County Poverty Concentration and Disparities in Unintentional Injury Deaths: A Fourteen-Year Analysis of 1.6 Million U.S. Fatalities

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Introduction

Unintentional injury is the fourth leading cause of death in the United States (US) —and the leading cause for individuals under 45 years old —accounting for over 130,000 deaths in 2013. Injuries are responsible for roughly as many deaths each year as stroke
or acute myocardial infarction. Moreover, in contrast to mortality from most diseases, rates of injury mortality in the US have risen over the past decade. The social determinants behind these trends are not well understood.

Neighborhood poverty has consistently been associated with a range of individual health outcomes, including overall mortality and life expectancy, cardiovascular disease, low birth weight, asthma admission rates, and obesity and diabetes. There is a growing appreciation of the role of the social and physical neighborhood environment in differentially shaping individuals’ access to health services, influencing health behavior through the built environment, and patterning exposure to violence, stressors, and potentially deleterious social norms. In contrast to other health outcomes and behaviors, the relationship between area disadvantage and injury has received relatively little attention.

The poverty rate in the US steadily rose during the first decade of the century, climbing from 12.2% in 2000 to 15.3% in 2010, and has remained relatively stable for the past 5 years. In addition to the negative impact on the individuals themselves who have become impoverished, this increase also changes the social and physical environment to which “non-poor” residents are exposed. In 1999, about 5% of the US population lived in counties that had a greater than 20% poverty rate; by 2012, over 15% of the population lived in such counties. As a result, more individuals have become exposed to the potentially detrimental effects of concentrated neighborhood poverty.

The aim of this study is to examine the association between county-level poverty and unintentional injury mortality in the US from 1999-2012, overall and by six specific mechanisms. Associations between area socioeconomic status and injury rates have been observed in other countries, for particular age groups, and in site-specific studies. To the authors’ knowledge, this is the first study that uses comprehensive mortality data to document the associations between county poverty and injury mortality rates for the entire US population.
Study Design and Data

Patients

No patients were involved in setting the research question or the outcome measures, nor were they involved in the design and implementation of the study. There are no plans to involve patients in the dissemination of results as the nature of the data precludes individual patient identification.

Data

Annual compressed mortality and population data for 1999-2012 were obtained from the National Center for Health Statistics (NCHS)\textsuperscript{21}. The data provides complete pooled annual mortality and population counts by age, sex, race/ethnicity, and cause of death at the county level. Cause of death is coded in accordance with the International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10). Population counts are based on bridged-race revised intercensal estimates. We examined combined total unintentional injury mortality, as well as six specific causes of mortality due to injury: motor vehicle collisions (MVC), falls, accidental discharge of firearms, drowning, exposure to smoke or fire, and unintentional poisoning. For the denominator, the mortality file was linked with Census population data for age, sex, and race/ethnicity categories at the county level.

County poverty rate estimates were obtained through the Census from the Small Area Income and Poverty Estimates website. NCHS 2006 urban-rural county classification was obtained from the CDC and is based on the 2000 census population. County poverty rates, the percentage of the population living below the federal poverty level ($16,500 for a family of 4 in 1999, $22,050 in 2010), were divided into 5 groups, less than 5% living in poverty, 5 to <10%, 10 to <15%, 15 to <20% and 20% or more living in poverty, the federal definition of a “poverty area”\textsuperscript{22}.
**Statistical Analyses**

Age was coded as a categorical variable, with the following categories: 0-14, 15-24, 25-44, 45-64, 65-84, and 85 years and older. Race/ethnicity was constructed as a four category variable: white, black, Hispanic, and other (includes Asians and American Indians). For descriptive analyses of trends over time in injury mortality within county poverty categories, we aggregated mortality counts to the county poverty category level using methods outlined in The Public Health Disparities Geocoding Project\textsuperscript{23}. We calculated annual age-standardized (with the 2000 population as referent) mortality rates for each county poverty category using age categories and the direct method\textsuperscript{24}. The CDC mortality file consists of population data; therefore, it is not subject to sampling error.

For multivariate analyses, we aggregated mortality counts by unique cross tabulation of year, age, race/ethnicity, sex, county poverty category, and county urban/rural classification, yielding 20,160 total observations. Aggregation to this level reduces the level of error for both the numerator (number of deaths) and denominator (population estimates). We performed negative binomial regression due to overdispersion, with the outcome being counts per cell, to calculate the relative risk (RR) for total unintentional injury mortality as well as the six specific causes.

The population attributable fraction (PAF) was calculated using the adjusted RRs from year-specific negative binomial regressions, and takes into account the multiple levels of exposure of the county poverty variable. The PAF represents the proportion of total deaths that are associated with county poverty, or, conversely, the reduction in the number of deaths that could potentially be seen if the exposure were eliminated (i.e. if all counties had poverty rates less than 5%). The PAF was calculated using the following formula to account for multiple levels of the exposure variable\textsuperscript{25}. Adjusted RR from the multivariate negative binomial regressions (adjusted for age, sex, race, and urban status) were used to minimize confounding.
For falls, the PAF for county poverty was negative and so the Preventative Fraction (PF) was calculated in its place (1–PF = 1/[1–PAF]). The PF represents the proportion reduction in deaths that may be seen if all individuals were exposed to the “protective factor”. CIs for the PAF were derived using the substitution method\textsuperscript{26} and are reported in the supplemental excel file.

**Results**

Table 1 reports mortality rates (per 100,000) for all unintentional injuries combined, as well as the six specific causes, for the years 1999 and 2012. Overall age-adjusted mortality from unintentional injuries increased 7% over the 14 year period, from 35.23 to 38.64 per 100,000 (3.41; 95% CI 3.11,3.72). The greatest increases were seen among whites (8.08; 95% CI 7.70,8.46) and individuals 45-64 years (12.36; 95% CI 11.72,12.99), with decreases among blacks (-8.18; 95% CI -7.24,-9.11), Hispanics (-4.02; 95% CI -3.12,-4.93), and young adults 15-24 (-8.2; 95% CI -7.44,-8.97). The increase in overall injury mortality appears to be driven primarily by increases in falls (3.25; 95% CI 3.12,3.38) and unintentional poisonings (7.03; 95% CI 6.89,7.17). These increases were offset predominantly by a decline in mortality due to motor vehicle collisions (-3.83; 95% CI -3.64,-4.01) and fire/smoke exposure (-0.47; 95% CI -0.43,-0.51). Mortality rates for falls and poisoning have approached rates of death from motor vehicle collisions.
Overall injury mortality rates are highest for individuals over 85, owing mostly to high rates of death from falls, which by 2012 accounted for 66% of injury mortality for this age group. From 1999-2012, injury rates among children and youth significantly declined, while rates for other age groups increased. The largest percentage increase among the 45-64 age group was driven primarily by the large increase in unintentional poisoning (13.21; 95% CI 12.86,13.57) in this age group.

Injury mortality rates for whites have risen since 1999, and have surpassed injury mortality rates for blacks. In 2012, whites had a mortality rate of 43.56 compared to
32.59 for blacks, 26.24 for Hispanics, and 22.18 for other racial/ethnic groups. Once again, this jump among whites was driven by disproportionate increases in rates of falls and poisonings.

Age-adjusted mortality rates by county poverty concentration category (Table 1) show that counties with greater than 20% poverty had a 66% higher rate of injury mortality in 1999 than counties with less than 5% poverty (45.25 vs. 27.24 per 100,000; 95% CI for rate difference 15.57,20.46). The gap between counties widened in 2012 to 79% (44.54 vs. 24.93 per 100,000; 95% CI for rate difference 17.13,22.09) due to decreases in mortality within low poverty areas. With the exception of falls, mortality rates were dramatically higher among high poverty counties compared to low poverty counties across all mechanisms.

{INSERT FIGURE 1}

**Figure 1** shows time trends for age-standardized rates by county poverty category for all unintentional injuries and the six specific injury mechanisms. There is a significant and increasing disparity for overall injury mortality between low and high poverty counties from 1999 to 2012, with declining rates found for the lowest poverty counties and steady rates among high poverty counties. In addition, a time-poverty interaction was significant for falls, poisoning, and drownings, indicating more rapidly increasing rates within higher poverty areas. The most striking trend was among poisoning deaths, with greater increases seen within high poverty
## Table 2: Relative Risk of Mortality from Unintentional Injury: United States 1999-2012

| Specific Cause                  | All Unintentional Injuries | MVA | Falls | Accidental Discharge of Firearms | Drowning | Exposure to Fire/Smoke | Poisoning |
|--------------------------------|-----------------------------|-----|-------|----------------------------------|----------|------------------------|-----------|
|  | 1999 | 2012 | 1999 | 2012 | 1999 | 2012 | 1999 | 2012 | 1999 | 2012 | 1999 | 2012 | 1999 | 2012 |
| Age                          |                              |     |       |                                  |          |                        |           |
| 0-14                         | 0.32 **                      | 0.32 ** | 0.19 ** | 0.16 ** | 0.34 ** | 0.2 ** | 0.23 ** | 0.35 ** | 0.99 | 1.05 | 1.96 ** | 2.01 ** | 0.07 ** | 0.03 ** |
| 15-24                        | 1                            | 0.95 | 1.35 ** | 0.68 ** | 0.85 ** | 1.93 ** | 2.05 ** | 0.54 ** | 0.71 | 0.67 ** | 0.83 | 1.63 ** | 2.17 ** | 3.47 ** | 2.87 ** |
| 25-44                        | 1.02 **                      | 1.63 ** | 0.62 ** | 0.79 ** | 5.15 ** | 9.03 ** | 0.37 ** | 0.62 | 0.6 ** | 0.94 | 2.37 ** | 5.24 ** | 2.89 ** | 3.26 ** |
| 45-64                        | 2.11 **                      | 2.57 ** | 0.95 | 0.96 | 31.07 ** | 62.34 ** | 0.3 ** | 0.58 | 0.78 ** | 0.99 | 6.62 ** | 10.74 ** | 0.99 | 0.72 ** |
| >65                          | 8.51 **                      | 12.11 ** | 1.45 ** | 1.55 ** | 200.66 ** | 429.29 ** | 0.5 | 0.31 | 1.37 ** | 1.45 ** | 14.19 ** | 21.07 ** | 1.99 ** | 0.7 ** |
| Race/Ethnicity               |                              |     |       |                                  |          |                        |           |
| White                        | 1.00 Reference               | 1.00 ** | 0.76 ** | 1.09 ** | 0.99 | 0.73 ** | 0.48 ** | 1.47 ** | 1.45 ** | 1.56 ** | 1.26 ** | 2.76 ** | 1.82 ** | 1.13 + | 0.58 ** |
| Black                        | 0.88 **                      | 0.65 ** | 1 | 0.89 ** | 0.81 ** | 0.66 ** | 0.65 ** | 0.56 ** | 1.16 | 0.65 ** | 0.73 | 0.59 ** | 0.89 | 0.45 ** |
| Hispanic                     | 0.88 **                      | 0.69 ** | 1.02 | 0.79 ** | 0.72 ** | 0.65 ** | 0.5 ** | 0.46 ** | 1.27 ** | 1.31 ** | 0.71 ** | 0.68 ** | 0.44 ** | 0.49 ** |
| Other                        |                              |     |       |                                  |          |                        |           |
| Sex                          |                              |     |       |                                  |          |                        |           |
| Female                       | 2.25 **                      | 2.05 ** | 2.15 ** | 2.36 ** | 2.47 ** | 1.99 ** | 6.24 ** | 6.68 ** | 4.19 ** | 3.74 ** | 1.83 ** | 1.71 ** | 2.65 ** | 2 ** |
| Male                         | 1.00 Reference               | 1.00 ** | 1.08 | 1.62 ** | 1.44 ** | 0.81 ** | 0.87 ** | 1.58 ** | 1.44 ** | 1.1 | 1.15 | 1.22 ** | 1.23 ** | 0.61 ** | 0.87 + |
| Urbanism                     |                              |     |       |                                  |          |                        |           |
| Large Central Metro          | 1.23 **                      | 1.08 | 1.62 ** | 1.44 ** | 0.81 ** | 0.87 ** | 1.58 ** | 1.44 ** | 1.1 | 1.15 | 1.22 ** | 1.23 ** | 0.61 ** | 0.87 + |
| Large Fringe Metro           | 1.37 **                      | 1.25 ** | 1.68 ** | 1.48 ** | 0.92 | 0.99 | 1.85 ** | 2.35 ** | 1.31 ** | 1.26 ** | 1.5 ** | 1.42 ** | 0.82 ** | 1.1 |
| Medium Metro                 | 1.5 **                       | 1.37 ** | 1.86 ** | 1.76 ** | 0.99 | 0.94 | 2.07 ** | 3.15 ** | 1.46 ** | 1.23 ** | 1.64 ** | 1.93 ** | 0.61 ** | 0.94 |
| Small Metro                  | 1.82 **                      | 1.62 ** | 2.43 ** | 2.32 ** | 0.92 | 0.99 | 3.39 ** | 3.54 ** | 1.55 ** | 1.55 ** | 1.95 ** | 2.14 ** | 0.63 ** | 1.06 |
| Micropolitan                 | 2.34 **                      | 1.95 ** | 3.31 ** | 3.14 ** | 0.95 | 0.99 | 4.47 ** | 4.18 ** | 1.94 ** | 1.64 ** | 2.3 ** | 2.99 ** | 0.6 ** | 1.03 |
| County Poverty               |                              |     |       |                                  |          |                        |           |
| 0–5%                         | 1.00 Reference               | 1.00 | 1.27 | 1.21 | 1.5 | 0.89 | 1.24 | 1.22 | 1.27 | 1.33 | 1.61 | 1.62 ** | 1.79 | 1.16 | 1.19 |
| 5–10%                        | 1.13 | 1.27 ** | 1.21 | 1.5 | 0.89 | 1.24 | 1.22 | 1.27 | 1.33 | 1.61 | 1.62 ** | 1.79 | 1.16 | 1.19 |
| 10–15%                       | 1.33 **                      | 1.44 ** | 1.55 ** | 1.76 ** | 0.9 | 1.23 | 2.95 ** | 1.77 | 1.58 ** | 2.08 ** | 2.45 ** | 2.17 | 1.23 | 1.51 * |
| 15–20%                       | 1.41 **                      | 1.56 ** | 1.7 | 2.11 ** | 0.85 | 1.21 | 3.23 ** | 2.09 | 1.53 ** | 2.29 ** | 2.5 ** | 2.73 ** | 1.32 | 1.64 ** |
| 20%                          | 1.49 **                      | 1.72 | 1.79 ** | 2.44 ** | 0.89 | 1.13 | 3.76 ** | 3.02 | 1.52 | 2.26 ** | 2.49 ** | 3.65 ** | 1.49 ** | 1.78 ** |

Source: National Center for Health Statistics (Compressed Mortality File 1999-2010)

**p < 0.01 ** p < 0.05 + p < 0.10
counties compared with low poverty counties. Interestingly, poverty disparities for accidental firearm mortality have been decreasing over time. Time trends by county poverty category along with CIs for each injury mechanism are available in the Supplemental Excel file.

**Table 2** reports RR for the multivariate negative binomial regressions. Adjusting for age, race/ethnicity, sex and urbanism, there is a significant and increasing linear association between county poverty and mortality from unintentional injury. Residents in counties with a poverty rate of greater than 20% had a 49% increased risk of death from injury (RR=1.49; 95% CI 1.33,1.68) compared to residents in low poverty (less than 5%) counties in 1999, compared with a 72% increased risk of death in 2012 (RR 1.72; 95% CI 1.44,2.05).

Relative risk increased from 1999 to 2012 for all mechanisms with the exception of accidental discharge of firearms. RR of death from MVA for counties with >20% poverty increased from 1.79 (95% CI 1.56,2.06) to 2.44 (95% CI 1.90,3.12) between 1999 and 2012. Similar increases were seen for drowning, exposure to smoke/fire and poisonings.

**Table 3** reports the number of deaths per year for each injury mechanism and the corresponding Population Attributable Fraction (PAF) for county poverty. Again, the PAF represents the percentage of deaths that may not have occurred had fatality rates across all counties been equivalent to the counties with the lowest poverty rates. Between 1999 and 2012 over 1.6 million people died from unintentional injuries. The PAF for all unintentional injuries was 0.22 (95% CI 0.13,0.30) in 1999, and rose steadily to 0.35 (95% CI 0.22,0.45) in 2012. The total number of deaths due to unintentional injury was over 127,000 in 2012, meaning that approximately 44,700 (95% CI 28,606-58,093) excess deaths occurred in 2012 associated with county poverty. Over the 14 year period from
| Year | Total Unintentional Injuries | MVA | Falls | Accidental Discharge of Firearms |
|------|-------------------------------|------|-------|---------------------------------|
|      | Total Deaths | PAF | Attributable Deaths | Total Deaths | PAF | Attributable Deaths | Total Deaths | PAF | Attributable Deaths |
| 1999 | 97860          | 0.22 | 21100             | 42401        | 0.31 | 13300             | 13162       | 0.11 | 1421             | 824        | 0.58 | 482             |
| 2000 | 97900          | 0.16 | 15476             | 43354        | 0.24 | 10225             | 13322       | 0.15 | 2064             | 776        | 0.46 | 356             |
| 2001 | 101537         | 0.22 | 22652             | 43788        | 0.27 | 11943             | 15019       | 0.17 | 2596             | 802        | 0.62 | 497             |
| 2002 | 106742         | 0.22 | 23404             | 45380        | 0.27 | 12160             | 16257       | 0.21 | 3380             | 762        | 0.57 | 438             |
| 2003 | 109277         | 0.23 | 25089             | 44757        | 0.31 | 13663             | 17229       | 0.23 | 3976             | 730        | 0.69 | 503             |
| 2004 | 112012         | 0.29 | 32782             | 44933        | 0.35 | 15825             | 18807       | 0.12 | 2243             | 649        | 0.35 | 225             |
| 2005 | 117809         | 0.34 | 40074             | 45343        | 0.37 | 16990             | 19656       | 0.06 | 1250             | 789        | 0.74 | 581             |
| 2006 | 121599         | 0.35 | 42350             | 45316        | 0.34 | 15547             | 20823       | 0.03 | 673              | 642        | 0.38 | 244             |
| 2007 | 123706         | 0.38 | 47184             | 43945        | 0.49 | 21668             | 22631       | 0.08 | 1783             | 613        | 0.82 | 504             |
| 2008 | 121902         | 0.35 | 42104             | 39790        | 0.46 | 18431             | 24013       | 0.05 | 1268             | 592        | 0.75 | 446             |
| 2009 | 118021         | 0.32 | 37741             | 36216        | 0.40 | 14591             | 24792       | 0.12 | 2877             | 554        | 0.58 | 321             |
| 2010 | 120859         | 0.40 | 47813             | 35332        | 0.40 | 14176             | 26009       | 0.02  | 520              | 606        | 0.53 | 321             |
| 2011 | 126438         | 0.36 | 45518             | 35303        | 0.51 | 18005             | 27483       | 0.09  | 2473             | 591        | 0.58 | 343             |
| 2012 | 127792         | 0.35 | 44727             | 36415        | 0.50 | 18208             | 28753       | 0.18  | 517              | 548        | 0.52 | 285             |
| TOTAL | 1603454        | 0.30 | 488015            | 582273       | 0.37 | 214732            | 287956      | 0.12  | 23011            | 9478       | 0.58 | 5546            |

Table 3: Injury Fatalities, Population Attributable Fraction, and Attributable Deaths for County Poverty, 1999-2010

| Year | Total Deaths | PAF | Attributable Deaths | Total Deaths | PAF | Attributable Deaths | Total Deaths | PAF | Attributable Deaths |
|------|--------------|-----|---------------------|--------------|-----|---------------------|--------------|-----|---------------------|
| 1999 | 3529         | 0.32 | 1119                | 3348         | 0.53 | 1781                | 12186       | 0.18 | 2252                |
| 2000 | 3482         | 0.30 | 1058                | 3377         | 0.46 | 1550                | 12757       | 0.18 | 2258                |
| 2001 | 3281         | 0.34 | 1113                | 3309         | 0.46 | 1515                | 14078       | 0.39 | 5542                |
| 2002 | 3447         | 0.36 | 1248                | 3159         | 0.64 | 2006                | 17550       | 0.34 | 5978                |
| 2003 | 3306         | 0.42 | 1390                | 3369         | 0.71 | 2377                | 19457       | 0.32 | 6219                |
| 2004 | 3308         | 0.32 | 1063                | 3229         | 0.43 | 1390                | 20950       | 0.42 | 8890                |
| 2005 | 3582         | 0.35 | 1266                | 3197         | 0.53 | 1701                | 23618       | 0.50 | 11786               |
| 2006 | 3579         | 0.18 | 657                 | 3109         | 0.47 | 1456                | 27531       | 0.55 | 15083               |
| 2007 | 3443         | 0.47 | 1619                | 3286         | 0.37 | 1217                | 29846       | 0.41 | 12172               |
| 2008 | 3548         | 0.30 | 1056                | 2912         | 0.47 | 1366                | 31116       | 0.43 | 13434               |
| 2009 | 3517         | 0.49 | 1735                | 2756         | 0.68 | 1878                | 31758       | 0.47 | 14831               |
| 2010 | 3782         | 0.79 | 3002                | 2782         | 0.69 | 1908                | 33041       | 0.51 | 16928               |
| 2011 | 3556         | 0.93 | 3307                | 2746         | 0.68 | 1867                | 36280       | 0.46 | 16689               |
| 2012 | 3551         | 0.54 | 1918                | 2464         | 0.62 | 1528                | 36332       | 0.37 | 13443               |

TOTAL: 48911 0.44 21550 43043 0.55 23541 346500 0.40 145505

Source: National Center for Health Statistics (Compressed Mortality File 1999-2010)

* PAF for falls is negative, and so the Preventive Fraction (PF) is calculated in its place (1-PF = 1/[1-PAF]). The PF is the proportion reduction in the outcome if all individuals were exposed to a protective factor.

† PAF for falls in 2010 and 2012 was positive, so this number is a true PAF with associated attributable deaths.
1999 to 2012, 488,015 (95% CI 317,553-626,187) deaths from injuries may not have occurred if the risk across all counties was the same as those counties with the lowest poverty rates.

Comment

In this study, we use comprehensive annual injury mortality data combined with county-level census poverty measures to characterize disparities in injury mortality in the US from 1999-2012. Injury mortality has increased over the past decade, with disparate trends identified for specific injury mechanisms. In accordance with the growing body of literature documenting the deleterious effects of neighborhood poverty on health, our study shows that county-level poverty confers a greater risk of death from unintentional injury, and that higher poverty areas have shouldered the burden of the recent national increases in unintentional injury mortality rates.

There is an increasing socioeconomic disparity for all combined unintentional injuries. These findings are in line with recent research that has found widening area-based disparities for all-cause mortality and life expectancy\textsuperscript{26,6}. Unintentional poisoning deaths have been on the rise since at least the 1980s\textsuperscript{27}, and the largest driver of this trend has been an increase in prescription drug overdose\textsuperscript{28}. In 2008, opioid analgesics (including morphine, oxycodone, methadone, and hydrocodone, among others) were responsible for 55% of deaths due to drug overdose\textsuperscript{28}. The disparate increase within high poverty and rural areas deserves greater attention and future research. Recent research has raised concerns regarding nonrandom misclassification of unintentional poisonings based on both area and individual sociodemographic characteristics, due in part to wide variations in the qualifications and training of medical examiners\textsuperscript{29}.

While the PAF increased for nearly all mechanisms, it is important to note that the equation for PAF takes into account both the prevalence of the exposure and the relative risk. County poverty rates have increased over the past decade. The distribution of
counties across poverty categories has shifted such that fewer counties fall within the low poverty group. This increase in exposure can increase the PAF without any change in relative risk. Moreover, caution is advised in interpreting the PAF as a causal statement about county poverty. However, the PAF is powerful in reflecting the impact of increases over time in both the exposure of interest (county poverty) and the relative risk.

Despite the use of comprehensive mortality data, there are several limitations. First, although associations between individual socioeconomic status and injury rates have been documented, information on socioeconomic status of individuals is not available in the CDC dataset. We should not assume that county poverty reflects the SES socioeconomic status of individuals within counties; however, we also cannot conclude that county-level poverty is associated with injury mortality above and beyond an individual’s poverty status. What we show as a possible poverty effect may indeed represent a combined effect of individual poverty status and the area poverty. Despite this limitation, the use of area level poverty as a means to determine risk and identify disparity is highly valuable, and rigorous documentation of poverty-based disparities is an important and necessary foundation for future research.

The mechanisms linking area poverty and injury are not explored in this study, and likely vary based on the specific injury outcome. Area poverty may operate through various and interdependent mechanisms that increase injury risk, including decayed physical environments (e.g. deteriorating streets/sidewalks, poor access to safe green space), restricted access to health information and safety equipment (e.g. bike helmets, newer/safer cars), and social isolation and norms regarding risky behaviors (e.g. seat belt use, drug use). Once again, future research is needed to identify which aspects of the social and/or physical environment contribute to the increased likelihood of death from injury.

**Conclusion**
This study documents area-based socioeconomic disparities in injury mortality across categories of unintentional injury. In contrast to disease mortality, rates of unintentional injuries have risen over the past decade, with the greatest burden shouldered by populations living in high poverty areas. Our findings shed light on the potentially important role of the socioeconomic and physical environment in shaping patterns of injury mortality. Given the trends of increasing areal socioeconomic inequality, these results also highlight the importance of community-level intervention. Future research, as well as public health policies aimed at reducing injury rates, should take seriously the neighborhood environments to which individuals are exposed.

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