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Article

Racial disparities in poverty account for mortality differences in US medicare beneficiaries

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ABSTRACT

Higher mortality in Blacks than Whites has been consistently reported in the US, but previous investigations have not accounted for poverty at the individual level. The health of its population is an important part of the capital of a nation. We examined the association between individual level poverty and disability and racial mortality differences in a 5% Medicare beneficiary random sample from 2004 to 2010. Cox regression models examined associations of race with all-cause mortality, adjusted for demographics, comorbidities, disability, neighborhood income, and Medicare "Buy-in" status (a proxy for individual level poverty) in 1,190,510 Black and White beneficiaries between 65 and 99 years old as of January 1, 2014, who had full and primary Medicare Part A and B coverage in 2004, and lived in one of the 50 states or Washington, DC.

Overall, black beneficiaries had higher sex-and-age adjusted mortality than Whites (hazard ratio [HR] 1.18). Controlling for health-related measures and disability reduced the HR for Black beneficiaries to 1.03. Adding "Buy-in" as an individual level covariate lowered the HR for Black beneficiaries to 0.92. Neither of the residential measures added to the predictive model. We conclude that poorer health status, excess disability, and most importantly, greater poverty among Black beneficiaries accounts for racial mortality differences in the aged US Medicare population. Poverty fosters social and health inequalities, including mortality disparities, notwithstanding national health insurance for the US elderly. Controlling for individual level poverty, in contrast to the common use of area level poverty in previous analyses, accounts for the White survival advantage in Medicare beneficiaries, and should be a covariate in analyses of administrative databases.

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Introduction

Black people have higher mortality than Whites in the US (Isaacs & Schroeder, 2004; Sautter, Thomas, Dupre, & George, 2012). Excess mortality in older Blacks has been attributed to poorer health status, more widespread adverse health behaviors, more limited access to care, and lower socioeconomic status (SES) among Black Americans. These factors explain a substantial proportion of racial mortality differences, but a sizable unexplained residual remains (Isaacs & Schroeder, 2004; Thorpe et al., 2012; Williams, Mohammed, Leavell, & Collins, 2010). The unexplained portion may be attributed to limitations such as inadequate or imprecise measurement of contributing factors, insufficient adjustment for unmeasured factors, small samples, or unrepresentative populations. Ideally, SES measures should be individual level, but large population databases usually lack such measures (Adler, Bush, & Pantell, 2012). Smaller databases containing individual level SES measures are often not generalizable, and lack power to detect differences from which definitive conclusions may be made (Adler et al., 2012; Isaacs & Schroeder, 2004).

We recently used ecologic variables to assess relationships among health outcomes and income, income inequality, and residential segregation in Black and White end-stage renal disease (ESRD) patients. Black patients who lived in areas characterized by

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segregation and lower income had higher mortality (Kimmel, Fwu, & Eggers, 2013).

The mortality disadvantage for Blacks in the US elderly population is substantial. The disparity varies with age, decreasing from a mortality disadvantage of 49% in those 65–69, to 12% in those 80–84. The racial mortality disadvantage reverses after age 85. The reason for crossover at 85 is unknown, but the finding is well-documented (Liu & Witten, 1995; Sautter et al., 2012). Therefore, the etiology of Black disadvantage is undoubtedly complex, reflecting many confounding factors.

Poverty is an important factor underlying US racial mortality differences, given the strong link between higher mortality and adverse economic conditions (Isaacs & Schroeder, 2004) and the well-documented differences in poverty rates across racial groups (DeNavas-Walt, Proctor, & Smith, 2013). Poverty and poor health can reinforce each other, a notion increasingly recognized as an impediment to economic advances in both developed and low-income nations (Mirvis, Chang, & Cosby, 2008).

Residential or ecologic characteristics such as neighborhood median household income and racial segregation may also contribute to racial mortality disparities (Kimmel et al., 2013; Nuru-Jeter & LaVeist, 2011). Residence in a socioeconomically disadvantaged community is associated with poorer health and higher mortality (Ludwig et al., 2011; Nuru-Jeter & LaVeist, 2011). Poor neighborhoods can provide unhealthy environments and offer residents little chance to engage in healthy behaviors (Nuru-Jeter & LaVeist, 2011). Residential segregation perpetuates poor housing, unhealthy neighborhood environments (Kramer & Hogue, 2009; Nuru-Jeter & LaVeist, 2011) and limited health care access (Rodriguez et al., 2007).

Typical analytic approaches evaluating SES factors in US studies include linking large databases, such as Medicare enrollment files, with Census level SES measures. Analyses using area level approaches usually show modest associations of SES and outcomes, but are subject to ecological biases (Kimmel et al., 2013; Rodriguez et al., 2007). Relying solely on area-wide poverty or income measures to account for individual variation in health outcomes may result in misleading or inadequate assessment of income effects on health (Hanley & Morgan, 2008). Individual level information regarding income and wealth as socioeconomic indicators is largely missing from US administrative health registries (Isaacs & Schroeder, 2004). Direct individual level income or poverty measures are much preferred for such analyses since even race-specific ecologic analyses may subject the evaluation of certain characteristics, such as income, to misclassification (Hanley & Morgan, 2008).

Medicare data, however, include both individual level disability and poverty measures, not widely used in outcome analyses (Lovald et al., 2013). First, Social Security offers Medicare coverage to those unable to work because of medically determined physical or mental impairment before age 65. This lack of participation in the legal workforce, acknowledged by disability status, in combination with relatively low levels of monetary reimbursement, puts even recipients of disability benefits at economic disadvantage. Compared to elderly beneficiaries, disabled Medicare beneficiaries are much more likely to be of a minority group (Iezzoni, 2006). Disability also is associated with increased mortality (Lubitz & Pine, 1986). Therefore, Medicare disability eligibility is a marker of economic and health disadvantage during beneficiaries' early lives that may have enduring effects, which could contribute to racial mortality disparities.

Second, Medicare also has a proxy poverty measure. Many Medicare beneficiaries qualify for benefits from Medicaid, a Federal-State program for certain low-income individuals. In addition, Medicare "Buy-in" benefits were created to help low-income Medicare beneficiaries pay Medicare premiums, and in some instances, deductibles and copayments. Medicare Buy-in Programs are administered by States to pay all or part of Medicare health insurance co-pay expenses for eligible low-income Medicare recipients. All Medicare beneficiaries qualifying for either Medicaid or State Buy-in programs meet designated low-income standards, usually no higher than 135% of Federal poverty levels (Eichner & Vladeck, 2005; Ryan & Super, 2003). In 2013, $15,510 annual income was the poverty level for a US family of two (US HHS, 2013). Average income for households headed by someone $\geq$ 65 years at that time was $53,000. Consequently, anyone receiving a Buy-in subsidy (dual eligibility) had an income less than one-third the average for elderly persons.

In addition to direct SES and disability measures, Medicare beneficiary data are linkable to claims data, permitting calculation of health status based on hospitalizations (Waxman, Greenberg, Ridgely, Kellermann, & Heaton, 2014).

We hypothesized mortality disparities between US Black and White aged persons can be largely accounted for by health status, poverty, and disability, and that these individual level measures are more powerful predictors of mortality than residential characteristics.

Methods

Data resources and study population

We obtained a 5% Medicare beneficiary random sample, using 2004–2010 Denominator files and 2004 Part A Institutional Claims files from Centers for Medicare & Medicaid Services (CMS) in this retrospective cohort study. We identified 1,461,071 Black and White beneficiaries 65–99 years old as of January 1, 2004 (and 66–100 years old at study start on January 1, 2005), who had full Medicare Part A and B coverage in 2004, were not in hospice care, and resided in the 50 States or Washington, DC. Data from 2004 (the 1-year observation period before study start) were used to establish baseline health status. To ensure complete Medicare claims data for baseline health status, we excluded 231,110 beneficiaries enrolled in health maintenance organizations in all or part of 2004.

We assigned two residential measures for each beneficiary, linking individual level data from Medicare files with 2000 Census Bureau data, as previously (Kimmel et al., 2013), using residential ZIP code (for race-specific neighborhood median household income) and county code (for Dissimilarity Index scores to measure residential racial segregation) (Nuru-Jeter & LaVeist, 2011). We excluded 39,451 beneficiaries with unavailable ZIP and county code data. The final study cohort included 1,190,510 beneficiaries (Supplemental Fig. 1).

Baseline characteristics

Demographic factors included race, age (as of January 1, 2005) and gender. Two health-related measures were considered: hospitalizations with Charlson Comorbidity Index (Charlson) scores, and ESRD therapy. Beneficiaries were designated hospitalized if they had one or more Part A institutional inpatient care claims in 2004. Based on diagnoses in the Medicare Part A Institutional Claim files, we used standardized coding algorithms (Quan et al., 2005) to calculate Charlson scores for beneficiaries hospitalized in 2004. Charlson score is a widely-used composite value based on number and seriousness of comorbid medical illnesses that alter mortality risk (Charlson, Pompei, Ales, & MacKenzie, 1987). We treated beneficiaries having no hospitalization as one category and grouped other beneficiaries into another six categories (based on calculated Charlson scores 0, 1 through 4, or $\geq$5) to represent beneficiaries' baseline hospitalization and Charlson score. The other baseline health-related measure, ESRD status, was indicated

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