Heightened Risk of Fire Deaths Among Older African Americans and Native Americans

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SYNOPSIS

Objective. We examined disparities in burn and fire injuries by age and race/ethnicity to identify disparities during the life course.

Methods. Burn and fire mortality rates were disaggregated by five-year age groups, gender, and race/ethnicity from 1999 to 2004.

Results. Compared with non-Hispanic white people, Native American and African American people older than 55 years of age experienced a higher risk of death from fires and burns. The rate ratio of burn/fire deaths for African Americans compared with white people was 3.14 (95% confidence interval [CI] 2.98, 3.31) for those aged 55 years and older. The corresponding rate ratio for Native Americans compared with white people was 1.93 (95% CI 1.49, 2.46) for those aged 55 years and older.

Conclusion. The especially heightened risk among minority seniors could reflect living arrangements that place them at higher risk. Heightened fire risks for minority seniors require broad attention and the development of effective interventions.

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Statistics on injury death rates by race/ethnicity in the United States document notable racial/ethnic disparities in injury death rates.¹⁻³ Examining race/ethnicity-specific differences in injury across the life course is important because social roles and exposures to injurious social and physical environments do not remain static across age groups.⁴ Examining injury disparities across the lifespan can disclose problems that are masked when all age groups are aggregated.⁵ Fire death rates are known to increase with age.⁶ Fire and burn injuries are a major contributor to fatal injury among African American children^{7,8} and other minority groups.⁹⁻¹¹ Poverty and racial/ethnic minority status are known to have interactive effects on the risk of fire deaths.¹² The African American population in the U.S. is more concentrated in urban areas and more likely to live near vacant buildings.¹³ Native American populations are more rural. Because vacant buildings are a risk factor for house fires¹⁴ and small communities have higher per capita rates of fire deaths,¹⁵ residential patterns can contribute to racial/ethnic disparities in fire deaths.

Few studies have examined how racial/ethnic disparities in fire deaths change with age. Prior studies examining racial/ethnic disparities in injury death tended to focus on regional data from a single city^{11,16} or data from a single age group.³ Using the whole life course approach and national data is important for studying injury disparities because social roles and exposures to injurious environments vary across age groups and regions.¹⁷

This article examines overall injury rates by age for various U.S. racial/ethnic groups to unravel disparities across the life course and then focuses on burn/fire death rates by age to emphasize the heightened risk among the elderly minority population. A principal social disadvantage faced by racial/ethnic minority groups is lower housing quality,¹⁸ leading us to hypothesize a higher rate of deaths from fires for minority groups.

METHODS

We used datasets from the Centers for Disease Control and Prevention's Web-Based Injury Statistics Query and Reporting System (WISQARSTM) for the years 1999 to 2004. WISQARS publishes National Center for Health Statistics data on injury mortality based on age group, census region, residence, race, gender, and Hispanic origin.¹⁹ Available categories for race are white, black, American Indian/Alaska Native, Asian and Pacific Islander, and other. White individuals were classified as Hispanic and non-Hispanic; other racial groups of

Hispanic origin were excluded due to insufficient numbers of Hispanic origin for meaningful observations. WISQARS classifies injury deaths according to International Classification of Diseases, 10th Revision codes.¹⁹ We downloaded data for "Unintentional Burn/Fire" deaths by age and race/ethnicity for 1999 to 2004.

Cumulative, fatal unintentional burn/fire injury death counts from 1999 to 2004 were expressed as death rates per 100,000 people by gender and five-year age groups for each racial/ethnic group using data from the 2000 Census to form person-year denominators appropriate to the six years of injury data. We analyzed age-specific rates for each racial/ethnic group throughout the life cycle. Gaps between different racial/ethnic groups by age were computed by subtracting the non-Hispanic white group's age-specific mortality rate from each minority group's age-specific mortality rate. After computing the differences, we tabulated age-related patterns in injury disparities of African American, Hispanic, Asian, and Native American groups relative to those of the non-Hispanic white group.

One possible limitation of this analysis was if misreports in the age at death were systematically associated with race/ethnicity or if census data differentially undercounted the population denominator used to compute mortality rates.²⁰ To assess whether systematic misreporting was spuriously appearing as racial/ethnic differences in burn/fire deaths, we also presented age- and race/ethnicity-specific data on all unintentional injury deaths. Because the racial/ethnic patterns for burn/fire deaths were markedly different from those for other injury deaths, we can infer that these patterns were not entirely due to misreporting.

RESULTS

The general pattern of injury deaths from all causes in the U.S. during 1999–2004 (Figure 1) documents several features: higher risks for males, higher risks at older ages, heightened risks for Native Americans and African Americans, and lower risks for Asian people. Injury death rates reached a lifetime low from ages 5 to 15 years. The relative risk of injury death was higher for Native Americans than for any other group, reaching a 2-to-1 ratio from ages 20 to 40 years. The general pattern also showed that for each racial/ethnic group, death rates in childhood fell after age 5 and then rose again after age 15. (Figures showing mortality disparities across the life course for motor vehicle crash-, pedestrian-, firearm-, and fall-specific injury causes are available from the authors and can elucidate the pattern shown in Figure 1.)

Figure 1. Injury death rates across the life course in the U.S. by gender, age, and race/ethnicity, 1999–2004^a

^aSource: Centers for Disease Control and Prevention (US). WISQARS™ (Web-based Injury Statistics Query and Reporting System) [cited 2009 Sep 1]. Available from: URL: <http://www.cdc.gov/injury/wisqars/index.html>

Examining burn/fire deaths (Figure 2) shows key differences from the general pattern. Compared with African American and Native American people, rates of burn/fire deaths were relatively constant across the life span for white, Asian, and Hispanic people, although the pattern does have a somewhat U-shaped distribution. The gap in the burn/fire death rates across all ages showed a difference of 0.68 (95% confidence interval [CI] 0.46, 0.90) deaths per 100,000 among Native Americans and 1.24 (95% CI 1.12, 1.31) deaths per 100,000 among African Americans. The

corresponding burn/fire death rate ratios were 1.60 (95% CI 1.41, 1.81) for African Americans and 2.10 (95% CI 2.03, 2.16) for Native Americans.

For most white, Hispanic, and Asian people, there was no noticeable drop in burn/fire deaths during childhood, as was seen for all injuries in Figure 1. In contrast, the pattern for both Native Americans and African Americans showed relatively higher mortality in childhood and later life (>55 years of age) compared with youth and middle age. African American females consistently showed higher burn/fire death

rates than white females throughout the life course. The degree to which burn/fire death rates for both African American and Native American males exceeded white males became progressively larger with age until the gap was largest after age 75. This differs from the pattern for all injuries, where the gap in death rates reached a peak earlier in life, peaking at 35–39 years of age for Native Americans and 50–54 years of age for African Americans.

From 0 to 9 years of age, the burn/fire death rate

difference between African Americans and white people was about 1.90 (95% CI 1.20, 2.10) person-years per 100,000. From 10 to 19 years of age, the disparity remained low, with a death rate difference of 0.37 (95% CI 0.27, 0.46) person-years per 100,000 (Figure 3). The disparity started to widen at age >25 years and steadily increased with age. After age 55 years, the African American vs. white burn/fire death rate difference widened to 5.19 (95% CI 4.84, 5.54) deaths per 100,000. It progressively widened until the

Figure 2. Burn/fire death rates across the life course in the U.S. by gender, age, and race/ethnicity, 1999–2004^a

^aSource: Centers for Disease Control and Prevention (US). WISQARS™ (Web-based Injury Statistics Query and Reporting System) [cited 2009 Sep 1]. Available from: URL: <http://www.cdc.gov/injury/wisqars/index.html>

Figure 3. Gaps in burn/fire death rates by age and gender between African American and non-Hispanic white people in the U.S., 1999–2004^a

^aSource: Centers for Disease Control and Prevention (US). WISQARS™ (Web-based Injury Statistics Query and Reporting System) [cited 2009 Sep 1]. Available from: URL: <http://www.cdc.gov/injury/wisqars/index.html>

gap reached 9.47 (95% CI 8.64, 10.30) deaths per 100,000 at age ≥ 75 years. Expressed as a rate ratio, African Americans suffered a risk that was 2.10 (95% CI 2.03, 2.16) times higher than non-Hispanic white people, aggregated across all ages.

The rate ratio (minority death rate divided by non-Hispanic white death rate) was heightened for African Americans aged ≥ 55 years compared with non-Hispanic white people aged ≥ 55 years, with a rate ratio of 3.14 (95% CI 2.98, 3.31). The corresponding rate ratio for Native Americans aged ≥ 55 years compared with non-Hispanic white people in the same age group was 1.93 (95% CI 1.49, 2.46). Data on death rate differences for Native Americans are shown in Figure 4.

The data presented in this article pertain to rates of death observed in entire populations during a five-year block of time. The application of z-tests or Chi-

square tests of significance would be inappropriate in this situation because the data are not from a sample of a population; they are from the whole population. If one ignores this distinction and applies a z-test on proportions to test the null that the African American-white mortality rates are equal, one rejects the null at $p < 0.01$ for every age group except ages 20–24, 30–34, and > 85 years. The z-test on proportions rejects the equality of Native American-white mortality rates at $p < 0.10$ for every age group except ages 5–9, 20–24, and ≥ 80 years.

DISCUSSION

This article documents a heightened rate of burn/fire deaths for both Native American and African American people that becomes greater after age 50 years. Our

Figure 4. Gaps in burn/fire death rates by age and gender between Native Americans and non-Hispanic white people in the U.S., 1999–2004^a

^aSource: Centers for Disease Control and Prevention (US). WISQARS™ (Web-based Injury Statistics Query and Reporting System) [cited 2009 Sep 1]. Available from: URL: <http://www.cdc.gov/injury/wisqars/index.html>

results based on national data are similar to prior findings limited to the state of Alabama.^{21,22} A study such as this suffers limitations related to the completeness of both numerator and denominator data. The WISQARS data ultimately rely on the completeness of death certificates. If burn/fire deaths are underreported on the death certificates of minority individuals, it could reduce the magnitude of the effects that are measured. If the population in the denominator is undercounted by the Census, it could artificially increase estimates of the incidence rate.

Racial/ethnic disparities in health are sometimes attributed in part to socioeconomic status.²³ Some of this effect may be due to the association between poverty and race/ethnicity,^{24,25} as poverty is known to be a risk factor for injury.²⁶ However, the absence of higher risk for Hispanic people (whose poverty measures are

intermediate between those of African Americans and non-Hispanic white people) suggests that poverty and housing quality may not be the only factors at work. African Americans and Native Americans in their 20s and 30s are experiencing only slightly higher rates of burn/fire deaths compared with non-Hispanic white people. The disparity between minority groups and white people is much more striking at older ages. It is difficult to attribute all of the racial/ethnic disparities in burn/fire deaths to housing quality because an individual's housing quality per se does not deteriorate after the person turns 50 years of age.

Interpreting these findings, one must bear in mind that a burn/fire death is the product of the probability of a thermal exposure or fire, the probability of being injured if there is a fire, and the case fatality rate from those injuries. In this light, the higher death rates for

seniors of all racial/ethnic groups could reflect higher frailty of seniors, who are less capable of surviving devastating injuries due to comorbid conditions. One must consider whether the higher risk of death for Native American and African American seniors could reflect heightened frailty among these groups, a higher rate of injury per fire, or a higher incidence of fires that is not shared by middle-aged Native American and African American people. One report of home inspections in Australia found that seniors living in private dwellings had fewer smoke detectors in their homes compared with younger individuals.²⁷

It is uncertain what accounts for the disparities documented in this article. Tobacco smoking is a known risk factor for fires. National Health Interview Survey data do not show dramatic differences in smoking between African Americans and white people; however, Native Americans have the highest smoking prevalence of any racial/ethnic group.²⁸ Alcohol use is another risk factor for fires, but rates of alcohol use are lower among African American people than white people, although such rates are highest among Native Americans.²⁹

We speculate that the higher risk of death from fires among Native Americans and African Americans could reflect living arrangements in these groups that expose seniors, but not middle-aged populations, to heightened risk. Census data have revealed a higher rate of co-residence of grandparents caring for grandchildren among Native Americans and African Americans.³⁰ Co-residence of seniors with children might explain the observation of heightened risk among young and old, but not middle-aged individuals. One might conjecture that children residing with grandparents may be more likely to engage in unsupervised cooking and to play with fire, or that such co-residences are less likely to use smoke detectors and more likely to overload electrical outlets, thus increasing the risk of fires. These ideas remain unsupported, however, and additional research is needed to test such hypotheses.

CONCLUSION

Heightened risk of burn/fire fatal injuries for African American and Native American seniors is one example of the importance of examining racial/ethnic differences in disease or injury by age. We have yet to fully explain why the risk among these groups of seniors increases with age. There is an opportunity for groups that care for elderly populations (e.g., social service, health-care, church, and other community organizations) to be involved in prevention of burn/fire injuries in this high-risk population. Home inspections frequently conducted for the purpose of assessing

fall risks among seniors need to also assess fire risks, including whether the residence has working smoke detectors. Further investigation is needed to unveil the causes of the higher rates of burn/fire death faced by African American and Native American seniors.

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