an international context. *Health Aff (Millwood)*. 2004;23(3):10-25.
- 7 National Research Council, Institute of Medicine. U.S. health in international perspective: shorter lives, poorer health. Washington (DC): National Academies Press; 2013.
- 8 National Research Council. Explaining divergent levels of longevity in high-income countries. Washington (DC): National Academies Press; 2011.
- 9 Elo IT, Preston SH. Effects of early-life conditions on adult mortality: a review. *Popul Index*. 1992; 58(2): 186-212.
- 10 Kuh D, Ben-Shlomo Y. Introduction: a life course approach to the aetiology of adult chronic disease. In: Kuh D, Ben-Shlomo Y. A life course approach to chronic disease epidemiology. Oxford: Oxford University Press; 1997. p. 3-14.
- 11 Hayward MD, Gorman BK. The long arm of childhood: the influence of early life social conditions on men's mortality. *Demography*. 2004;41(1): 87-107.
- 12 Mathers CD, Fat DM, Inoue M, Rao C, Lopez AD. Counting the dead and what they died from: an assessment of the global status of cause of death data. *Bull World Health Organ*. 2005;83(3):171-7.
- 13 Human Mortality Database [home page on the Internet]. Berkeley (CA): University of California; 2011 [cited 2013 Jan 30]. Available from: <http://www.mortality.org>
- 14 World Health Organization. Detailed data files of the WHO Mortality Database [Internet]. Geneva: WHO; 2011 [cited 2013 Jan 30]. Available from: <http://www.who.int/whosis/mort/download/en/index.html>
- 15 Statistics Canada. Health—life expectancy and deaths—detailed tables from CANSIM [Internet]. Ottawa: Statistics Canada; 2010 [cited 2013 Jan 30]. Available from: <http://www5.statcan.gc.ca/subject-sujet/result-resultat.action?pid=2966&id=2979&lang=eng&type=ARRAY&pageNum=1&more=0>
- 16 Mathers CD, Lopez AD, Murray CJL. The burden of disease and mortality by condition: data, methods, and results for 2001. In: Lopez AD, Mathers CD, Ezzati M, Jamison DT, Murray CJL, editors. Global burden of disease and risk factors. New York (NY): Oxford University Press;

2006. p. 45–240.
- 17 Xu JQ, Kochanek KD, Murphy SL, Tejada-Vera B. Deaths: final data for 2007. *National Vital Stat Rep.* 2010; 58(19).
  - 18 Preston SH, Heuveline P, Guillot M. *Demography: measuring and modeling population processes.* Oxford: Blackwell Publishers; 2001.
  - 19 Désesquelles A, Salvatore MA, Frova L, Pace M, Pappagallo M, Meslé F, et al. Revisiting the mortality of France and Italy with the multiple-cause-of-death approach. *Demogr Res.* 2010;23:771–806.
  - 20 For example, it seems unlikely a death from firearm discharge would be misclassified under communicable diseases or noncommunicable conditions rather than as a homicide. Deaths from drug-related causes may fall under nontransport injuries or noncommunicable conditions, both important contributors.
  - 21 The top five contributors to the US female shortfall in life expectancy at birth are noncommunicable diseases excluding cardiovascular disease (56 percent), cardiovascular disease (21 percent), transport injuries (8 percent), nontransport injuries (7 percent), and perinatal conditions (5 percent).
  - 22 The top five contributors to the US male shortfall in life expectancy at birth are cardiovascular disease (28 percent), noncommunicable diseases excluding cardiovascular disease (19 percent), transport injuries (14 percent), nontransport injuries (13 percent), and homicide (13 percent).
  - 23 The decomposition estimates of the overall life expectancy shortfall attributable to mortality below age fifty took into account years of life lost below and above age fifty from deaths occurring below age fifty (that is, the number of years an individual would have lived past age fifty had he or she not died before age fifty). The cause-deleted life table results focused exclusively on years of life lost below age fifty.
  - 24 Esping-Andersen G. *The three worlds of welfare capitalism.* Cambridge: Polity Press; 1990.
  - 25 Martinson ML, Teitler JO, Reichman NE. Health across the life span in the United States and England. *Am J Epidemiol.* 2011; 173(8):858–65.
  - 26 Comparisons were also performed between the United States and each individual country (available upon request). HIV, communicable diseases excluding HIV, maternal conditions, and suicide (among women) are not major contributors to Americans' excess mortality below age fifty for any comparison. Although some heterogeneity in the contributions of other cause categories exists, the results comparing the United States to the mean of the comparison countries are robust.
  - 27 Joseph KS, Liu S, Rouleau J, Lisonkova S, Hutcheon JA, Sauve R, et al. Influence of definition based versus pragmatic birth registration on international comparisons of perinatal and infant mortality: population based retrospective study. *BMJ.* 2012;344:e746.
  - 28 Lynch J, Davey Smith G, Harper S, Hillemeier M, Ross N, Kaplan GA, et al. Is income inequality a determinant of population health? Part 1. A systematic review. *Milbank Q.* 2004;82(1):5–99.
  - 29 Kennedy BP, Kawachi I, Prothrow-Stith D. Income distribution and mortality: cross-sectional ecological study of the Robin Hood index in the United States. *BMJ.* 1996;312:1004–7.
  - 30 Calculations by the author, both sexes combined.
  - 31 Transportation Research Board. *Achieving traffic safety goals in the United States: lessons from other nations.* Washington (DC): The Board; 2010. (Special Report No. 300).
  - 32 Centers for Disease Control and Prevention. *Poisoning in the United States: fact sheet [Internet].* Atlanta (GA): CDC; [last updated 2012 Jun 29; cited 2012 Dec 12]. Available from: <http://www.cdc.gov/homeandrecreationsafety/poisoning/poisoning-factsheet.htm>
  - 33 Nonmedical use of prescription drugs (use of drugs without a prescription, in ways other than prescribed, or solely for inducing an experience or feeling) is a significant contributor.
  - 34 Centers for Disease Control and Prevention. *Prescription painkiller overdoses in the US.* *Vital Signs [serial on the Internet].* 2011 Nov [cited 2012 Dec 12]. Available from: <http://www.cdc.gov/vitalsigns/painkilleroverdoses/>
  - 35 Degenhardt L, Chiu W, Samspon N, Kessler RC, Anthony JC, Angermeyer M, et al. Toward a global view of alcohol, tobacco, cannabis, and cocaine use: findings from the WHO World Mental Health Surveys. *PLoS Medicine.* 2008;5(7):e141.
  - 36 Swendsen J, Anthony JC, Conway KP, Degenhardt L, Dierker L, Glantz M, et al. Improving targets for the prevention of drug use disorders: sociodemographic predictors of transitions across drug use stages in the national comorbidity survey replication. *Prev Med.* 2008;47(6): 629–34.
  - 37 Scott KM, Bruffaerts R, Tsang A, Ormel J, Alonso J, Angermeyer MC, et al. Depression-anxiety relationships with chronic physical conditions: results from the World Mental Health surveys. *J Affect Disord.* 2007;103(1):113–20.
  - 38 Swendsen J, Conway KP, Degenhardt L, Glantz M, Jin R, Merikangas KR, et al. Mental disorders as risk factors for substance use, abuse and dependence: results from the 10-year follow-up of the National Comorbidity Survey. *Addiction.* 2010;105(6):1117–28.
  - 39 The WHO World Mental Health Survey Consortium. Prevalence, severity, and unmet need for treatment of mental disorders in the World Health Organization World Mental Health Surveys. *J Am Med Assoc.* 2004;291(21):2581–2590.
  - 40 Although not the main focus of this paper, socioeconomic inequalities in life expectancy are sizeable within the United States. In 2000 life expectancy differentials at age twenty-five between those with high and low education were eight and five years among males and females, respectively. See Note 41 Among adults ages 50–74, Americans at all wealth levels were less healthy than their European counterparts, but Americans in the lowest wealth tertile experienced the largest health disadvantage. See Note 42
  - 41 Meara ER, Richards S, Cutler DM. The gap gets bigger: changes in mortality and life expectancy, by education, 1981–2000. *Health Aff (Millwood).* 2008;27(2):350–60.
  - 42 Avendano M, Glymour M, Banks J, Mackenbach JP. Health disadvantage in US adults aged 50 to 74 years: A comparison of the health of rich and poor Americans with that of Europeans. *Am J Public Health.* 2009;99:540–548.
  - 43 Kellermann AL, Rivara FP, Rushforth NB, Banton JG, Reay DT, Francisco JT, et al. Gun ownership as a risk factor for homicide in the home. *New Engl J Med.* 1993;329: 1084–91.
  - 44 Cummings P, Koepsell TD, Grossman DC, Savarino J, Thompson RS. The association between the purchase of a handgun and homicide or suicide. *Am J Public Health.* 1997;87:974–8.
  - 45 Miller M, Azrael D, Hemenway D. Firearm availability and unintentional firearm deaths, suicide, and homicide among 5–14 year olds. *J Trauma.* 2002;52:267–75.



## ABOUT THE AUTHOR: JESSICA Y. HO



**Jessica Y. Ho** is a doctoral candidate in demography and sociology at the University of Pennsylvania.

In this month's *Health Affairs*, Jessica Ho examines cross-national mortality data and concludes that mortality differences below age fifty account for much of gap in life expectancy at birth between Americans and their counterparts

in sixteen comparison high-income countries. The major causes of death responsible are unintentional injuries, including drug overdose—a fact that constitutes the most striking finding from this study—as well as noncommunicable diseases, homicide, and other factors. Ho writes that her study underscores the importance of focusing on policies both to prevent the major causes of death below age fifty and to reduce social inequalities.

Ho is a doctoral candidate in demography and sociology at the University of Pennsylvania. She is a recipient of the National Science

Foundation Graduate Research Fellowship and has consulted for the National Academy of Sciences Panel on Understanding International Health Differences in High-Income Countries. Her research focuses on the causes of the US life expectancy disadvantage relative to other high-income countries and on the social, behavioral, and institutional factors contributing to racial or ethnic and socioeconomic health disparities in the United States. She holds a master's degree in demography from the University of Pennsylvania.