Trends in the Education-Mortality Gradient among Hispanics in the U.S.: Same Old Story or a Different Tune?

Jason Thomas & Jonathan Gonzalez
Pennsylvania State University

Introduction

It has been well established that people with higher socioeconomic status (SES) have better outcomes across numerous dimensions of health (Berkman and Kawachi 2000). Higher education, in particular, has been linked to lower mortality (Hummer and Lariscy 2011), and recent investigations show increasing disparities over the past few decades among non-Hispanic blacks and whites (Masters, Hummer, and Powers 2012; Meara, Richards, and Cutler 2008). However, very little work has been done to document how education differentials in mortality have evolved over time among Hispanics. A steepening of the education-mortality gradient within the Hispanic population would represent a salient source of socioeconomic inequality for a growing segment of the total population, and would also suggest that similar processes may be operating across different racial and ethnic groups. Even less work has been done to link changes in health behaviors and risk factors to changes in the education gradient in mortality for Hispanics. This question is particularly of interest given the rise in obesity in the United States (World Health Organization 2011) and socioeconomic differences in health behaviors (Pampel, Krueger, and Denney 2010), but it is difficult to make predictions given the paucity of evidence concerning changes in education differentials in health behavior and risk factors (such as smoking and obesity) over time among Hispanics.

The current study has two questions. First, is the education gradient in mortality changing over time for the Hispanic population in the U.S.? While the gradient has steepened in

recent decades among non-Hispanic whites and blacks, previous work suggests qualitative ethnic differences in the relationship between health and education (Goldman, Kimbro, Turra, and Pebley 2006). Thus, our work in this direction is primarily descriptive. Second, how do obesity and smoking contribute to changes (or stability) in the education-mortality gradient? While the existing evidence suggests that health behaviors and risk factors are associated with socioeconomic status among Hispanics (Morales, Lara, Kington, Valdez, and Escarce 2002), it is the *change* in educational differences that will impact changes in the gradient. Thus, our analysis will focus on linking changes in the education-specific risk profiles of the Hispanic population to educational disparities in mortality.

Methods

We will be using data from the National Health Interview Survey-Linked Mortality Files (NHIS-LMF). The NHIS is a nationally representative household survey of the civilian non-institutionalized population of the United States .The NHIS-LMF includes demographic and socioeconomic variables, plus mortality follow-up through a linkage of the cross-sectional waves of the NHIS to the National Death Index. We will analyze information on mortality occurring between 1986 and 2006, and hope to condition our analyses on age, gender, education, ethnicity, and nativity status (the limited number of observations on Hispanics in the NHIS will primarily dictate the coding and inclusion of covariates into our analysis). In our analysis of smoking status – never smoked, former smoker, and current smoker – information is available for the years 1990-95, and 1997-2003; whereas, information on body mass index (BMI) is available for the full range of years. BMI will be used to create three categories: underweight/normal (BMI<25), overweight (25≤BMI<30), and obese (30≤BMI).

To address changes in the education-mortality gradient over time, we will adopt a descriptive approach that consists of plotting mortality rates by education-gender groups for different birth cohorts as they age. This strategy is partially due to the limited number of observations available in the NHIS, but it is also informed by recent work highlighting the importance of cohort differences in changes in the education-mortality gradient for other racial and ethnic groups (Masters, Hummer, and Powers 2012). We will describe differences in the mortality profiles by education, and focus on how the patterns changes across cohorts.

To assess the influence of smoking and obesity on the education-mortality gradient, we will begin by estimating two Cox proportional hazard models for mortality that include education, gender, age groups, Smoking status, and BMI categories (as well as nativity if sample size allows – again, sample size will primarily dictate our ability to stratify the analysis across important covariates). The first model will be restricted to cases that or exposed to the risk of mortality from 1986 to 1996, and the second will be restricted to the person-years lived between 1997 and 2006. We will then use a Oaxaca-Blinder decomposition to assess the influence of changes in the behavioral risks of the Hispanic population on the observed changes in the education-mortality gradient. This approach, used in previous work by Cutler et al. (2011), begins with the following hazard models

$$\text{mortality}_{p1} = \exp(\beta_{p1} * \text{education}_{p1} + \gamma_{p1} * \text{BMI}_{p1} + \theta_{t1} * \text{Smoking}_{p1} + \lambda_{p1} * \text{covariates}_{p1})$$

$$\text{mortality}_{p2} = \exp(\beta_{p2} * \text{education}_{p2} + \gamma_{p2} * \text{BMI}_{p2} + \theta_{t1} * \text{Smoking}_{p2} + \lambda_{p2} * \text{covariates}_{p2})$$

for period 1 (p1 = 1986-1996) and period 2 (p2 = 1997-2006). If we take the coefficients from the model for period 1 and combine them with the smoking and BMI covariates from period 2

(and the remaining covariates from period 1), we can calculate a counterfactual education-mortality gradient that would occur if only the risk factors (i.e., smoking and BMI) had changed. This can be expressed as:

$$\text{mortality}_{cf} = \exp(\beta_{p1} * \text{education}_{p1} + \gamma_{p1} * \text{BMI}_{p2} + \theta_{t1} * \text{Smoking}_{p2} + \lambda_{p1} * \text{covariates}_{p1}).$$

We can compare this counterfactual education-mortality gradient (that would arise if only the risk factors changed) to the observed education-mortality gradient to assess the contribution of changes in the risk factors. Other counterfactual gradients will also be calculated to assess the contribution of changes in the returns to education (or changes in the returns to smoking/BMI) to the changes in the gradient.

The two pieces of the analysis proposed here will not only shed light on recent mortality trends among Hispanics, but will help us understand how the trends are related to changes in two important risk factors, obesity and smoking.

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