

*Macro Level Influences of Income on Individual Mortality Risk:
An HLM Analysis*

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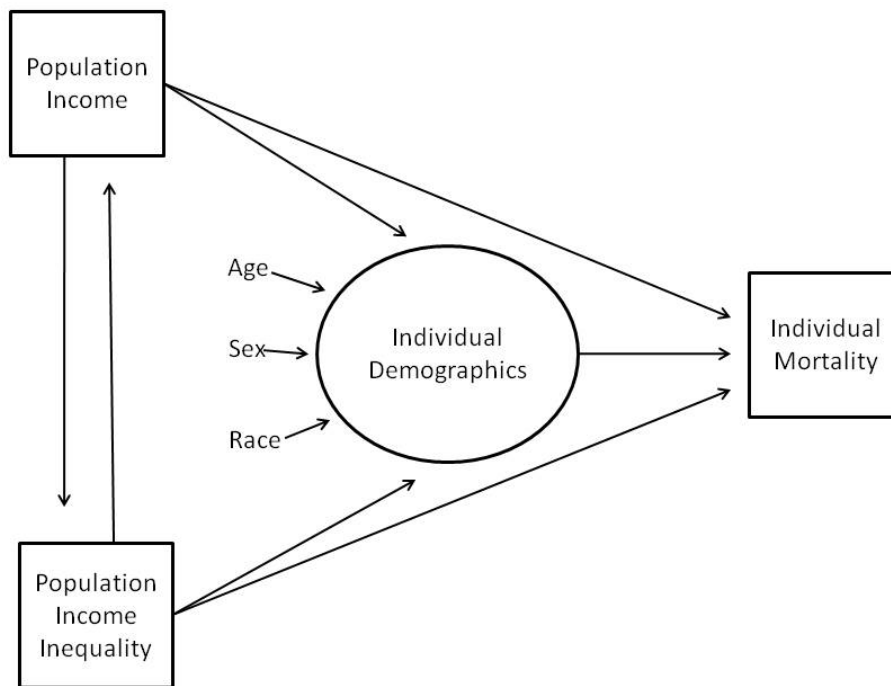
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There is a long tradition of studying the effects of income on personal mortality risk (Schnittker 2004, Adler and Newman 2002, House, Kessler, and Herzog 1990). A clear gradient is established documenting the advantages of individuals with high levels of socioeconomic status in regards to disability (Maddox and Clark 1992), morbidity (Ross and Mirowsky 1999), and mortality (Hummer, Rogers and Eberstein 1998; Christenson and Johnson 1995). Another recent research trajectory assesses the ecological relationship between income inequality and mortality at the state level (Muller 2002, Kawachi et al. 1997), county level (James and Cossman 2006, Franzini, Ribble, and Spears 2001) and across Metropolitan Statistical Areas (Shi and Starfield 2001, Lynch et al. 1998). There are several explanations linking population level income inequality to mortality, including a breakdown of social cohesion (Kawachi and Kennedy 1999), lack of investment in societal resources and institutions (Kawachi and Kennedy 1999), underinvestment in human resources (Smith 1996), and a reflection of individual level income and health (Lynch et al. 2000).

The effect of ecological-level income, as opposed to income inequality, on individual health is explored less frequently and never in conjunction with income inequality, as far as we know. Though contextual effects have been examined in the relationship between income and mortality (Lochner, Kawachi, Brennan and Buka, 2005, for example), it was for a small geographic area

(Chicago). It is likely that similar explanatory pathways to those introduced previously are useful for connecting population level income and mortality. That is, the degree of income and wealth in a community determines the quality and quantity of investment in health resources to which individuals have available. Given the sub-state variations found in both mortality (James and Cossman 2006) and income inequality (Kaplan et al. 1996), previous research calls for a county-level analysis of the relationship between an individual's personal mortality risk and the context of their community's income and income inequality. We link individual mortality data to county-level information on income and income inequality to determine the importance of one's economic environment on risk of death.

Two sources of data are utilized in the study. Individual data from the Compressed Mortality File (CMF) are linked with county-level Area Resource File data and employed to run HLM models. The CMF is maintained by the National Center for Health Statistics and is a controlled access database that documents the mortality history of the United States by county (Centers for Disease Control and Prevention 2009). A record of each death by year, county of residence, race, gender, age, and cause of death on all individuals who died from 1968 to 2006 is provided (Centers for Disease Control and Prevention 2009). County-level measures of income and income inequality will be calculated using US Census Bureau data. We use hierarchical linear modeling to assess the effects of county-level income and income inequality on individual mortality risk. Our model accounts for the direct effects of individual demographics on mortality while simultaneously examining direct and indirect effects of contextual level income measures on individual demographics and mortality. The figure that follows illustrates a graphic interpretation of the conceptual model.



Preliminary results indicate that the context of income, beyond individual demographics, is important, both directly and indirectly. Therefore, context needs to be taken into account in individual studies of mortality. Hierarchical linear modeling provides a suitable outlet for assessing contextual relationships.

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