Untangling Differences in Cancer Mortality Rates: A Closer Look at Race and Education

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In this issue of the Journal, Albano et al. (1) draw attention to the association between education and cancer mortality overall and for the most common sites among white men and women and among black men and women. Their effort to cull the information on educational level from death certificates adds to the wealth of descriptive data on racial disparities in cancer mortality in the United States. However, the authors are not able to address with confidence a question that many readers will ask: do differences in education explain racial differences in cancer mortality?

Albano et al. (1) show age-adjusted cancer mortality rates by years of formal education within strata that are defined by sex and race for individuals aged 25–64 years using information from death certificates collected in 47 of the 50 states and the District of Columbia for the year 2001. These rates are broadly representative of those for individuals younger than 65 years in the US population. The age restriction excludes deaths in older people, which, for example, constitute more than 90% of deaths from prostate cancer (2). Two unrealistic assumptions are required to extrapolate from the data presented by Albano et al. (1) to a conclusion that education level explains some fraction of the difference in cancer mortality rates between blacks and whites: first, that we can estimate the effect of race on educational achievement, and second, that we can estimate the effect of increasing a child’s educational level on his or her subsequent risk of death from cancer. Estimating these effects is challenging because educational level both reflects and affects personal and family income in childhood and adulthood, health insurance coverage and the use of preventive measures, early detection of cancer and medical care, occupational choices, and behavioral, occupational, and environmental factors—all of which have an impact on mortality.

How might comparisons of education-, sex-, and race-specific cancer mortality rates obtained from vital statistics records improve health? Unequal mortality rates between groups can sometimes provide hints about where a successful public health intervention might have the greatest potential impact. The extra detail about educational level provided in the study by Albano et al. (1) might help in the design of more intensive attempts at reducing cancer
incidence and mortality rates that are targeted at specific subsets of the population. For example, Albano et al. (1) reported that mortality rates for lung cancer were strikingly higher in less educated men than in more educated men, irrespective of race (differences in annual mortality rates were approximately 45 per 100000 persons in blacks and in whites), but the differences were less extreme in women (13 and 23 per 100000 persons in blacks and whites, respectively). These observations suggest but do not prove that an antismoking campaign that targets less educated men may be a better public health investment than one that targets less educated women. Additional data are needed to specify the target population in which a smoking prevention effort, if successful, can have the greatest impact on lung cancer mortality rates. The decision about the choice of target population should consider differences in mortality (and rates of other health outcomes) by age, race, sex, and smoking status across various education levels, as well as the program’s reach, effectiveness, and per-person cost in the proposed target populations.

The cancer mortality rates presented by Albano et al. (1) are summarized over age, place of residence, and time period of education. Age-specific mortality data could provide some perspective on the effect of screening and medical care on differences in cancer mortality in the United States by comparing rates in groups that are younger than 65 years with rates in those older than 65 years, for whom access to medical care is greatly expanded. In addition, recent cancer mortality statistics are dominated by older people whose schooling was complete decades ago. Any causal effect of education received in the 1940s on cancer mortality now might not hold for contemporary education and cancer mortality in 50 years. Furthermore, the interpretation of associations between smoking or any of the variables in the 2000 National Health Interview Study and cancer mortality in 2001 need to consider earlier changes in behavior and the possible lag between exposure to a risk factor or use of screening and mortality. The apparent effect of reduced hormone use beginning in 2000 on breast cancer incidence after 2002 may be the exceptional example of a change in behavior that quickly affected incidence rates (3–5).

Information from analytic studies can help in understanding the source of differences seen in descriptive data. According to Surveillance, Epidemiology, and End Results data, the difference in prostate cancer incidence rates between blacks and whites is 95 (i.e., 256 – 161) per 100000 men per year (6). However, it is unclear how much of this difference, or what fraction of these deaths, is amenable to any available public health intervention. For example, Amundadottir et al. (7) recently reported that 13% of men of European ancestry and 30% of African American men carry at least one variant of allele –8 of the microsatellite DG8573 on chromosome 8q24 that confers an odds ratio of 1.62 for prostate cancer. An excess relative risk of 0.62 in men who carry at least one copy constitutes 8% of the incidence (age-adjusted incidence of 161 per 100000 persons per year for 2000–2004) in white men and 19% of the incidence (256 per 100000 persons) in black men and implies that among men who carry no copies of the variant, the overall age-adjusted mortality difference between blacks and whites drops to 59 (207 [(1 – 0.19) × 256] minus 148 [(1 – 0.08) ×161]). Identification of additional alleles that affect prostate cancer risk may lead us to perceive the unexplained racial differences as being greater or lesser than we do now.

Reducing health disparities is only an intermediate objective. The primary goal is to prevent illness and death in people in all populations, regardless of age, race, sex, and education level. Even if race has little biologic meaning (8), ignoring race in epidemiologic studies can result in unjustified complacency and missed opportunities to improve public health (9). More generally, a careful combination of descriptive and analytic epidemiology can identify differences in morbidity and mortality that are associated with race, educational level, and other measures of socioeconomic status and thereby may eventually lead to improved public health.

References

(6) SEER Fast Stats Results. SEER Age-Adjusted Rates & 95% CIs. Available at: http://seer.cancer.gov/cgi-bin/cq-submit?dir=seer2004&db=3 &rpt=TAB&sel=%5e0%5e%5e2%5e0%5e1%5e2%5e5%5e6%5e7%5e8%5e9%5e10%5e11%5e12%5e13%5e14%5e15%5e16%5e17%5e2&x=Starting%20Age&y=Statistic%20type&dec=3&x=SEER%20registry%5e0%5e1%5e2%5e3%5e4%5e5%5e6%5e7%5e8%5e9%5e10%5e11%5e12%5e13%5e14%5e15%5e16%5e17%5e18%5e19%5e20%5e%5e&z=Race%5e1%5e2%5e3%5e4%5e5%5e6%5e7%5e8%5e9%5e10%5e11%5e12%5e13%5e14%5e15%5e16%5e17%5e18%5e19%5e20%5e%5e&dec=2&title=Probability+of+Dying+from+Cancer++by+Race,++Males++SEER+17++Registries+for+2002–2004+%3B+template=faststats. [Last accessed: August 24, 2007.]
(6) SEER Fast Stats Results. SEER Age-Adjusted Rates & 95% CIs. Available at: http://seer.cancer.gov/cgi-bin/cq-submit?dir=seer2004&db=3