

Published in final edited form as:

*J Consum Aff.* 2005 April ; 39(1): 148–172.

## Unequal Effects of Elders' Health Problems on Wealth Depletion across Race and Ethnicity

**Hyungsoo Kim**

*Hyungsoo Kim is an assistant professor in the Department of Family Studies, The University of Kentucky, 315 Funkhouser Building, Lexington, KY (hkim3@uky.edu).*

The authors thank the Georgia Gerontology Consortium Seed Grant for funding and the faculty of the Department of Housing and Consumer Economics at the University of Georgia for their helpful comments.

American Council on Consumer Interests

1. Race and ethnicity are often used interchangeably, despite a distinct difference in meaning. The term ethnic is derived from the Greek ethnikos, meaning race or nation. A race is a group of people divided according to biological homogeneity such as skin color or physical features (House and Williams 2000), language, culture, or nationality (Yankauer 1987). Later, the word “ethnic” was applied to a group of more recent immigrants from Latin American countries, and then “Hispanic” acquired the same meaning (Yankauer 1987). Even though some Hispanics are biologically similar to Europeans, they have different socioeconomic backgrounds. Many researchers use separate categories of African American, white, and Hispanic (Chilton and Sutton 1986), while the Census differentiates race and Hispanic origin as two separate and distinct concepts (U.S. Census Bureau 2003a). In this study, we compare African Americans and Hispanics with non-Hispanic whites (whites), as African Americans and Hispanics are often identified as racial/ethnic minorities.

2. According to the U.S. Census Bureau (2001), approximately 17% of men over the age of 65 are employed, and the labor force participation rates of men and women aged 75–79 decrease to 8.9% and 5.1%, respectively.

3. Longitudinal data tend to lose households or respondents from the baseline sample over time. Respondents drop out for a variety of reasons: they decline to be interviewed, are impossible to contact, move into a nursing home, or die. This attrition may lead to biased estimates (Falaris and Peters 1998; Lillard and Panis 1998). The attrition rate of our sample was 26% over the five-year period. In order to investigate whether this attrition affects the results of our study, we conducted a selection bias test for attrition using Heckman's selection procedure. This result indicates that the attrition does not significantly influence the results of this study (available upon request). These results are consistent with Falaris and Peters (1998), who used the Panel Study of Income Dynamics and National Longitudinal Surveys of Labor Market Experience and found no evidence of an attrition effect.

4. We include housing equity in calculating net wealth because housing equity is one of the major sources of household assets. As Smith (1997) points out, home equity comprises 65% of net worth for African American and Hispanic elders and 40% for white elders. With limited financial wealth, elders may be more likely to draw on home equity for their health care services through home equity lines of credit.

5. Several measures of chronic conditions can be used, including a simple count of all health conditions, a set of dummy variables for each condition, and separate counts of serious and nonserious conditions. Each measure has its own pros and cons, and Ferraro and Wilmoth (2000) compared the advantages and disadvantages of different measures. These researchers argue for differentiating the severity of conditions and capturing health status as a set of binary variables. Dividing conditions into two groups avoids the problem of inadequate statistical power associated with the inclusion of a set of dummy variables for every condition and provides more insight compared to a simple count variable. We adopt the recommended measure in this study.

6. The life cycle theory of savings provides an explanation of the use of transitory income. The permanent income and life cycle theories of consumer behavior define the measured (current) income ( $Y$ ) as consisting of permanent ( $Y_p$ ) and transitory ( $Y_t$ ) components, that is,

$$Y = Y_p + Y_t$$

Given that permanent components do not change over time, the current incomes in the first and second time period can be expressed as

$$Y_1 = Y_p + Y_{t1}$$

$$Y_2 = Y_p + Y_{t2}$$

Subtracting  $Y_1$  from  $Y_2$  leads to  $\Delta Y = \Delta Y^A$ , where  $\Delta Y = Y_2 - Y_1$  and  $\Delta Y_t = Y_{t2} - Y_{t1}$ . Obviously, change in current income signifies a change in transitory income. Considering the definition of transitory income as not planned but accidental, a change in transitory income reflects changes in elders' income from unexpectedly high dividends and capital gains or losses, which influence wealth depletion among elders. We conducted an additional estimation using the measured income change instead of the transitory income change. The results were very similar to the results based on transitory income change as described in this paper.

7. The HRS/AHEAD is one of the most highly regarded data sets in terms of quality. However, income and wealth are very private information that many people are not willing to provide. Therefore, for missing observations, imputation is often used. Although imputation is widely used, it is important to control for the potential impact.

**Jinkook Lee**

*Jinkook Lee is a professor in the Department of Consumer Sciences, Ohio State University, 1787 Neil Avenue, Columbus, OH (lee.42@osu.edu).*

**Abstract**

We investigate the impact of health on wealth depletion of African American, Hispanic, and non-Hispanic white elders. Using the data from 4,464 elderly households that participated in both the 1993 Asset and Health Dynamics of the Oldest Old and the 1998 Health and Retirement Study, we find that health problems contribute to wealth depletion differently across elders in different racial and ethnic groups. We draw policy implications from the findings regarding ways to help consumers protect their financial security from health shocks in later life.

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As the health of the average American has improved over the past decade, some populations have continued to suffer a disproportionate burden of disease (Feinstein 1993; House and Williams 2000; NCMHD 2001; Oliver and Shapiro 2001; Williams 2001). In fact, racial and ethnic disparities<sup>1</sup> in health are well-known facts, and such disparities in health status have raised serious concerns among policy makers, academicians, and the public. In 2000, the Congress enacted the Minority Health and Health Disparities Research and Education Act (Public Law 106-525).

Racial and ethnic minorities have lower income and wealth than non-Hispanic whites (hereafter whites). According to Oliver and Shapiro (2001), the median household incomes for African Americans and Hispanics are about 61%–67% of the median for whites. Wealth shows even greater inequality (Oliver and Shapiro 2001): African Americans and Hispanics have median household wealth of \$6,127 and \$6,723, respectively, which is about 12% of the median household wealth of whites (\$52,944).

Racial and ethnic minorities are less healthy and less wealthy than whites, raising a very important, unanswered research question: Do health problems accelerate depletion of wealth differently for racial and ethnic minorities compared to white elders? In this study, we will answer this question by examining the impact of health on wealth depletion across different racial and ethnic groups. This issue is particularly critical, as the population of minority elders continues to increase, and the disparities in health and wealth still persist in the United States. According to the Census Bureau's estimation (2000), minority elders (aged 65 or older) will make up 28.6% (23.4 million) of the U.S. population of elders by 2050, a substantial increase from 13.7% (4.7 million) in 2000. As we develop public policies and programs to protect individual consumers' health and financial security as well as to promote racial and ethnic equity, it is critical to answer the proposed research question. Using the data from 4,464 elderly households that participated in both the 1993 Asset and Health Dynamics of the Oldest Old (AHEAD) and the 1998 Health and Retirement Study (HRS), we empirically examine whether health problems contribute to elders' wealth depletion differently across different racial and ethnic groups.

**LITERATURE REVIEW****Racial and Ethnic Disparities in Health**

Racial and ethnic disparities in health are commonly accepted facts in the United States. Hispanic and African American elders are less healthy than whites by most measures of health status, including mortality, morbidity, self-rated health, and functional status (for a review, see Binstock and George 1995,2001;Smith and Kington 1997b), even though some conflicting evidence exists for specific conditions.

In 2001, life expectancy at birth for African Americans was 72.2 years, 5.5 years shorter than the 77.7 years expected for whites (NCHS 2001). Mortality rate, the number of deaths per 100,000 persons, shows a similar pattern. The age-adjusted mortality rate for African Americans in 2001 was 1,116.5, 32% higher than the rate of 842.9 for whites (Arias 2002). Data on life expectancy of Hispanics are not available, but Erikson, Wilson, and Shannon (1995) estimated life expectancy at birth for Hispanics in 1990 to be 3 years longer than for whites. The mortality rate of Hispanics in 2001 was 802.5, which is 5% lower than that of whites (Arias 2002).

Another measure of health is self-reported general health status, with a scale of excellent, very good, good, fair, and poor. On this measure, whites tend to report better health than African Americans and Hispanics. Specifically, 15.4% of African Americans and 9.0% of Hispanics report fair or poor health, compared to 8.7% of whites (Ren and Amick 1996).

The prevalence of specific diseases and their impact on mortality also vary across racial and ethnic groups (NCMHD 2001; Williams 2001). For example, the prevalence of acquired immunodeficiency syndrome in the Hispanic population is four times that in the white population, and in the African American population, it is nine times that in whites (NCMHD 2001). The mortality rate for African Americans with diabetes is more than twice that for white Americans, and the mortality rates for Hispanics with diabetes are 65% higher than for whites. Heart disease carries a 40% higher mortality rate for African Americans than for whites, and stroke carries an 80% higher mortality; these conditions are less often fatal for Hispanics.

Such racial and ethnic disparities in health are also pervasive among the elderly population (Smith and Kington 1997b). Elo and Preston (1997) find that African American elders have higher mortality than white elders, while Hispanic elders have lower mortality than white elders. Minority elders suffer from different types of chronic diseases compared with white elders. For example, Hispanics and African Americans have greater incidence of high blood pressure, diabetes, and arthritis than white elders (Dunlop et al. 2001; Kington and Smith 1997), while white elders have greater incidence of cancer, lung disease, and heart conditions than racial and ethnic minorities (Schoenbaum and Waidmann 1997).

Differences in functional ability to perform daily activities also exist across elders of different racial and ethnic groups. Activities of daily living and activities of instrumental daily living are two common measures of functional ability. African American elders are more likely to have activities of daily living and activities of instrumental daily living dependencies and to use assistive devices, and they tend to experience greater health decline over time than white elders (Peek et al. 1997). Compared to white elders, Hispanic elders report greater activities of instrumental daily living dependencies and more limitations in lower body movements (Carrasquillo, Lantigua, and Shea 2000; Schoenbaum and Waidmann 1997; Stump et al. 1997).

### **Racial and Ethnic Disparities in Health Care Utilization and Expenditures**

Differences in health across racial and ethnic groups are related to differences in health care utilization and expenditures. On average, Hispanics spend \$1,185 and African Americans spend \$1,059 each year on health care services, whereas whites spend \$1,881 (U.S. Census Bureau 2003b). About 17.3% of whites spend 5% or more of their income on out-of-pocket health care expenditures compared to about 12% of Hispanics and African Americans (Merlis 2002).

Substantial differences in health care utilization exist across racial and ethnic groups. For example, Escarce and Kapur (2003) find that white elders spend more on doctor visits than African Americans and use outpatient hospital services more often than Hispanic elders. On

the other hand, African American and Hispanic elders spend more on home care and medical equipment than white elders.

Several researchers suggest that differences in health insurance holdings are the main cause for differences in health care utilization and the consequent disparities in health status (Blendon et al. 1989; Trevino et al. 1991). Medicare insures most elders aged 65 or older but does not provide complete insurance, failing to cover extended hospital stays and the majority of long-term care needs (McGarry and Schoeni 2001). Supplemental insurance can mitigate this risk by capping out-of-pocket costs, lowering copayments, and covering more services, but the availability of such options varies with individual circumstances. Indeed, racial and ethnic disparities exist in supplementary health insurance coverage: 22.2% of Hispanics and 23.7% of African Americans have supplementary health insurance, compared to 39.3% of whites (NCHS 2003).

### **Racial and Ethnic Disparities in Wealth and Wealth Depletion**

Among Americans aged 65 and older, the average income of minority elders is about 70% of white elders': the median (mean) incomes of Hispanic and African American elders are \$16,870 (\$26,488) and \$16,761 (\$25,758), respectively, compared to \$24,114 (\$36,488) for whites (U.S. Census Bureau 2002). Smith (1997) reports that the average wealth of minority elders is only 15%–18% of white elders': the median (mean) wealth of Hispanic and African American elders is \$15,586 (\$64,091) and \$18,957 (\$50,143), respectively, compared to \$102,823 (\$201,336) for whites.

In addition to income differences, Smith (1999) suggests that differences in savings rates, returns on investments, and inheritances are the major causes of wealth inequality across elders of different racial and ethnic groups. There is some evidence of racial/ethnic differences in savings rates. The savings rate of African Americans (1.7%) is lower than that of Hispanics (2.8%) and whites (2.7%) in households with Individual Development Accounts, which enable low-income families to build assets (Schreiner et al. 2001). However, Gittleman and Wolff (2000) suggest that lower savings rates for African Americans account for only 1% of the wealth gap with whites for a 10-year period, after controlling for income.

Overall differences in rate of return stem from household portfolio choice and asset-specific rates of return. Housing equity accounts for 31%–35% of wealth for whites and 53%–64% of wealth for African Americans (Gittleman and Wolff 2000). Thirty-six percent of whites aged 50 and older have stocks, compared with 9% of African Americans and 7% of Hispanics (Choudhury 2001). Stock ownership is a strong predictor of wealth differences, accounting for 11%–14% of the wealth gap between whites and African Americans (Hurst et al. 1998). The combined effect of portfolio choices and asset-specific rates of return accounts for 1% of the wealth gap for couples and 8% of the gap for singles (Menchik and Jianakoplos 1997). Menchik and Jianakoplos also investigate the causes of wealth inequality of age 58 and age 72 and find that inheritances account for 11.6% of the wealth disparity between African American and white households for singles and 19.3% for couples.

### **The Relationship between Health and Wealth**

It is a well-established fact that health and wealth are strongly associated, although the direction of causality remains controversial (Adams et al. 2003; Smith 1999, 2003). Smith (1998, 1999, 2003) and his colleague (Smith and Kington 1997a, 1997b) have examined the impact of health on economic status and found several pathways from health to wealth. First, health creates needs for health care expenditures. While health insurance coverage determines out-of-pocket expenses, health affects wealth depending on health care consumption. Second, health influences income, both current and future (Coile 2003; Dow et al. 2003; Dwyer

2001; Dwyer and Mitchell 1999; Grossman 1999; Smith 1998, 1999, 2003). Health influences labor force supply, such as working hours and productivity, which not only determines current income but also influences future income via lost promotion opportunities and retirement income.

With aging, health declines and health care becomes a major source of expenses in later life (Deaton and Paxson 1998; Grossman 1972, 1999). Examining the relationship between health and economic status over the life cycle, Smith (1998) finds that the impact of economic status on health is the strongest during childhood and early adulthood while one's health becomes established; with aging, the impact of health on economic status increases, dominating the bilateral relationship. In particular, health shocks (i.e., negative health changes, such as an onset of an acute health event, injury, or accidents) are increasingly common among elders and have a significant effect on wealth (Smith 2003; Smith and Kington 1997a).

Few researchers have attempted to estimate the effect of health problems on wealth depletion of elders looking at those aged 70 and older. Smith (1999) estimates that the onset of new health problems depletes elders' wealth by \$10,481 over a two-year time period. Lee and Kim (2003) report that poor health, both new health events and existing chronic conditions, leads to considerable wealth depletion for elders aged 70 or older. Wu (2003) finds that the effect of the wife's health problems is greater than that of the husband's health problems. He attributes the asymmetry to the fact that general living expenses increase when wives become seriously ill but not when husbands become ill. All these studies focus on general population of the elderly without investigating potential differences in the impact of health on wealth across different racial/ethnic elderly groups.

## MODEL

Based on the literature review, we draw three conclusions: racial and ethnic disparities exist in health, racial and ethnic disparities exist in wealth, and health influences wealth in later life. What we do not know is whether the impact of health on wealth differs across racial and ethnic groups. To answer this question, we develop a conceptual framework for this study based on the life cycle theory of savings.

The life cycle theory of savings posits that individuals accumulate wealth during their working years and spend the accumulated wealth after retirement (Mincer 1979). Under this theory, elders deplete their wealth as they age due to consumption smoothing after retirement. Therefore, wealth depletion itself is not a problem; in fact, it is expected and even planned. The issue is an accelerated rate of wealth depletion, which is neither anticipated nor planned. In particular, unexpected health events and prolonged health problems can impose financial burdens, causing wealth depletion at an accelerated rate, which means that elders run out of money much earlier than they expect or plan.

Although the life cycle theory predicts wealth depletion in later life, it does not tell us the depletion rate per year. Several previous studies have estimated that the average rate of wealth depletion in later life is between 3.2% and 6.0% per year. Using the 1966–1976 National Longitudinal Survey of Older Men, who were aged 45–59 in 1966, Diamond and Hausman (1984) estimate the rate of wealth depletion after retirement at 5.1% per year. Hurd (1987) reports an annual wealth depletion rate of 3.2% for elders aged 59–63 at the baseline, using the 1969–1979 Retirement History Survey. For those aged 75 or older, Hurd (2001) reports a greater wealth depletion rate than in younger-age cohorts, using the 1984 Survey of Income and Program Participation. Hurd also finds that singles deplete wealth faster than married couples: the annual rate of wealth depletion is 6.0% for singles and 3.7% for couples.



While informative, these earlier studies rely on data that are years or decades old. Rapid increases in health care costs could lead to an increase in the rate of wealth depletion. If this is the case, the effect would be most severe among those with poorer health and may be influenced by known racial and ethnic disparities in health and wealth.

Therefore, in this study we estimate the impact of health on wealth depletion of elders, particularly the probability of accelerated wealth depletion. In examining this impact, we differentiate the impact of health status from that of health shocks as suggested by Grossman's (1972) health economics model. That is, we propose that both one's health status or health capital, which represents the stock of health, and health shocks or changes in health accelerate wealth depletion. Further, the impact of health shocks on health care utilization may be different from that of health capital. Therefore, we examine the effects of health capital ( $H_1$ ) and health shock ( $H_2$ ) on wealth depletion.

As the goal of this study is to compare the impact of health on wealth depletion across racial and ethnic groups, we control for other variables that may affect wealth depletion in our estimation. First, we control for determinants of health care expenditures suggested by the behavioral model of health care utilization (Anderson and Newman 1973): health insurance holdings, marital status, and coresidence. Although most elders receive Medicare, significant variation exists in supplementary health insurance holdings. Therefore, we control for supplementary health insurance holdings (HI) in this study. As spouses and coresidents often provide informal care, marital status and coresidence influence wealth depletion (Escarce and Kapur 2003; Wu 2003). Thus, we also control for the impact of marital status (M) and living arrangement (L) in the estimation.

Second, we control for changes in transitory income (DY), private transfers of wealth (T), and wealth change in the previous time period (DW) suggested by the life cycle theory of savings (Lee and Kim 2003). Wealth change in the previous time period captures households' savings or consumption habits. Adverse economic events, such as unemployment or reduced working time, can affect wealth depletion. However, after retirement, most elders' labor force participation tends to be limited.<sup>2</sup> Haider and Loughran (2001) studied elderly workers and found that they are the most educated, wealthiest, and healthiest, but their wages are extremely low, indicating that work is closer to leisure for the majority of them. Given this limited labor force participation and its relative insignificance for the economic status of elders, we do not include adverse economic event variables in our estimation. On the other hand, we do control for the ratio of liquid assets to wealth because liquid assets allow smoother liquidation so that, when facing health care consumption needs, elders with liquid assets might deplete their wealth more quickly than those with nonliquid assets.

Family events such as widowhood, divorce, or marriage may also have a significant impact on wealth depletion. While divorce and marriage are not common in later life, widowhood is common and is an important life event. Feinstein and Ho (2000) find that widowhood is associated with rapid wealth depletion, so we control for widowhood in our estimation. Therefore, we can summarize the proposed impact of health on wealth depletion as follows:

$$WD = f(H_1, H_2, X) \quad 1$$

where WD = wealth depletion,  $H^1$  = health capital,  $H^2$  = health shock, and X = control variables, which include HI (supplementary health insurance holding), M (marital status), C (coresidence), DY (change in transitory income), T (private wealth transfers), DW (wealth change in previous time period), L (liquidity ratio), and WI (widowhood)

We estimate the impact of health on wealth depletion based on this equation (1). As we propose to compare the impact of health across elders of different racial and ethnic groups, we first

conduct stability tests using a likelihood ratio (LR) test. If we find significant differences across race and ethnicity, we need to separately estimate the impact of health on wealth depletion for each racial and ethnic group. That is, we examine whether and how the impact of health,  $H_1$  and  $H_2$ , differs across different racial and ethnic elders using

$$WD_j = \alpha_j H_1 + \beta_j H_2 + \gamma_j X + \epsilon, \quad 2$$

where  $j$  = racial ethnic groups, ranging from 1 to 3 (1 = African Americans, 2 = Hispanics, and 3 = whites),  $\alpha^j$  = the marginal effect of health capital on wealth depletion,  $\beta^j$  = the marginal effect of health shock on wealth depletion,  $\gamma^j$  is a vector of estimable parameters of  $X$ , and  $\epsilon$  = error term.

## METHODS

### Data

We employ data from the 1993 AHEAD and the 1998 HRS commissioned by the National Institute on Aging. The AHEAD is a national panel study of the noninstitutionalized U.S. population aged 70 or older in 1993. The initial 1993 wave was actually conducted during 1993 and 1994 and surveyed 8,221 respondents in 6,047 households, including 6,528 whites, 1,101 African Americans, and 487 Hispanics, of which 58.5% are Mexican American, 17.7% are Cuban, 6% are Puerto Rican, and 17.8% are of another Hispanic background. A second interview was conducted during 1995 and 1996, and the AHEAD panel was merged with the HRS and reinterviewed in 1998. In this study, our sample consists of only the respondents who participated in both the 1993 and 1998 surveys.<sup>3</sup> In the case of married couples, we randomly select only one of the respondents, while retaining information on spouse's health conditions. We eliminate 75 respondents in minority categories other than Hispanic and African American because this group is both small in number and heterogeneous in racial and ethnic background. The final sample used for analysis is 4,464 respondents: 273 Hispanics (6%), 631 African Americans (14.1%), and 3,560 whites (79.5%); of these, 68.3% are single and 31.7% are married.

The AHEAD data provide in-depth information on the economic status of households, including assets and income, as well as comprehensive information about different aspects of health status, including the prevalence of chronic conditions and new health events. With an oversample of racial and ethnic minorities, specifically Hispanics and African Americans, at a rate of 2 to 1 relative to whites, this data set provides sufficient sample sizes to allow racial and ethnic comparisons. Moreover, the longitudinal nature of the data set allows us to estimate the impact of changes in health status on the wealth depletion of elders over time.

## Measures

### Wealth Depletion

We define wealth depletion as the following binary variable: whether a household depleted more than 30% of its net wealth between 1993 and 1998. As previous studies estimate the average rates of wealth depletion in later life as 3.2%–6.0% per year, we employ the cutoff of 30% for five years in order to identify wealth depletion accelerated beyond the average rate. However, the cutoff of 30% is rather arbitrary, and therefore we also estimate other cutoffs, such as 10%, 20%, 40%, and 50%, to ensure the stability of the findings. The results are consistent across different cutoffs, except for the magnitudes of the effects, so we report only the findings using the 30% cutoff (the results using other cutoffs are available upon request). Household net wealth is equal to the total value of all assets minus total debts. Household assets consist of financial and nonfinancial assets, including housing equity,<sup>4</sup> other real estate, vehicles, business equity, individual retirement accounts (IRAs) or Keogh accounts, stocks or

mutual funds, checking, savings or money market funds, certificates of deposit (CDs), government bonds or treasury bills, other bonds, and other assets. Total debts are the sum of all reported debts. We convert all dollar figures for income and net wealth into 1998 dollars, using the current methods version of the Consumer Price Index for all urban consumers.

## Health

The key independent variables of this study are health capital ( $H_1$ ) and health shock ( $H_2$ ). The AHEAD surveys record eight types of chronic conditions that are most common among elders: high blood pressure, diabetes, cancer, lung disease, heart condition, stroke, psychiatric problems including emotional or nervous conditions, and arthritis. In the 1993 interview, respondents were asked if they had been diagnosed with each of these chronic conditions. In the 1998 interview, respondents were asked if they were newly diagnosed with each of these chronic conditions since 1995. For research purposes, these conditions can be categorized into mild and severe based on which conditions are likely to be life threatening and thereby increase the financial burden of elders (Smith 1999; Wallace and Herzog 1995).<sup>5</sup> Severe diseases include diabetes, cancer, lung disease, heart condition, and stroke, while high blood pressure, psychiatric problems, and arthritis are mild chronic diseases. We use the prevalence of mild and severe diseases at the baseline as the proxy measures of health capital ( $H_1$ ) and the incidences of new mild and severe chronic diseases between the interviews as the proxy measures for health shocks ( $H_2$ ).

## Race and Ethnicity

In this study, we propose to investigate potential differences in the impact of health on wealth depletion across elders of different racial and ethnic groups. Based on race and ethnicity survey variables reported by the respondents, we group elders into African Americans, Hispanics, and whites. As mentioned above, the small number of respondents in racial/ethnic groups other than these three is dropped from the analysis.

## Control Variables

We also include the following control variables based on equation (2): HI (supplementary health insurance holding), M (marital status), C (coresidence), DY (change in transitory income), T (private wealth transfers), DW (wealth change in previous time period), L (liquidity ratio), and WI (widowhood). First, for HI, we use a binary variable of supplementary health insurance holding that indicates whether the respondent has additional health insurance, such as Medigap or private insurance (i.e., 1 = has Medigap or private insurance, 0 = does not have it).

While marital status influences individuals' health services utilization and health care expenditures, the inclusion of this variable in estimation is not straightforward due to the data characteristics. Specifically, the AHEAD and HRS data provide health information at individual level but wealth information at household level. Therefore, for couples, both the respondent's and spouse's health can be included, allowing the estimation of the impact of both spouses' health on wealth depletion, while such consideration is not applicable for single households. Therefore, we conduct separate analyses for singles and couples instead of simply including marital status as a control variable.

We include a binary variable of coresidence (C): 1 = living with children or others, 0 = otherwise).

We include the following proxy variable to measure changes in transitory income (DY)<sup>6</sup>: transitory income is first obtained by estimating a model in which income in each period is regressed on age, marital status, education, and area of residence. Predicted values in this



regression can be considered as a proxy for permanent income, and residuals, which are differences between current measured income and predicted value of income, can be considered as a proxy of transitory income (Bhalla 1980). Thus, the changes in transitory income are measured as the differences between residuals in each time period.

We include the following continuous variable for private wealth transfers (T): the total values of transfers and gifts to children and others for the two years before the 1998 interview. Wealth change in the previous time period (DW) is also a continuous variable, which is the change in net wealth during the 12-month period before the 1993 interview. Liquidity ratio (L) is a continuous variable measured as the proportion of financial assets to net worth at the baseline year (1993).

For widowhood (WI), we include a binary variable of whether or not a respondent experienced widowhood during the five-year time period between 1993 and 1998.

Even though wealth data from the AHEAD and HRS are of very high quality, measurement errors still exist. In particular, the amount of wealth for some respondents in the AHEAD is inferred from brackets, and this imputation procedure can lead to incorrect wealth data. In order to assess the impact of possible measurement errors caused by imputation, two imputation dummy variables are added (i.e., Imputation 1993 = 1, if either the amount of assets or debts is imputed in the 1993 data, 0 otherwise; Imputation 1998 = 1, if either the amount of assets or debts is imputed in the 1998 data, 0 otherwise).

## Analysis

We estimate the impact of health on wealth depletion of elders based on equation (2), using maximum likelihood probit estimation. Before performing separate estimations for each racial and ethnic group, we first conduct an LR test to test whether there are differences in both the intercept and parameter coefficients of health conditions across elders of different racial and ethnic groups. The LR test is between the restricted model (excluding race dummy variables and their interaction terms with new chronic conditions) and the unrestricted model (including race dummy variables and their interaction terms). The null hypothesis is that each coefficient of the corresponding interaction term is consistent across the racial and ethnic groups. Based on the result of LR test, we reject this hypothesis ( $\chi^2(6) 19.75$  for singles,  $p = .01$ ;  $\chi^2(6) 14.95$  for couples,  $p = .05$ ). Therefore, separate estimation of each racial/ethnic group is required to provide adequate results for each group. In addition, the results of the LR test indicate that parameter estimates of health shocks are statistically different across racial/ethnic groups (Hispanics vs. Whites and Hispanics vs. African Americans,  $p = .05$ ). Therefore, we present the results of separate analyses for each group of racial and ethnic elders in the following section.

## RESULTS

First, we present descriptive statistics of health and wealth depletion across elders of different racial and ethnic groups. The types of chronic diseases that elders have differ significantly by race and ethnicity (Table 1). In 1993, 74.5% of Hispanic elders and 79.2% of African American elders had mild chronic conditions, compared to 61.2% of white elders. Regarding severe conditions, white elders had a relatively high prevalence of lung disease and cancer compared to Hispanic and African American elders. In contrast, Hispanic and African Americans had a higher prevalence of diabetes than white elders. During the five-year time period from 1993 to 1998, 51.2% of white elders reported new incidence of mild chronic conditions, more than the 39.6% of Hispanic and 42.2% of African American respondents reporting new conditions. On the other hand, the incidence of severe chronic conditions across the five-year period is not significantly different across the racial and ethnic groups, with the exception of lung disease.

We find that the incidence of onset of lung disease is higher for white elders than for Hispanic or African American elders.

We find racial and ethnic disparities in wealth (Table 2), as expected based on the literature review. Among single households, Hispanic and African American elders had median wealth of \$2,088 and \$23,478 in 1993, respectively, which is far less than the median wealth of white elders (\$88,392). During the five-year time period, median wealth increased across all racial and ethnic groups. However, we observe racial and ethnic differences in wealth depletion. More African American (47.9%) and white (49.8%) singles depleted their wealth than Hispanic singles (31.6%). On the other hand, more Hispanic (50.5%) and African American (53.8%) couples depleted their wealth than white couples (44.5%).

The results of the separate estimations are presented in Table 3. As the LR test indicated, we find that differences exist in the impact of health on wealth depletion across racial and ethnic groups. Specifically, for single respondents, we find the following: new severe chronic conditions increase the probability of wealth depletion for African Americans and white elders but do not affect the probability of wealth depletion for Hispanics. Existing severe chronic conditions at the baseline influence the probability of wealth depletion only for white elders, not for Hispanics and African Americans. The impact of mild chronic conditions, both new and existing, is not significant for any racial or ethnic group.

For married respondents, we find the following: onset of a mild chronic condition increases the probability of wealth depletion only for Hispanics

It is worthwhile to address other variables such as health insurance, income change, wealth transfers, wealth changes between 1993 and the preceding year, living arrangements, widowhood, and liquidity ratio. Regarding Medigap and other supplementary private insurance, we find that holding supplementary health insurance decreases the probability of wealth depletion for white couples, while this variable is not significant for couples in other racial and ethnic groups or for singles. Income change during the five-year time period is significantly related to wealth depletion, implying that decreased income during the five-year time period is associated with wealth depletion, consistent with the theory. Wealth transfers to children are significantly associated with wealth depletion only for white elders. This finding can be understood within the context that financial transfers are more frequent among white elders than among other racial and ethnic groups (data not shown), and such transfers are positively associated with higher initial wealth. Changes in wealth between 1993 and the preceding year are insignificant across all racial/ethnic and marital status groups. Living arrangements and widowhood are not associated with wealth depletion for any racial or ethnic group. The liquidity ratio of financial assets to net worth is significantly associated with wealth depletion only for white elders, indicating that higher liquidity increases wealth depletion. This result may reflect the fact that 61% of Hispanics and 54% of African Americans in this sample (data not shown) do not have financial assets, while 84% of white elders have liquid assets. With regard to the impact of imputation, the two binary variables indicating imputation in 1993 and 1998 are significant across all racial/ethnic groups, indicating some measurement errors.

In order to illustrate the differing impact of health shocks on the probability of wealth depletion, we compute predicted probability using the mean values of all other independent variables. Thus, for the discrete change of health shocks caused by new severe conditions (from no occurrence [=0] to the occurrence [=1]),

$$\text{probability change} = \Pr(y = 1 \mid X, x = 1) - \Pr(y = 1 \mid X, x = 0),$$

where  $y = 1$  if wealth depletion happens,  $X$  is the vector of other independent variables, and  $x$  represents a variable for onset of severe chronic conditions.

Without the occurrence of health shocks, the probability of wealth depletion is .27 for Hispanic, .34 for African American, and .28 for white singles. If these respondents develop new severe chronic conditions, the probability of wealth depletion goes up to .47 for African American and .35 for white singles, while the probability for Hispanic singles does not change. That is, a new severe chronic condition increases the probability of wealth depletion by 13% for African Americans and 7% for white singles.

Without the occurrence of health shocks, the probability of wealth depletion is .17 for Hispanic, .29 for African American, and .18 for white couples. If the respondents develop new severe chronic conditions, the probability of wealth depletion goes up to .24 (6% increase) for white couples, while the probability for Hispanic and African American couples does not change. Similarly, onset of a new mild chronic condition increases the probability of wealth depletion by 31% for Hispanic couples, whereas the probabilities for white and African American couples do not change.

## DISCUSSION

To exploit the health data for couples, we estimate the impact of health capital and health shocks separately not only by racial and ethnic group but also by marital status. First, we find that the impact of health capital (i.e., existing health conditions) on wealth depletion differs across race and ethnicity. Whereas having a severe chronic disease at the baseline contributes to the probability of wealth depletion among white singles and Hispanic couples, other racial and ethnic groups of singles and couples are not significantly affected. On the other hand, having a mild chronic disease at the baseline influences the probability for wealth depletion of African American and white couples but not of Hispanic couples. Across all races and ethnicities, having a mild chronic disease at the baseline does not have a significant effect on wealth depletion for single households.

Second, we find that the impact of health shocks (i.e., new health events) differs across race and ethnicity. In examining single elders, we find that health shocks from the onset of severe chronic diseases (e.g., diabetes, cancer, lung disease, heart disease, and stroke) increased the probability of wealth depletion by 14% for African Americans and by 7% for white elders, but they did not affect the probability of wealth depletion of Hispanic elders. That is, elders who suffer new health problems, such as diabetes, cancer, lung disease, heart disease, and stroke, are more likely to deplete 30% or more of their wealth over the five-year period of the study. The different incidence rates of health events and the different levels of initial wealth may cause this racial/ethnic difference. Hispanic elders have both a lower incidence rate for severe health conditions and much less wealth to deplete than African American and white elders. On the other hand, new mild chronic conditions do not influence wealth depletion of single elders across all racial and ethnic groups. This finding indicates that even though many single elders develop new mild chronic conditions such as high blood pressure, they can deal with these conditions by adjusting their consumption without depleting their wealth during the five-year time period.

For couples, we find that the health shock of a new severe chronic disease increases the probability of wealth depletion for whites by 6% but does not influence the probability of wealth depletion for African American and Hispanics. The onset of mild chronic conditions, on the other hand, is significantly associated only with Hispanic couples' wealth depletion (by 31%) but does not influence the probability of wealth depletion for African American and white couples. The difference in the impact of changes in health on wealth depletion between singles and married households can be explained by consumption smoothing. Compared to singles, couples have more room in their budget to accommodate increased health care expenditures

by adjusting other consumption. Thus, the impact of health on wealth depletion is greater for singles than for couples.

The finding that the health shock of new severe chronic diseases increases the probability of wealth depletion only for white elders also indicates that these relatively more wealthy elders tend to utilize their wealth for better health, whereas other groups are more reluctant to utilize their wealth. This finding is thus consistent with the fact that married white couples have more wealth than both white singles and other racial and ethnic couples.

We also find that Hispanic couples deplete their wealth when dealing with the health shock of a new mild disease. This finding suggests that Hispanic couples are also vulnerable to health shocks. Among Hispanic couples, the occurrence of new mild health shocks is significant and also has a significant impact on wealth depletion, suggesting that once exposed to health risk, Hispanic elders are also vulnerable to its financial burden. Although the impact of a new severe chronic condition is insignificant among Hispanic singles, the occurrence of health shocks among this group is very low.

## CONCLUSIONS AND IMPLICATIONS

We examine potential differences in the impact of health on wealth depletion across elders of different racial/ethnic groups during a five-year time period. This study indicates that both existing health conditions and health shocks in later life have different impacts on accelerated wealth depletion across different race and ethnic groups. To the best of our knowledge, this is the first attempt to examine potential racial and ethnic disparities in the impact of health on wealth depletion. From the findings of this study, we draw the following implications: health events in later life can contribute to wealth depletion, and their impact differs across different racial and ethnic groups. This finding indicates that assuming homogenous effects of chronic conditions on all elders leads to significant bias, and it calls for estimating the burden of illness separately for each racial and ethnic group.

Furthermore, even though both Hispanics and African Americans are considered as minorities, the impacts of new severe chronic conditions on wealth depletion are different for the two groups, implying that aggregating them as “minority elders” can be quite problematic. In particular, African Americans are the most vulnerable to wealth depletion once they develop new severe chronic conditions; new severe chronic conditions increased the probability of wealth depletion for African Americans by 14%. More attention is needed for the chronic conditions that African American elders are more likely to experience, such as diabetes; the financial burden associated with such chronic diseases; and health insurance coverage.

Considering that African Americans are less healthy and affluent than white elders, the finding that the impact of health on wealth depletion is greater for African Americans than for other elders is particularly troublesome. African Americans who are less healthy than elders in other racial and ethnic groups are more likely to have existing health problems and have a greater likelihood of developing new health problems. If such health problems occur, African Americans are more likely to deplete their wealth, ultimately losing financial security in later life. Although we find that supplemental health insurance lowers the probability of wealth depletion of white elders, we do not find the same effect for African American elders. This implies that policy makers need to examine the coverage offered by current health insurance, as the prevalence of diseases and health care services utilization patterns vary by race and ethnicity. Thus, health insurance may need to be expanded to cover the health care service frequently demanded by African American elders, or African Americans may need to be encouraged to utilize available services.

In contrast, Hispanic elders demonstrate greater resilience to adverse health conditions, both existing chronic diseases and newly diagnosed health shocks. The finding that health problems have relatively limited impact on wealth depletion of Hispanic elders calls for further attention and additional studies to investigate what causes this difference. Considering that Hispanic elders report poor self-assessed health status, it is possible that they suffer health problems without seeking help from health care professionals. If this is the case, we need to find ways to encourage Hispanic elders to utilize health care services. Another explanation may be informal care provided by family members, as Hispanics tend to receive more help. For example, the coresidence rates for Hispanic men and women are 15.0% and 36.7%, respectively (Federal Interagency Forum on Aging-Related Statistics 2000). These rates are much higher than the rates for white men and women, which are 6% and 14.8%, respectively. As a result, more Hispanics (58%) receive care from their family and friends compared with whites (45%) and blacks (52%) (National Academy on an Aging Society 2000).

One important conclusion that we can draw from this study is that in estimating the financial security of elders, we need to consider the population's racial and ethnic composition. Further, considering the racial and ethnic disparities in health, wealth, and the impact of health on wealth, the financial burdens of illness differ greatly for each racial and ethnic group. When such disparities are not explicitly considered, current forecasts underestimate the financial burden of African American elders and therefore overestimate their financial security. In particular, African American elders are in a worse position in health and wealth status, and the negative impact of health conditions is greater for them than for Hispanic and white elders. Therefore, they face a far greater risk of financial insecurity caused by poor health than any other group. A careful examination of current health insurance policies is needed to lower the impact of poor health on wealth depletion for this group, as African Americans' demands for health care services differ from those of others.

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**TABLE 1**  
Prevalence and New Incidence of Chronic Conditions by Race and Ethnicity (%)

Health Status	Hispanics (N = 273)	African Americans (N = 631)	Whites (N = 3,560)	$\chi^2$
Have chronic diseases in 1993				
Any mild condition	74.5a	79.2b	61.4c	83.1***
High blood pressure	55.6a	65.2b	46.9a	79.3***
Arthritis	44.1a	41.2a	22.7b	142.0***
Psychiatric problems	17.1a	11.0b	11.5b	8.2*
Any severe condition	46.7a	48.7a	51.0a	2.5
Diabetes	19.5a	21.3a	10.1b	71.9***
Cancer	6.8a	10.1a	13.9b	15.2**
Lung disease	9.0a	5.3ab	10.5ac	15.7**
Heart condition	21.9a	24.0a	30.0b	10.7**
Stroke	5.3a	7.8a	7.2a	1.6
New health events during the five-year time period				
Any mild condition	39.6a	42.2a	51.2b	29.5***
High blood pressure	9.1a	9.3a	11.8a	4.6
Arthritis	25.3a	32.7b	41.3c	43.1***
Psychiatric problems	10.7a	8.1b	7.2b	7.0*
Any severe condition	23.3a	25.8a	25.9a	.5
Diabetes	6.3a	5.5a	4.3a	4.3
Cancer	4.1a	5.5a	5.6a	1.2
Lung disease	1.4a	2.7a,b	4.5a,c	6.5*
Heart condition	8.4a	9.6a	9.6a	1.9
Stroke	6.6a	6.3a	6.7a	.8

**Note:** Percentages are weighted. Same superscripts indicate no significant difference between racial and /ethnic groups at  $p < .05$  of Least Square (LS) means tests. For example, any mild conditions in 1993 have a, b, and c, meaning that prevalence of any mild conditions differs among Hispanic, African American, and white elders.

\*  
 $p < .05$

\*\*  
 $p < .01$

\*\*\*  
 $p < .001$ .

**TABLE 2**  
Net Wealth and Wealth Depletion during the Five-Year Time Period across Race and Ethnicity (1998 dollars)

Single Households	Hispanics (N = 204)		African Americans (N = 500)		Whites (N = 2,344)	
Year	1993	1998	1993	1998	1993	1998
Median	2,088	12,000	23,478	19,000	88,392	92,500
Mean	44,913	49,614	49,049	47,823	167,156	235,799
Standard deviation	99,610	108,778	93,370	97,002	305,730	1,132,522
Wealth depletion (%)						
No occurrence	68.3		52.1		50.2	
Occurrence	31.6		47.9		49.8	
Less than 10%	2.5		3.0		5.7	
10%-29%	7.6		7.9		13.2	
30%-49%	6.3		6.9		9.3	
50%-69%	3.2		6.9		6.8	
70%-89%	4.4		6.8		6.0	
90%-100%	7.6		16.4		8.8	
	100%		100%		100%	
Couples	Hispanics (N = 69)		African Americans (N = 131)		Whites (N = 1,216)	
Year	1993	1998	1993	1998	1993	1998
Median	45,200	50,000	53,650	49,000	184,981	201,500
Mean	85,138	84,384	95,954	97,438	319,789	390,350
Standard deviation	133,151	110,833	146,635	165,418	480,002	787,010
Wealth depletion (%)						
No occurrence	49.5		46.2		55.5	
Occurrence	50.5		53.8		44.5	
Less than 10%	3.5		6.0		7.4	
10%-29%	13.9		12.6		13.2	
30%-49%	7.8		10.1		9.4	
50%-69%	7.8		9.6		7.3	
70%-89%	7.0		5.4		3.7	
90%-100%	10.5		10.1		3.5	
	100%		100%		100%	

**Note:** Percentages and means are weighted. No occurrence signifies no change in wealth or wealth accumulation.



**TABLE 3**  
Probit Regression Estimates of Wealth Depletion (Standard Error)

Variable	Hispanics (N = 273)		African Americans (N = 631)		Whites (N = 3,560)	
	Single (N = 204)	Couple (N = 69)	Single (N = 500)	Couple (N = 131)	Single (N = 2,344)	Couple (N = 1,216)
Health capital						
Respondent						
Mild conditions	-.1081 (.2403)	.3111 (.4383)	-.0030 (.1580)	.6557 (.3107)*	.0709 (.0580)	-.0518 (.0875)
Severe conditions	-.1941 (.2082)	.7543 (.4774)	-.0643 (.1191)	-.0709 (.2520)	.1500 (.0554)**	.0830 (.0847)
Spouse						
Mild conditions	—	.1838 (.4638)	—	.1427 (.2664)	—	.1792 (.0868)
Severe conditions	—	.4537 (.5198)	—	-.5510 (.2797)*	—	.0473 (.0861)
Health shocks						
Respondent						
Mild conditions	.2383 (.2149)	1.0760 (.4948)*	.1281 (.1246)	.5048 (.2826)	.0229 (.0563)	-.0683 (.0858)
Severe conditions	-.3307 (.2552)	.5141 (.4776)	.3332 (.1346)*	-.1393 (.2830)	.1658 (.0617)**	.2127 (.0957)*
Spouse						
Mild conditions	—	-.7225 (.4741)	—	-.3919 (.2629)	—	.0898 (.0864)
Severe conditions	—	-.1163 (.5281)	—	-.1088 (.2923)	—	.0414 (.0950)
Control variables						
Income changes	.0034 (.0073)	-.0395 (.0231)	-.0075 (.0039)*	.0001 (.0028)	-.0066 (.0013)***	-.0041 (.0010)***
Health insurance	-.2503 (.5241)	1.0752 (.8976)	-.0377 (.1628)	.1269 (.3605)	.0247 (.0596)	-.1961 (.0929)*
Living with children	.0897 (.2072)	.7650 (.5349)	-.1717 (.1214)	.3648 (.2674)	-.1286 (.0723)	-.2591 (.1498)
Widowhood	.3361 (.2564)	—	.0122 (.1760)	—	-.0538 (.0688)	—
Wealth transfers	-.5263 (.3824)	-.4770 (.7920)	-.1622 (.1972)	.0582 (.2859)	-.1111 (.0658)	-.1821 (.0918)*
Change in wealth in the preceding time period	-.0365 (.0292)	.1226 (.0925)	.0155 (.0208)	-.0290 (.0384)	.0006 (.0015)	.0007 (.0009)
Liquidity of wealth	.0017 (.2517)	-1.0738 (1.0072)	0.355 (.1021)	-.3795 (.3629)	.2778 (.0713)***	.3791 (.0930)***
Imputation						
1993	.8256 (.2336)***	-1.1132 (.5702)*	.5310 (.1297)***	.2789 (.2762)	.1590 (.0614)*	-.0527 (.0955)
1998	-.0795 (.2100)	.1094 (.4680)	-.1818 (.1188)	.3313 (.2844)	-.1603 (.0568)**	.2592 (.0870)**
Intercept	-.7355 (.2963)*	-1.8615 (.7384)*	-.4012 (.1913)*	-1.2218 (.4342)**	-.6875 (.0861)***	-1.0014 (.1345)***
Log likelihood	-106.15	-30.42	-314.42	-73.34	-1411.19	-581.60

\*  $p < .05$ \*\*  $p < .01$ \*\*\*  $p < .001$