Mortality from Leading Causes by Education and Race in the United States, 2001

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Background: Low educational attainment is a marker of socioeconomic status that correlates strongly with higher death rates from many conditions. No previous studies have analyzed national data to measure the number of deaths associated with lower education among working-aged adults (25–64 years) by race or ethnicity. Furthermore, no previous studies have examined comprehensively the relationship of education to cause-specific and all-cause mortality in the three largest racial or ethnic groups in the United States using national data.

Methods: Age-standardized, race/ethnicity–specific death rates from all causes and the 15 leading causes were measured among men and women aged 25–64 years by level of education based on U.S. national mortality data in 2001. The total number of deaths that potentially could be avoided among people aged 25–64 years was estimated by applying the mortality rates among college graduates (within each 5-year category of age, gender, and race/ethnicity) to each of the less-educated subpopulations. All analyses were performed in 2007.

Results: Nearly half (48%) of all deaths among men aged 25–64 years (white, black, and Hispanic), and 38% of all deaths in women would not have occurred in this age range if all segments of the population experienced the death rates of college graduates. Black men and women had the highest death rates from all causes combined and from many specific causes at nearly all levels of education, and the largest average life years lost before age 65 years. However, the total number of deaths associated with low education status was not confined to any single racial group. About 161,280 deaths in whites, 40,840 deaths in blacks, and 13,162 deaths in Hispanics in this age range were associated with educational disparity.

Conclusions: Potentially avoidable factors associated with lower educational status account for almost half of all deaths among working-aged adults in the U.S.; these deaths are not confined to any single racial or ethnic group. These findings highlight the need for greater attention to social determinants of health.

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Introduction

Many studies document that decreased longevity is associated with low educational attainment and other markers of low socioeconomic status (SES).[1–9] However, most of the population-based analyses of education and mortality by race and ethnicity in the United States have been based on relatively small representative samples of the population rather than on national data. The limited number of deaths from many specific conditions has precluded simultaneous stratification of analyses by gender, race, and education. Furthermore, only one published study estimated the number of deaths among working-aged adults (25–64 years) that potentially could be prevented if factors associated with low educational status could be eliminated.[10] That analysis did not consider race.

Age-standardized death rates from all causes combined and from the 15 most common causes of death were measured among men and women aged 25–64 years by race and education using 2001 national vital statistics. Analyses were restricted to the three largest racial/ethnic groups in the U.S. (non-Hispanic white [whites], non-Hispanic black [blacks], and Hispanics) because race information on death certificates is less

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reliable for American Indians and Asians or Pacific Islanders.[11] Published death rates in official publications are thought to underestimate death rates by 21% for American Indians and 11% for Asians or Pacific Islanders.[11] The mortality data included in this study cover 90% of the U.S. population. Estimates also were made of the total number of deaths among working-aged adults that potentially could be avoided if the underlying disparities associated with education could be eliminated.

Methods

Mortality data for 2001 were obtained from the National Vital Statistics System (NVSS) administered by the National Center for Health Statistics. NVSS data represent a complete count of deaths occurring in the U.S. and are not subject to sampling error. Underlying causes of death were classified according to the coding and selection rules of the Tenth Revision of the International Classification of Diseases (ICD-10).[12] The ICD-10 codes for the 15 leading causes of death among men and women aged 25–64 years were as follows: cancer (C00–C97); heart diseases (I00–I09, I11, I13, I20–I51); accidents and adverse effects (V01–X59, Y85–Y86); suicide and self inflicted injury (X60–X84, Y87.0); cerebrovascular diseases (I60–I69); diabetes mellitus (E10–E14); chronic liver disease and cirrhosis (K70, K73–K74); chronic obstructive pulmonary disease (J40–J47); human immunodeficiency virus infection (B20–B24); homicide (X85–Y09, Y87.1, Y35, Y89.0); septicemia (A40–A41); nephritis (N00–N07, N17–N19, N25–N27); pneumonia and influenza (J10–J18); viral hepatitis (B15–B19); and hypertension (I10, I12).

Information on educational attainment, a marker of SES, was obtained from death certificates as provided by the next of kin or other informant. Forty-seven states and the District of Columbia collected this information for at least 80% of the decedents. Georgia, Rhode Island, and South Dakota had lower levels of ascertainment and were excluded from the analysis. Educational attainment was classified into four groups according to total years of schooling: less than high school graduate (<12 years of education), high school graduate (12 years), some college (13–15 years), and college graduate (≥16 years). Population data for the corresponding educational categories in the study areas were obtained from the 2001 Current Population Survey, a nationally representative household survey of non-institutionalized people (data routinely provided to the National Center for Health Statistics [NCHS] by the Census Bureau).

Analyses in this paper were restricted to deaths that occurred in the 25–64 year age range in 2001 in 47 states and DC, accounting for 93% (524,207/545,561) of all deaths in this age range in the U.S. Educational attainment is a more reliable index of SES in this age group than at older ages,[13,14] and deaths at this age have a large economic as well as social impact. An additional 17,325 deaths were excluded because race/ethnicity was reported to be other than white, black, or Hispanic. Another 16,598 deaths (about 3% of the total deaths in the 47 states and DC) were excluded because of missing information on educational attainment. A total of 490,284 deaths were included in the final analysis, accounting for 90% and 94% of all deaths recorded among people aged 25–64 years in 2001 in the entire U.S. and in the 47 states and DC, respectively.

Age-standardized death rates were calculated using the 2000 U.S. population standard for all causes combined and for the 15 leading conditions by gender, race/ethnicity, and educational attainment within the age range 25–64 years. The approach recommended by NCHS was used to calculate upper and lower 95% confidence limits.[15] This method takes into account both the random variability of the numerator by assuming a Poisson probability distribution and the sampling variability of the denominator. Rate ratios (RR) and 95% confidence interval (CI) were calculated, comparing the death rates in the least educated group (no high school diploma) to the most educated group (college degree and above).

The total number of deaths that potentially could be avoided among people aged 25–64 years was estimated by comparing the observed to the expected number if all segments of the population within each gender and racial/ethnic group experienced the same death rates as those with a college degree of the corresponding group. The average number of life years lost per person before age 65 years was calculated using a life table method[16] for each race and gender group by education. All analyses were performed in 2007.

Results

Figure 1 depicts age-standardized death rates by educational attainment for all causes combined and for the three leading causes by race/ethnicity and gender, in the age group 25–64 years. The illustrations for the remaining 15 leading causes and the numeric rates for all causes combined and are shown in the Appendix (available online at www.ajpm-online.net). The three leading causes of death (cancer, heart disease, and accidents) account for about 60% of all deaths in this age range. For all causes of death combined and for every specific condition, rates were inversely related to education within each racial/ethnic group. For black women and Hispanics, the highest death rates for many conditions occurred in persons with 12 years of education rather than <12 years.

Black men and women experienced the highest death rates from all causes combined and from many specific conditions compared to other racial and ethnic groups at nearly every level of education. However, numerically, the difference in risk comparing the highest and lowest educational groups was larger, especially among white and black men and white women, than the difference in death rates between blacks and whites at any given level of education. For instance, among men, the death rate from all causes combined in people with <12 years of education compared to those with ≥16 years of education was more than 4 times larger in whites and 3 times higher in blacks (Table 1), whereas the largest black-to-white rate ratio for all causes combined was 1.8 in people with ≥16 years of education.

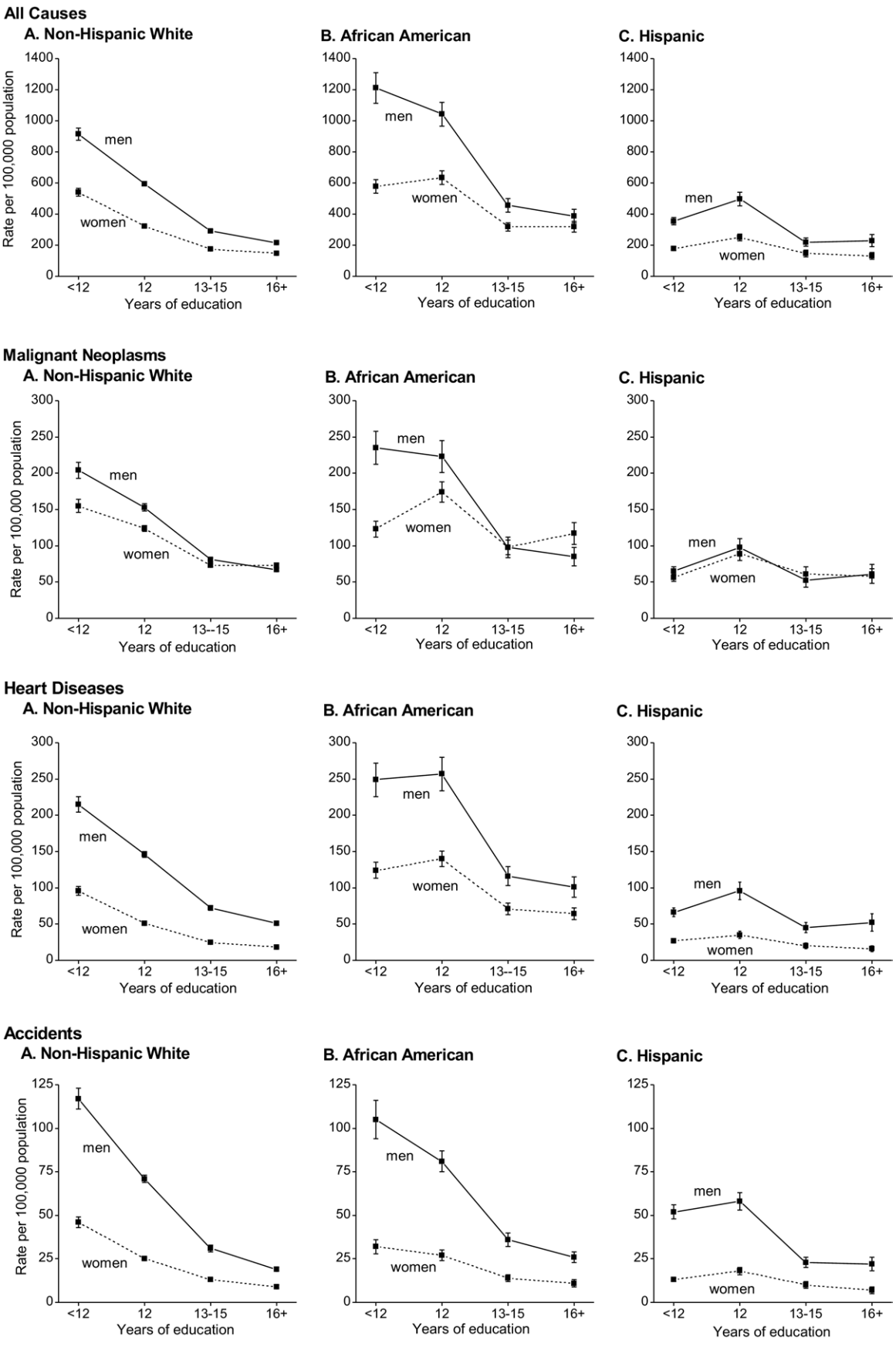

Figure 1. Age-standardized death rates among people aged 25–64 years for all causes combined and the three leading causes by gender, race, and education, 2001.

Table 1. Comparison of age-standardized death rates for all causes combined by race, gender, and education in the U.S., 2001

Gender/race	Deaths	Death rate by education level					≤12 years vs ≥16 years education	
		Overall	<12 years	12 years	13–15 years	≥16 years	Absolute difference	Rate ratio (95% CI)
Men								
Whites	222,741	415.6	914.6	595.1	291.8	216.2	698.4	4.23 (4.21–4.25)
Blacks	54,681	791.9	1211.0	1042.3	455.3	386.5	824.5	3.13 (3.10–3.16)
Blacks versus whites								
Absolute difference		376.3	296.4	447.2	163.5	170.4		
Rate ratio (95% CI)		1.91 (1.90–1.91)	1.32 (1.32–1.33)	1.75 (1.75–1.76)	1.56 (1.55–1.57)	1.79 (1.77–1.81)		
Women								
Whites	137,721	247.3	539.5	321.6	175.5	147.4	392.1	3.66 (3.64–3.69)
Blacks	38,356	470.9	577.6	634.8	318.2	318.7	259.0	1.81 (1.79–1.83)
Blacks versus whites								
Absolute difference		223.6	38.1	313.3	142.7	171.3		
Rate ratio (95% CI)		1.90 (1.90–1.91)	1.07 (1.06–1.08)	1.97 (1.97–1.98)	1.81 (1.80–1.83)	2.16 (2.14–2.19)		

Note: The overall rate ratio for death from all causes in blacks compared to whites when adjusted for education is 1.6 (95% CI=1.60–1.61) in men and 1.73 (95% CI=1.72–1.73) in women.

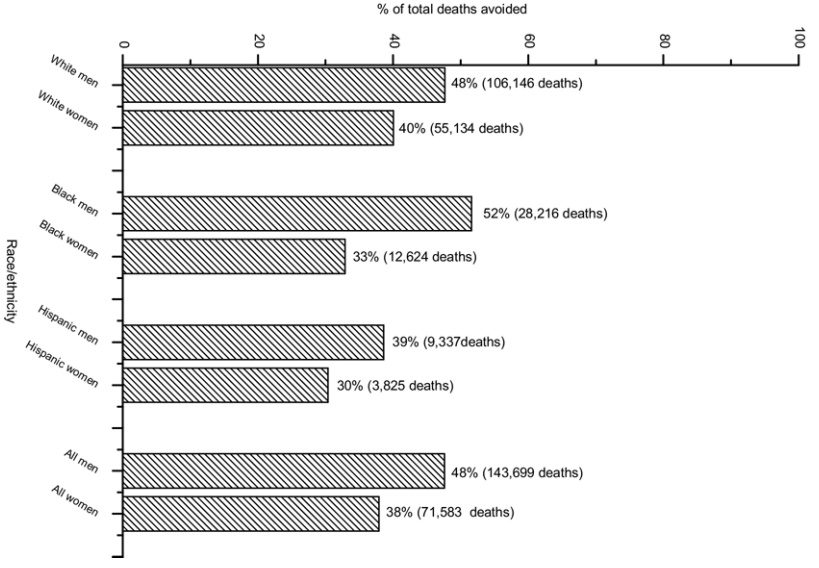

Figure 2. Total number of deaths that would have been averted in 2001 among people aged 25–64 years by race and gender had all the population had the mortality experience of the most educated. Overall, 44% of the total deaths (161,280 in whites, 40,840 in blacks, and 13,162 in Hispanics) could have been avoided in 2001.

The most extreme educational differences in relative terms, with rate ratio estimates as high as 38, were seen for human immunodeficiency virus (HIV) infection, viral hepatitis, homicide, and chronic lower respiratory disease, notably among whites (see appendix online at www.ajpm-online.net). In absolute terms, however, the educational differences were larger in blacks than whites for nine conditions in men and for six in women. The absolute difference in the rate per 100,000 people is the most relevant measure with respect to individual risk. Suicide is the only condition for which the absolute death rate was higher in whites than in blacks at every level of education.

Figure 2 shows the potential number of deaths at ages 25–64 years that could have been prevented in 2001 if all people within each of the racial/ethnic and gender categories experienced the overall death rates of those with ≥16 years of education. For each race/ethnicity group, the proportion of deaths that might be avoided was larger in men than women. Among men, the proportion of total deaths that potentially could be avoided ranged from 39% in Hispanics to 52% in blacks; in women it ranged from 30% in Hispanics to 40% in whites. Overall, about 48% (143,699/301,608)

Table 2. Average number of life years lost before 65 years by gender, race, and years of education, U.S., 2001

	Years of education							
	<12		12		13–15		16+	
	Life years lost	95% CI	Life years lost	95% CI	Life years lost	95% CI	Life years lost	95% CI
Men								
Non-Hispanic whites	4.77	4.71–4.83	3.04	3.02–3.06	1.48	1.46–1.49	1.07	1.06–1.08
Blacks	6.65	6.51–6.79	4.98	4.92–5.05	2.32	2.26–2.37	1.93	1.87–2.00
Hispanic	1.90	1.87–1.94	2.53	2.48–2.58	1.15	1.10–1.19	1.07	1.02–1.12
Women								
Non-Hispanic whites	2.86	2.80–2.89	1.66	1.65–1.68	0.88	0.87–0.89	0.70	0.69–0.71
Blacks	3.25	3.16–3.34	3.10	3.05–3.16	1.58	1.54–1.62	1.54	1.49–1.59
Hispanic	0.90	0.88–0.93	1.23	1.19–1.27	0.70	0.67–0.74	0.65	0.61–0.69

of all deaths in this age range among men and 38% (71,583/188,676) of the deaths in women could be avoided if the gender-, race-, and education-specific death rates could be reduced to those of the most educated.

Table 2 depicts the average number of life years lost per person before age 65 years. In general, the average number of life years lost per person increased with decreasing educational attainment. This increase was substantially larger in blacks and whites than in Hispanics and in men than in women. Black men who had never completed high school had the largest average number of life years lost in this age range (6.7 years), followed by white men who had never completed high school (4.8 years). In contrast, the average number of life years lost before age 65 years for black and white men with a college degree or more was 1.9 years and 1.1 years, respectively.

Discussion

The principal finding of this paper is that almost half (48% in men, 38% in women, 44% total) of all deaths that occurred among men and women aged 25–64 years in 2001 in the U.S. would not have occurred in that age range if all segments of the population aged 25–64 years experienced the annual death rates of college graduates. Although black men and women had the highest death rates from all causes combined and from many specific causes and the largest life years lost before age 65 years at nearly all levels of education, the educational disparity was not confined to any single racial or ethnic group. The number of potentially avoidable deaths in this age range was approximately four times larger in whites (161,000) than in blacks (41,000), because of the much larger population at every level of education. These findings highlight the importance of health disparities related to SES across all segments of the population.

Factors that contribute to the mortality disparity by SES and race include major risk factors and reduced access to health care that disproportionately affect less-educated people.[17–22] These disparities result in large part from factors in the social environment.[23] People with low educational attainment or low SES are more likely to reside in low-income areas, are especially vulnerable to marketing by the tobacco, alcohol, and fast food industries, have less opportunity for physical activity because of unsafe environments, and have less access to fresh fruits and vegetables because of cost and limited availability.[24–28] Furthermore, people with less economic means have less access to adequate health insurance or to receive optimal preventive or therapeutic medical care,[29] have lower literacy, and are less likely to seek timely medical attention or to successfully navigate the healthcare system.[30,31] Among the three groups studied, blacks and Hispanics are disproportionately represented in the lowest educated group, more likely to be uninsured, and less likely to receive optimal medical care.[21,32] It is noteworthy that SES, race, and ethnicity are closely interrelated and difficult to disentangle in studies of health disparities.[33,34]

Policies to reduce health disparities in the U.S. have focused more on racial than socioeconomic disparities,[33,35] largely because of the substantial differences in disease occurrence between blacks and whites[36] and because information on race is more readily available than that on parameters that affect SES.[37,38] However, socioeconomic health disparities are not confined to any particular racial or ethnic group. For example, according to 3-year average (2003–2005) data from the U.S. Bureau of Census, about 45.6 million Americans (15.7% of the total population) were without health insurance coverage of which 21.8 million were non-Hispanic whites, 13.6 million Hispanics, and 7.1 million blacks. According to the same data source, 37 million Americans (16.2 million non-Hispanic whites, 9.3 million Hispanics,

9.2 million blacks, and 1.4 million Asians) lived below poverty level in 2005.[39] No adequate health policies have been initiated to reduce SES health disparities in access to health care, smoking behavior, or physical inactivity. Recent statistics show that the overall death rate among young and middle-aged people with lower SES in the U.S. is twice that of the least healthy country in the Organization of Economic Cooperation and Development.[40]

The relationship between educational attainment and death rates from various specific causes is weaker in women than men and among Hispanics than whites or blacks.[41,42] For women, household income is thought to be a better predictor of SES than is personal education.[41,42] Furthermore, smoking prevalence was higher in more-educated than in less-educated women born before 1940,[43] which also may attenuate the educational gradient. For Hispanics and other racial and ethnic groups with large migrant populations, the relationship between education and mortality is affected by country of origin and time since migration and acculturation.[44] For example, smoking prevalence among Hispanics increases with greater acculturation.[45–47]

The magnitude of the associations between educational attainment and mortality is generally similar in this study to that of previous reports in the U.S.[4,5] and elsewhere.[48,49] These cause-specific estimates are more precise (have narrower CIs) than those from other studies, however, because they are based on national data not subject to sampling error. The total number of deaths in this study (490,284 deaths) is more than ten times larger than that (44,828 deaths) in the next largest study that examined race-specific relationships between education and mortality for several major causes.[4] These findings on average number of life years lost by education and race are also generally similar to those from previous reports.[3,8,50] The average number of life years lost decreased with increasing educational attainment and black men and white men who did not complete high school had the largest number of average life years lost.

Three previous studies have estimated the number of deaths that potentially could be avoided if the black-white mortality disparity were eliminated at all ages, but these did not consider differences in educational attainment or other markers of SES.[10,51,52] One of these studies estimated the total number of deaths avoided by eliminating differential mortality among the less educated without considering racial and ethnic groups.[10] That study estimated that a total of 199,142 deaths would be averted in 2001 if all people aged 25–64 years had the mortality rates of people with 1 or more years of college education. This estimate was only 7% lower than our estimate of 215,282 deaths, when both education and race/ethnicity are considered and race-specific mortality among college graduates is used as the referent. An important contribution of this paper is to highlight how educational disparities affect all three of the racial and ethnic groups studied, even though black men and women are the most affected.

A limitation of this study is that there was only one indicator of individual SES used, namely, educational attainment. SES is a multifactorial construct that reflects a combination of individual- and geographic-area–level influences. When possible, it is optimal to consider multiple indices of SES in examining relationships with health outcomes.[53,54] Education is the only individual-level indicator of SES recorded on vital statistics records. Despite its limitation, it is frequently used as an indicator of individual SES because of its availability, stability, and close association with other SES indicators that are not routinely obtained.[55]

A second limitation of this study is its reliance on years of education as reported on death certificates by next of kin. Sorlie et al.[14] compared self-reported education in the National Longitudinal Mortality Study (NLMS) to the information from next of kin recorded on death certificates and found that 38% of people who did not complete high school according to self-reported data were listed as high school graduates on their death certificates. Because of this, mortality by education based on death certificate may overestimate death rates for high school graduates and underestimate rates for those who did not complete high school, especially among blacks. However, this degree of misclassification would have little impact on overall conclusions of this paper.

A third limitation of this study is that it assumes differences in mortality rates among educational categories or SES are potentially avoidable. This obviously is not true for a variety of reasons. Even in countries that have made concerted efforts to minimize social and economic inequalities, differences in mortality by SES persist, albeit at a reduced level.[56] The fraction of these educational disparities that could be avoided in practice was not estimated.

Other limitations of this study were its inability to control for: (1) differences in quality of education by race/ethnicity; (2) misclassification of race/ethnicity on death certificates, especially for Hispanics; and (3) slight underestimation of death rates because 3% of decedents with education missing on their death certificates were excluded from the numerator, but not the denominator.

In conclusion, factors associated with lower educational status account for almost half of all deaths among working-aged U.S. adults. Black men and women have the highest death rates from almost all causes and the shortest life expectancy at each level of education, but the mortality disparities associated with education are not confined to any single gender, racial, or ethnic subgroup studied. Reduction of these disparities will require greater emphasis on policies that affect the social determinants of health.

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Appendix A. Age-standardized death rates among persons aged 25–64 years by cause, gender, race, and education, 2001

		Death rate					<12 vs 16+ years education	
Cause of death	**Men**	**Overall**	**<12**	**12**	**13–15**	**16+**	**Absolute difference**	**RR (95% CI)**
All causes								
Non-Hispanic white	222,741	415.6	914.6	595.1	291.8	216.2	698.4	4.23 (4.21–4.25)
African American	54,681	791.9	1211.0	1042.3	455.3	386.5	824.5	3.13 (3.10–3.16)
Hispanic	24,186	351.0	354.3	496.2	219.6	228.6	125.7	1.55 (1.52–1.58)
Malignant neoplasms								
Non-Hispanic white	60,376	110.3	203.6	152.5	81.2	67.0	136.6	3.04 (3.01–3.07)
African American	11,098	168.7	235.3	222.8	97.8	84.6	150.7	2.78 (2.69–2.88)
Hispanic	4,221	70.5	65.4	98.1	51.5	61.0	4.4	1.07 (1.01–1.14)
Heart disease								
Non-Hispanic white	55,166	101.2	214.9	145.9	72.0	51.2	163.7	4.20 (4.14–4.26)
African American	12,767	190.7	249.1	256.6	116.2	100.9	148.2	2.47 (2.39–2.54)
Hispanic	4,050	67.8	65.7	95.5	45.1	51.7	14.0	1.27 (1.19–1.36)
Accidents								
Non-Hispanic white	23,317	45.9	117.4	71.0	30.5	18.6	98.8	6.32 (6.10–6.55)
African American	4,574	61.9	105.3	80.7	35.6	26.2	79.1	4.02 (3.65–4.44)
Hispanic	3,946	44.4	51.6	57.6	22.9	21.6	30.0	2.39 (2.09–2.73)
Suicide								
Non-Hispanic white	12,979	25.5	52.4	37.3	18.4	14.0	38.5	3.75 (3.58–3.94)
African American	945	12.3	15.4	16.2	8.5	8.2	7.2	1.87 (1.49–2.34)
Hispanic	996	11.1	9.4	16.8	8.6	8.1	1.4	1.17 (0.92–1.49)
Cerebrovascular disease								
Non-Hispanic white	5,583	10.3	23.4	14.7	7.0	5.0	18.4	4.68 (4.34–5.04)
African American	2,361	35.3	52.4	45.4	19.7	18.2	34.2	2.88 (2.56–3.23)
Hispanic	851	13.8	15.4	18.2	8.5	7.0	8.4	2.20 (1.66–2.90)
Diabetes								
Non-Hispanic white	6,109	11.2	24.6	16.3	8.5	5.1	19.5	4.85 (4.50–5.22)
African American	1,911	28.6	36.6	35.2	21.7	15.7	20.9	2.34 (2.04–2.67)
Hispanic	916	15.7	16.4	21.3	9.6	10.3	6.1	1.59 (1.28–1.99)
Chronic liver disease								
Non-Hispanic white	7,496	13.9	36.0	20.8	9.7	5.7	30.3	6.32 (5.91–6.77)
African American	1,336	19.5	33.2	26.6	10.6	7.0	26.2	4.74 (3.82–5.90)
Hispanic	1,733	27.0	30.0	39.3	14.0	9.3	20.6	3.20 (2.55–4.02)
Chronic lower respiratory disease								
Non-Hispanic white	6,037	11.0	33.8	15.8	6.1	3.0	30.9	11.4 (10.5–12.4)
African American	929	14.0	20.9	19.5	7.3	3.8	17.1	5.47 (4.05–7.39)
Hispanic	205	3.6	3.3	6.4	1.2	1.8	1.5	1.84 (0.99–3.43)
Human immonodeficiency virus								
Non-Hispanic white	3,233	6.3	14.6	8.4	5.1	3.6	11.1	4.09 (3.67–4.55)
African American	4,282	58.1	113.8	73.8	28.1	29.7	84.1	3.83 (3.51–4.18)
Hispanic	1,231	15.7	12.9	27.8	8.3	10.5	2.4	1.23 (1.00–1.51)
Homicide								
Non-Hispanic white	2,323	4.6	16.6	7.0	2.6	1.4	15.2	12.1 (10.5–14.0)
African American	3,300	41.5	94.6	55.6	19.1	9.4	85.2	10.0 (8.4–11.9)
Hispanic	1,225	11.7	15.5	13.9	4.5	3.2	12.3	4.79 (3.32–6.90)
Septicemia								
Non-Hispanic white	1,844	3.4	8.6	5.0	2.1	1.5	7.1	5.66 (4.89–6.54)
African American	770	11.5	16.8	15.6	6.8	5.1	11.7	3.28 (2.51–4.29)
Hispanic	207	3.3	3.5	4.9	1.5	2.2	1.4	1.62 (0.92–2.86)
Nephritis								
Non-Hispanic white	1,666	3.1	8.2	4.3	2.0	1.4	6.8	6.02 (5.17–7.01)
African American	957	14.2	23.6	17.3	8.3	5.4	18.2	4.40 (3.42–5.66)
Hispanic	238	4.0	4.3	5.0	2.7	1.9	2.4	2.23 (1.33–3.74)
Influenza and pneumonia								
Non-Hispanic white	2,048	3.8	11.5	5.4	2.4	1.5	10.0	7.84 (6.81–9.03)
African American	670	9.8	15.9	12.5	5.8	4.0	11.9	4.02 (2.96–5.48)
Hispanic	219	3.5	3.5	5.5	1.7	1.6	1.9	2.22 (1.22–4.06)
Viral hepatitis								
Non-Hispanic white	1,736	3.2	8.6	5.1	2.4	1.0	7.6	8.38 (7.06–9.94)
African American	389	5.6	7.2	8.0	4.3	2.1	5.2	3.49 (2.24–5.43)
Hispanic	400	6.3	5.5	10.7	3.5	4.0	1.5	1.38 (0.95–2.02)
Hypertension								
Non-Hispanic white	714	1.3	2.7	2.0	0.8	0.6	2.0	4.15 (3.24–5.31)
African American	602	8.9	12.8	11.9	5.8	4.4	8.4	2.92 (2.16–3.95)
Hispanic	91	1.4	1.4	2.3	1.0	0.5	0.8	2.61 (0.87–7.85)
All other diseases								
Non-Hispanic white	32,114	60.6	137.6	83.6	41.1	35.8	101.8	3.85 (3.76–3.93)
African American	7,790	111.4	178.1	144.5	59.7	61.9	116.2	2.88 (2.73–3.03)
Hispanic	3,657	51.2	50.5	72.8	34.9	33.9	16.6	1.49 (1.34–1.65)

Note: Causes of death are in descending rank order according to death rates for all races/ethnicities combined in 2001.

Appendix A. Continued

	Death rate					<12 vs 16+ years education	
Women	**Overall**	**<12**	**12**	**13–15**	**16+**	**Absolute difference**	**RR (95% CI)**
137,721	247.3	539.5	321.6	175.5	147.4	392.1	3.66 (3.64–3.69)
38,356	470.9	577.6	634.8	318.2	318.7	259.0	1.81 (1.79–1.83)
12,599	186.7	178.2	249.8	147.0	131.1	47.1	1.36 (1.31–1.41)
55,516	98.2	154.8	123.7	73.5	72.8	82.0	2.13 (2.10–2.16)
10,535	131.2	123.1	174.2	97.9	117.0	6.1	1.05 (1.02–1.08)
4,257	65.1	55.6	89.2	61.5	58.1	−2.5	0.96 (0.89–1.03)
21,719	38.3	96.0	50.6	24.9	17.5	78.5	5.48 (5.30–5.67)
8,319	103.7	124.1	140.2	70.7	64.4	59.6	1.93 (1.85–2.01)
1,718	27.3	27.0	35.1	19.9	16.0	11.0	1.68 (1.43–1.99)
8,951	17.3	46.2	25.1	12.8	8.9	37.3	5.19 (4.87–5.53)
1,730	20.2	31.6	26.6	13.8	10.8	20.8	2.92 (2.48–3.44)
1,028	12.9	12.9	17.6	9.7	7.2	5.7	1.80 (1.39–2.32)
3,696	7.1	13.6	9.2	5.7	5.3	8.3	2.56 (2.30–2.86)
236	2.7	3.1	3.1	2.4	2.7	0.4	1.14 (0.74–1.77)
171	2.0	1.2	3.0	2.0	2.3	−1.1	0.53 (0.31–0.90)
4,741	8.4	18.6	11.0	6.1	4.5	14.1	4.14 (3.77–4.54)
2,163	26.8	32.4	36.6	18.8	15.6	16.8	2.08 (1.83–2.37)
636	9.7	11.0	10.7	6.4	6.3	4.6	1.73 (1.29–2.33)
4,315	7.6	19.3	10.1	5.2	3.3	16.0	5.90 (5.32–6.53)
1,865	23.4	29.9	31.6	14.8	11.5	18.4	2.60 (2.24–3.00)
707	11.4	13.3	12.7	6.4	5.8	7.5	2.28 (1.67–3.12)
3,390	6.2	15.6	8.5	4.6	2.9	12.7	5.38 (4.78–6.05)
590	7.2	12.5	8.9	4.6	3.8	8.6	3.26 (2.42–4.38)
437	6.6	7.1	9.8	2.9	2.8	4.4	2.59 (1.62–4.13)
5,978	10.4	34.1	12.7	5.7	3.0	31.1	11.4 (10.3–12.5)
865	10.7	14.5	14.6	6.7	5.6	8.9	2.61 (2.05–3.31)
220	3.5	2.9	6.1	2.2	1.8	1.1	1.63 (0.88–3.00)
536	1.1	5.4	1.8	0.5	0.1	5.2	38.0 (24.3–59.4)
2,021	23.3	49.7	34.7	9.3	6.5	43.1	7.62 (6.28–9.26)
359	4.6	4.6	7.7	2.2	1.3	3.2	3.42 (1.86–6.28)
1,156	2.3	7.1	3.5	1.5	1.1	6.0	6.47 (5.33–7.86)
760	8.6	17.3	11.6	5.0	3.5	13.9	5.01 (3.78–6.65)
261	2.9	3.5	3.7	1.5	1.8	1.7	1.94 (1.14–3.29)
1,682	3.0	8.0	3.8	1.9	1.5	6.5	5.29 (4.48–6.24)
771	9.6	13.9	12.7	5.8	5.3	8.6	2.6 (2.03–3.34)
146	2.2	2.3	3.1	1.2	1.0	1.3	2.26 (1.01–5.05)
1,309	2.3	6.3	3.1	1.3	1.0	5.3	6.16 (5.07–7.47)
937	11.7	14.2	17.0	6.1	7.0	7.3	2.05 (1.65–2.54)
203	3.1	2.9	4.7	2.8	1.2	1.7	2.47 (1.24–4.91)
1,539	2.8	8.9	3.6	1.8	1.1	7.7	7.72 (6.44–9.25)
421	5.1	6.7	7.2	3.4	3.1	3.6	2.15 (1.51–3.05)
136	2.1	2.0	3.2	1.4	0.9	1.0	2.10 (0.89–4.96)
641	1.2	4.5	1.5	0.9	0.3	4.2	14.2 (10.3–19.5)
211	2.6	3.8	3.6	1.6	1.0	2.8	3.86 (2.13–7.02)
164	2.5	2.2	4.2	1.7	0.8	1.3	2.60 (1.05–6.47)
509	0.9	2.6	1.1	0.6	0.4	2.2	7.34 (5.24–10.3)
474	5.9	8.0	7.5	3.9	4.7	3.2	1.68 (1.26–2.24)
73	1.2	1.4	1.7	0.7			
22,043	40.2	98.6	52.3	28.5	23.6	75.0	4.18 (4.04–4.32)
6,458	78.0	92.8	104.8	53.3	56.1	36.7	1.65 (1.56–1.75)
2,083	29.4	28.3	37.3	24.4	23.7	4.7	1.20 (1.04–1.37)

Appendix B

Age-standardized death rates among persons aged 25–64 years by cause, gender, race, and education, 2001. See following figures B1–B4.

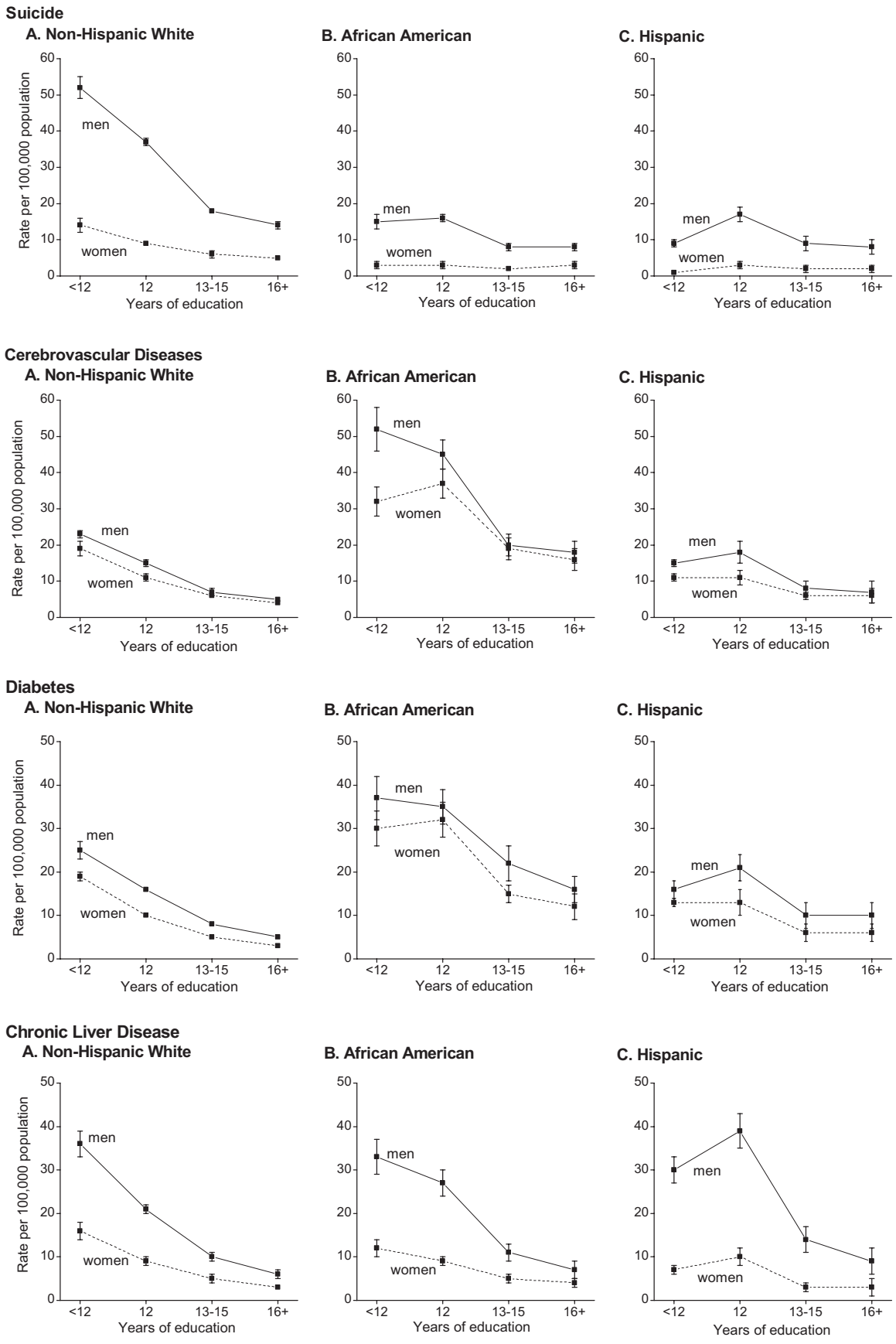
Suicide
A. Non-Hispanic White
B. African American
C. Hispanic
Cerebrovascular Diseases
A. Non-Hispanic White
B. African American
C. Hispanic
Diabetes
A. Non-Hispanic White
B. African American
C. Hispanic
Chronic Liver Disease
A. Non-Hispanic White
B. African American
C. Hispanic
Rate per 100,000 population
Years of education
<12
12
13-15
16+
men
women

Figure B1

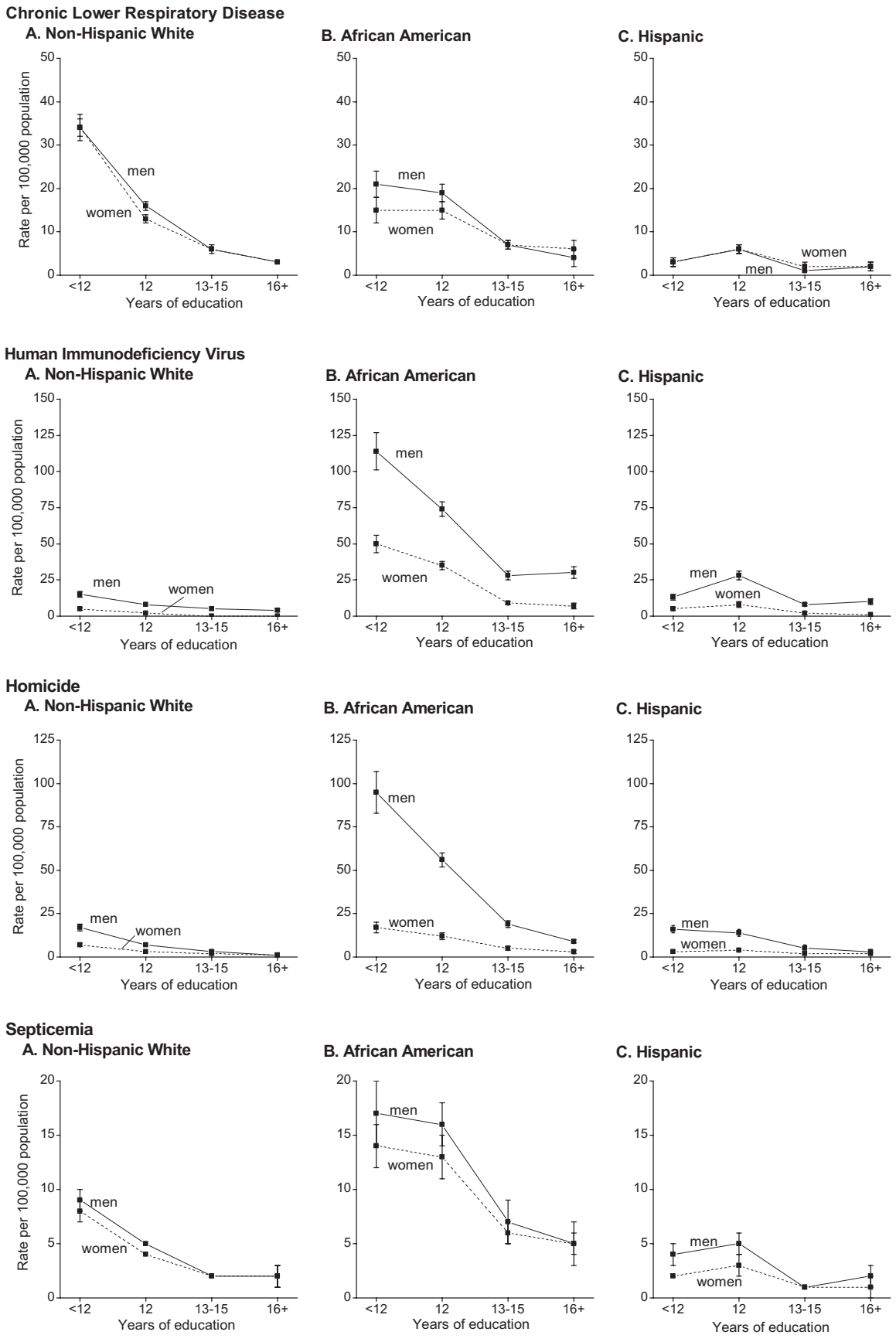
Chronic Lower Respiratory Disease
A. Non-Hispanic White
B. African American
C. Hispanic
Rate per 100,000 population
Years of education
<12
12
13-15
16+
men
women
Human Immunodeficiency Virus
A. Non-Hispanic White
B. African American
C. Hispanic
Homicide
A. Non-Hispanic White
B. African American
C. Hispanic
Septicemia
A. Non-Hispanic White
B. African American
C. Hispanic

Figure B2

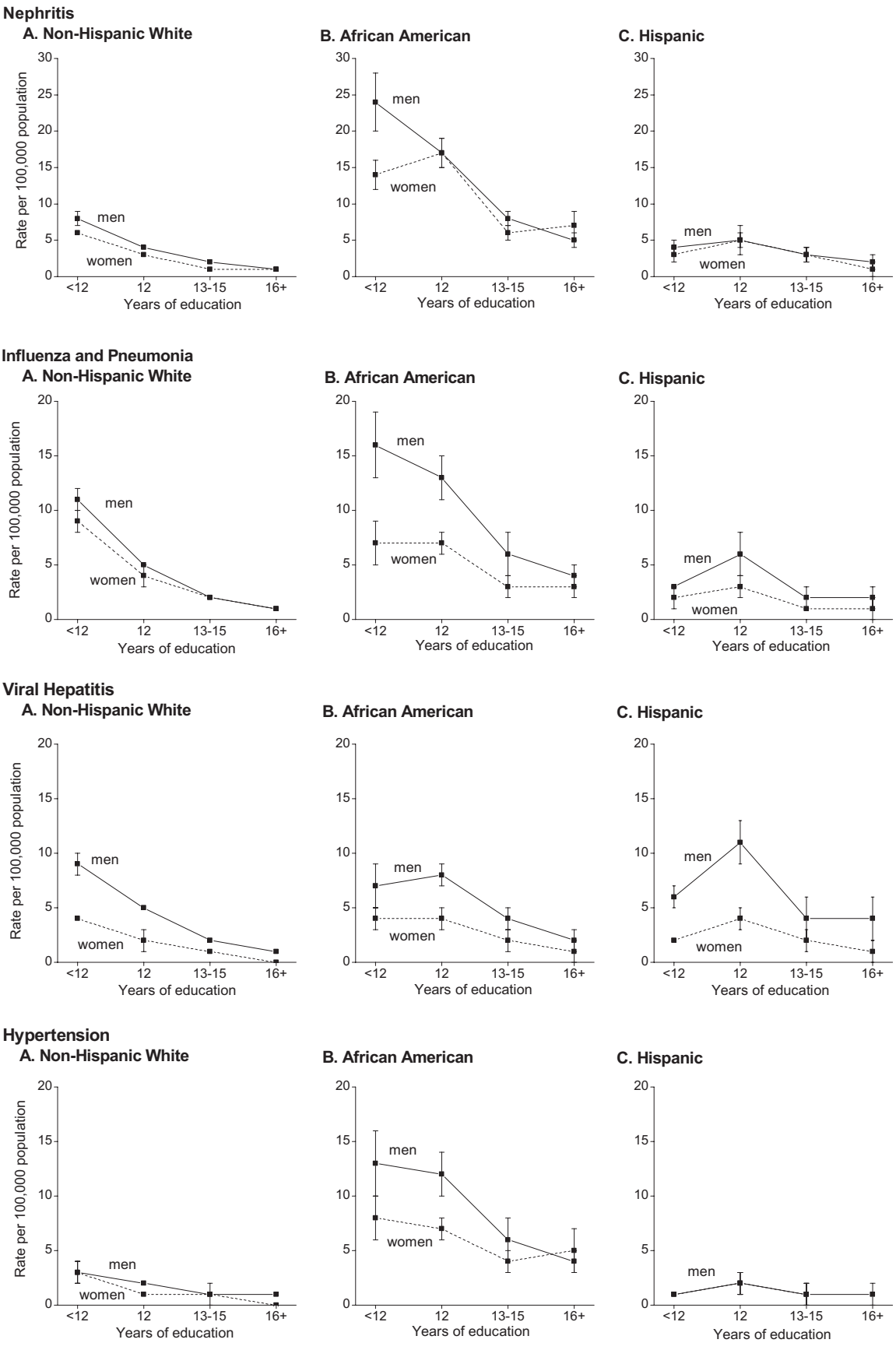
Nephritis
A. Non-Hispanic White
B. African American
C. Hispanic
Influenza and Pneumonia
A. Non-Hispanic White
B. African American
C. Hispanic
Viral Hepatitis
A. Non-Hispanic White
B. African American
C. Hispanic
Hypertension
A. Non-Hispanic White
B. African American
C. Hispanic
Rate per 100,000 population
men
women
<12
12
13-15
16+
Years of education

Figure B3

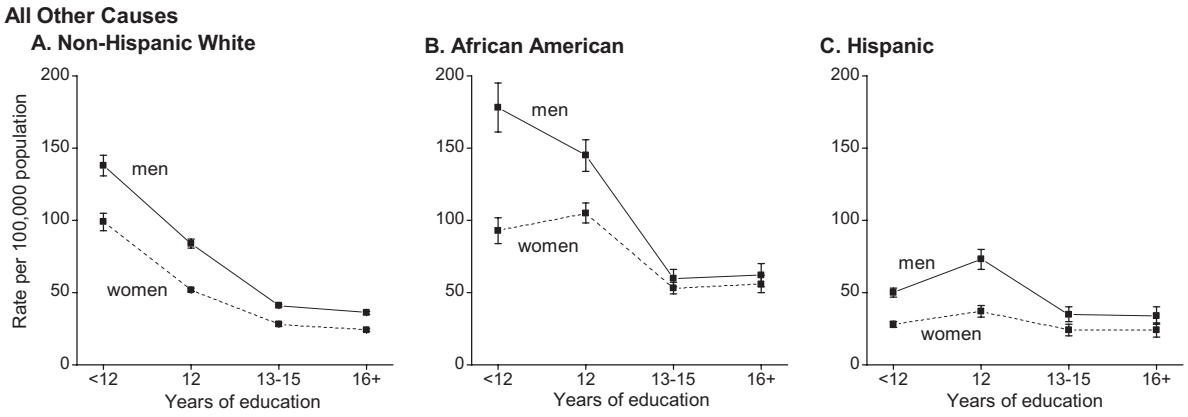
All Other Causes
A. Non-Hispanic White
B. African American
C. Hispanic
Rate per 100,000 population
200
150
100
50
0
men
women
<12
12
13-15
16+
Years of education

Figure B4