

Understanding How Pre-retirement Health Insurance Status Impacts the Health and Assets of the US

Retiree Population

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Abstract

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Introduction: Recently, numerous countries have encountered escalating healthcare costs as older adults increasingly utilize medical services, which simultaneously impacts expenditures and health outcomes. Research has highlighted a significant correlation between financial stability and the health of retirees. However, previous studies have frequently overlooked the impact of health insurance plans, especially the private health insurance plan. To address this knowledge gap, the current study endeavors to investigate the relationships among various private health insurance programs and their impacts on the post-retirement assets and health status of retirees.

Method: The study used data from the Health and Retirement Study, which includes individuals aged 59–70 years ($n = 2777$). Utilizing generalized structural equation modeling (GSEM), the study examined the longitudinal correlation between pre-retirement private health insurance and post-retirement asset and adjusted for race, sex, level of education, and spouse. Analysis considered the mediating influence of health status.

Results: The results indicate that 71.8% of pre-retirement health insurance was obtained from current or former employers. In terms of direct effect, the study observed no significant impact of private health insurance on post-retirement asset. For total effect, individuals who directly purchased private health insurance from a company and union have 1.42 ($P < 0.001$) and 1.6 ($P < 0.05$) times higher odds ratio of obtaining more post-retirement asset compared with the reference group after accounting for the mediator, health status. However, the study found a strong and significant indirect effect through health status. Individuals who directly purchased private health insurance from companies and unions have 1.4 ($P < 0.001$) and 1.82 ($P < 0.05$) times higher odds of obtaining more post-retirement asset compared with the reference group through health status.

Conclusion: The findings point to a significant relationship among private health insurance, health status, and post-retirement asset. Individuals who retired before 60 directly purchased private health insurance from insurance companies and unions tend to possess more health and post-retirement asset. Healthier individuals tend to accumulate more assets at retirement, which highlights the importance of health in financial well-being. Policymakers should consider initiatives to improve access to health insurance options to enhance health outcomes and financial security at retirement.

Acknowledgment

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Sincerely,

Yuhan Hsieh

1. Introduction

1.1 Background

Many countries are currently grappling with the rising healthcare expenses linked to aging populations, and this trend burdens healthcare systems significantly worldwide, denoting a shift toward increasingly older societies. Empirical research indicates that the use of medical services among older adults in the United States far exceeds that of younger age groups. In 2010, the average medical expenditure for individuals aged 65 or older was 2.6 times higher than the national average [1]. By 2020, personal healthcare spending per capita for those aged 65 and older reached \$22,356, nearly 2.5 times higher than the spending per working-age person at \$9,154 (Center for Medicare & Medicaid Services). This growing body of research emphasizes the need to develop strategies to lessen the burden of aging-related healthcare expenses.

In recent years, scholarly discussions have extended to include research on retired populations, encompassing their behaviors, health, and financial well-being. Several studies have linked changes in assets to health outcomes. It is widely recognized that better financial standing correlates positively with health and overall quality of life. Financial assets allow older adults to afford healthcare services, medication, nutritious food, and housing, which are critical to maintaining health and independence in later life. Research has shown that older adults who experience financial strain are at greater risk of experiencing physical and mental health issues, including depression, anxiety, and chronic diseases [2]. Additionally, a systematic review of existing evidence has demonstrated a robust association between assets and the health outcomes of retirees [3-6]. Research indicates that even after accounting for socioeconomic status, assets remain strongly linked to better health [4, 7]. Assets are believed to play a crucial role in mitigating the adverse effects of temporary income fluctuations, such as those caused by illness or unemployment, especially among older adults transitioning into retirement [8].

Economists and other health scientists propose that two types of explanations exist: the causal effects from health to wealth and the causal effects from wealth to health. Some researchers suggest there is a causal relationship running from wealth to health, as lower-income individuals tend to have riskier lifestyles, limited access to healthcare, and less healthy living and working environments [8-10]. It has long been recognized that many measures of economic wealth are positively related to various health outcomes. However, these questions are further complicated by the possibility that causality may go in the opposite direction, from health to wealth.

From another perspective, some research suggests that poor health can prompt early retirement and add to the financial strain on older adult households [11]. When people are forced to withdraw from the labor market due to health issues, it can hinder wealth accumulation, while healthcare expenses may rise alongside declining health. Research indicates health shocks can impact future income, consumption, medical expenses, and life expectancy, influencing saving behavior [12]. Individuals with poorer health often face a decrease in earnings before retirement and incur higher medical costs, leading to reduced overall wealth. Since poor health tends to persist over time, it gradually depletes an individual's financial resources. These studies conclude that there are strong and complex associations between health and assets.

Research also indicated that numerous factors influence the health and wealth of the retired population. Among these factors, health insurance stands out as a significant determinant of retirement behaviors. Many studies have demonstrated the impact of insurance plans on retirement decisions, especially government health insurance [6, 13, 14]. Most Americans under the age of 65 receive coverage through employer-provided health insurance, while others secure coverage through privately purchased or government-provided insurance. Research has also analyzed how pre-retirement health insurance affects retirees' health [15]. However, research analyzing how pre-retirement health insurance affects retirees' health and assets has been limited despite the strong correlation between these three factors. The exact effects remain largely unknown.

While the relationships between health and financial assets have been extensively studied, and both factors significantly impact the quality of life of older adults, there is currently a new focus on the impact of insurance programs on health and financial assets. However, the impact of private insurance plans has not been thoroughly investigated yet.

In this study, I aim to analyze the relationship between the effects of various health insurance programs, especially the private insurance type, on retirees' assets and health. This study contributes to the literature on disparities in healthcare outcomes and assets among different segments of the retired population. By understanding how insurance type impacts retirees' health and assets, policymakers and healthcare providers can design interventions to enhance health outcomes and assets among retirees. This study significantly enhances our understanding of how healthcare coverage influences retirees' financial well-being and overall health.

1.2 Literature Review

As the retired population continues to wield considerable influence on global healthcare costs, there is a growing focus on understanding the factors shaping retirees' behaviors. From a healthcare policy standpoint, various aspects of retirement, including financial planning, insurance, and health wellness, are being examined closely. In this study, I focus specifically on the impact of assets and health on the retired population.

J. Poterba, S. Venti, and D. A. Wise explored the correlation between health and the evolution of wealth among households, drawing from data from nine waves of the Health and Retirement Study (HRS) from 1996 to 2010 [8]. Their research examined the long-term changes in the net worth of individuals in or near retirement, taking into account varying levels of health to comprehend the cumulative financial implications of poor health since that can erode assets by increasing health-related expenses and decreasing earnings.

They investigated both the impact of assets on health and the influence of health on assets, revealing a robust relationship between the two.

However, a critical decision for retirees revolves around health insurance, particularly for US adults approaching Medicare eligibility at age 65. Poterba's (2011) study did not examine the health insurance programs individuals select before retirement. Numerous studies have emphasized the significant effect of health insurance programs on retirement behavior [13, 14, 16, 17], yet the relationship between health insurance status and post-retirement health and wealth remains unknown. Emphasizing the need for further exploration, decisions regarding pre-retirement health insurance play a pivotal role in shaping retired individuals' health and wealth outcomes. Understanding this complex relationship is crucial as it can shed light on how insurance decisions impact both health and financial stability during retirement.

Previous Research on Retirement and Health

In recent years, the aging population has grown rapidly, prompting research into the health of retirees and the retired population. Existing studies examining the causal effect of retirement on health yield mixed results, although they generally suggest that retirement impacts health positively. Some argue that retiring can improve health, while others contend that health deteriorates after retirement. Eibich carried out a research using a Regression Discontinuity Design, leveraging incentives within the German pension systems. His findings indicate that retirement leads to improvements in subjective health status and mental health while also reducing the use of outpatient care [18]. Additionally, the transition can be seen as an escape from demanding work situations for many older workers, resulting in positive health consequences [11]. More systematic research in this area has shown strong evidence that retirement has a beneficial effect on mental health, while contradictory evidence was found for its effects on perceived general and physical health.

From another perspective, some studies also support the notion that individuals experience a decline in health following retirement. Researchers have employed retirees' self-reported reasons for leaving the workforce to distinguish between retirement transitions influenced by poor health and those unrelated to health concerns. Michael Hurd and colleagues have explored not only the physical aspects but also the decline in overall life satisfaction as individuals age, noting an accelerated rate of decline, particularly in cognitive health, after retirement [19]. Studies have indicated that complete retirement is associated with adverse health effects, manifesting in increased difficulties with mobility and daily activities, a higher prevalence of health conditions, and a decline in mental well-being [20]. More and more studies propose a negative effect of retirement on the health of older adults. It is evident that the retirement effect may not be as initially anticipated but rather a more complex phenomenon, prompting further exploration.

Concerns have been raised about the possibility of retirement decisions being prompted by declining health, potentially inflating the observed negative impact of retirement on health outcomes. However, even after restricting the analysis to individuals who were physically and mentally healthy before retirement, adverse effects of retirement on health persist, albeit to a lesser extent. Interestingly, research also suggests that the adverse health effects of retirement are more pronounced among individuals who are forced to retire compared to those who retire voluntarily [20]. This underscores the potential influence of motives for retirement on retirees' health status.

One shortcoming of the literature on this topic is that it often approaches retirement as a uniform event, while any life transition can be welcome or unwanted, depending on the circumstances. There are several explanations for the inconsistent findings in the literature, one of which is that the lack of consensus may reflect the heterogeneous health effects of retirement. Researchers suggest that the connection between retirement and subsequent health depends on contextual factors surrounding the transition, such as job satisfaction, occupational characteristics, and the voluntary or involuntary nature of retirement. If retirement

from the labor force was for reasons unrelated to health, subsequent health outcomes were not affected. However, if retirement resulted from poor health, it was associated with worsened health thereafter [11, 21].

Previous Research on Health and Wealth for Older Adults

The Impact of Wealth on Health Transition

Research consistently shows a strong link between health and economic status, and numerous studies evidence a significant correlation between economic indicators—income, assets, savings, and various health outcomes. While some scholars suggest that a retiree’s health status can affect their accumulated wealth, others believe that wealth influences health outcomes in retirement. However, before examining their relationship in detail, it is essential to clearly define “wealth.” However, reaching a consensus on this definition is challenging, as different studies use different metrics. Most studies consider net worth—a measure that includes debts, property ownership, health coverage, and investments—a key indicator of wealth. However, the use of various measures for wealth and health status across studies leads to inconsistent conclusions.

In earlier research, wealth emerged as an alternative resource to address insufficient income and inadequate health insurance coverage for healthcare expenses. Jinkook Lee, for instance, employed both assets and income to gauge wealth and analyze the depletion of wealth among older adults. Their findings revealed that health statuses, including existing health conditions and new health events, influenced the wealth depletion of older adults significantly, albeit with varying impacts depending on marital status [22]. Other studies, such as the work by Hurd and Kapteyn, focused on income measures. They used the percentage change in household income between specific periods to assess its impact. Their research underscored the influence of both income and wealth on health transitions [23].

This study opts to focus on the assets of retirees, recognizing their critical role in buffering against health and financial shocks. Simpler wealth metrics have been proposed as effective alternatives for population-based health studies [4]. Following these recommendations, this study selects the total household assets as the primary measure of wealth.

Additionally, some research already supports the notion that wealth impacts retirees' health. For example, a study in Canada suggested that an increase in earnings in any year between the age of 52 and the year before retirement has a protective effect on mortality [24]. This indicates a positive association between longevity and earnings. When individuals have sufficient wealth, they have more options regarding health conditions compared to those with more limited wealth. Particularly in the United States, where medical expenses are notably high, although most expenses for retired individuals are covered by insurance, wealth can still influence retirees' health through other channels. For instance, greater wealth is associated with greater life satisfaction, which can have positive effects.

The relationship between health and wealth can now be studied in a dynamic setting over time, and the two interactions are important for people approaching retirement, as pre-retirement income and wealth also affect post-retirement wealth. People who have more assets will have more financial buffers against health shocks [25]. Unexpected health events can result in significant and enduring financial setbacks from which people may struggle to recover. Research indicates that people who experienced major unexpected health events, such as heart attacks or strokes, suffered an average cumulative income loss of nearly \$37,000, compared to \$8,700 in the case of those who experienced minor health events [26]. This underscores the high potential costs associated with new health circumstances and the importance of engaging in preventive healthcare behaviors, taking precautionary savings measures, and acquiring comprehensive health insurance.

The Impact of Health on Wealth

Health is widely known to be strongly related to the ability to work and accumulate wealth. Current research approaches from different perspectives, the most popular being the proposition that health will affect the retiree's wealth. A positive correlation between health and wealth accumulation has been documented [12, 27]. Individuals who begin with better health may experience faster wealth accumulation, as good health enhances their capacity for earnings and facilitates saving. Increased economic resources could also shield individuals from the challenges of aging. Research has revealed that health shocks decrease household wealth significantly due to reduced earnings. These findings imply that depending solely on health insurance may not be enough to protect households from the economic consequences of serious health issues [28]. In other words, poor health leads to lower income and also increases medical costs, which affects the post-retirement wealthy significantly. Research also provides initial evidence that retiring because of poor health affects retirement income significantly and negatively, especially for men [29].

Numerous studies have demonstrated that poor health can lead to divergence in asset accumulation between households, with any disparity often exceeding medical expenses. This suggests that poor health can affect wealth accumulation through factors beyond simply increased medical costs. Additionally, studies indicate that health and expectations regarding health are closely linked and can impact productivity, influencing decisions about retirement and the ability to save for retirement. Furthermore, health directly influences expenditure, especially in the United States, where many workers under the age of 65 lack health insurance coverage. This situation leads to substantial copayments and additional health-related costs [28]. Lee and Kim mentioned the financial challenges older individuals face due to healthcare expenses, particularly those with chronic conditions. It notes that these expenses can lead to significant out-of-pocket costs despite Medicare coverage [3].

To analyze the relationship between health and wealth, researchers also opt to use the life-cycle model to predict behaviors, which is a valid approach to consider various factors within this framework. For instance,

AS Deaton employs data from the National Health Interview Survey and the Panel Study of Income Dynamics to explore life-cycle patterns in health status and income distribution. The findings indicate that average health status declines with age, and there is a rise in health inequality over the life course. Moreover, a negative correlation between health status and income is observed, suggesting that individuals with lower incomes tend to report poorer health [9].

To analyze the relation between health and wealth, researchers also opt to utilize the life-cycle model to predict behaviors, which is a valid approach for considering various factors within this framework. For instance, the analysis in the passage employs data from the National Health Interview Survey (NHIS) and the Panel Study of Income Dynamics (PSID) to explore life-cycle patterns in health status and income distribution. The findings indicate that average health status declines with age, and there is a rise in health inequality over the life course. Moreover, a negative correlation between health status and income is observed, suggesting that individuals with lower income tend to report poorer health.

Moreover, education has been seen as a significant factor affecting the retiree's health and wealth. Higher education leads to a better quality of life, including income and health. Much literature on the relationship between education, earnings, and wealth accumulation has developed over many decades. Education has been shown to affect wealth positively in different ways. Asset growth following retirement depends partly on health capital and financial capital accumulated before retirement, which is strongly related to educational attainment [30].

How does insurance affect the retiree's behavior?

As US adults approach Medicare eligibility at age 65, they face important healthcare and employment decisions. Before the age of 65, many individuals only receive health insurance if they continue working. At age 65, however, Medicare provides health insurance to almost everyone. However, the effect of insurance on the retired population's health and asset relation is still unknown. Many factors affect these

relations. Research on the retirement market indicates that an incomplete public insurance program can diminish the demand for more extensive private insurance markedly, potentially leading to reduced overall insurance coverage and heightened exposure to risk [17]. Additionally, some individuals may opt to remain uninsured until they reach the age of 65 and become eligible for Medicare [15]. These factors collectively influence people's insurance choices.

Insurance is highly relevant to the retired population's post-retire life. A comprehensive insurance program can lower medical costs for extreme situations. However, many Americans lack confidence in and understanding of insurance. Research conducted on individuals aged 50 to 64 found that approximately a quarter of respondents had little to no confidence in their ability to afford health insurance in the coming year [31]. Limited research has been conducted on how insurance directly affects the health and wealth of the retired population despite its salience.

Research on insurance and retirement has been addressed in several studies. Much of this research has used dynamic or life-cycle models, which consider various factors to predict the entire population's behavior [6, 13, 14, 32]. For instance, estimates suggest that individuals with retiree health insurance tend to retire earlier than those without such coverage, with retiree health insurance increasing the probability of retiring before age 65 [33]. Furthermore, a comparison between individuals with retiree coverage and those with job-tied coverage reveals that the former tend to retire approximately 12 years earlier than the latter, highlighting the significance of employer-provided health insurance as a determinant of retirement [13]. Retirement time also affects people's post-retire assets because of the difference in the time to accumulate assets.

Not only job-tied insurance but also retiree health insurance can have a significant effect. Risk-averse workers who wish to retire before age 65 but lack access to retiree health insurance may be motivated to remain employed until age 65 to avoid exposure to the risk of catastrophic medical expenditure between the retirement age and subsequent Medicare eligibility [34]. Additionally, for the uninsured population,

research indicates that households without insurance, facing greater uncertainty in terms of healthcare costs, may engage in higher levels of precautionary savings than those with insurance [35]. This highlights the significant role that health insurance plays in the retirement plans of older adults.

Despite the availability of Medicare, many individuals continue to face significant out-of-pocket expenses, which highlights the need for additional options for private insurance. Research consistently demonstrates a strong correlation among health insurance, financial resources, and overall health outcomes, particularly within the public insurance demographic. However, a dearth of longitudinal studies that observe evolving perspectives throughout retirement exists. In addition, many studies focus more on public health insurance than they do private health insurance. Studies that compared between public and private health insurance consistently find that those covered by employer-sponsored insurance generally enjoy better health statuses followed by individuals with nongroup private insurance, the uninsured, and those eligible for public coverage based on income or medical necessity [36]. However, these studies typically overlook the complexities of the arrangements of private health insurance, such as coverage obtained through unions or other avenues.

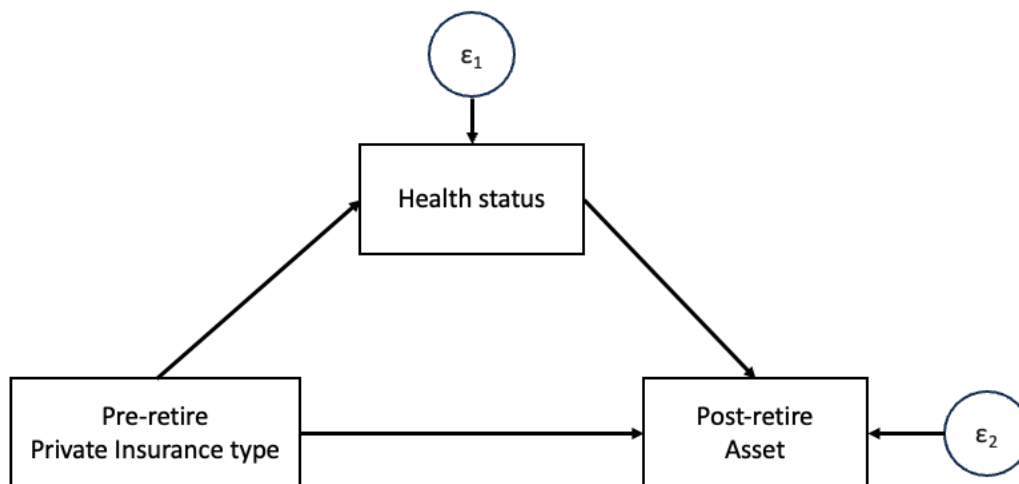
Recipients of public health insurance, including beneficiaries of Medicare and Medicaid, frequently experience poor health outcomes potentially due to disability or low income. However, studies that focus on the population with private health insurance are lacking, which leads to the lack of knowledge about the impact of private health insurance on retirees. Further investigation into the impact of various options in private health insurance on health and financial outcomes during retirement is warranted to provide a comprehensive understanding of the insurance landscape for retirees. Therefore, the current study intends to examine pre-retirement private health insurance.

1.3 Research Questions

In this research, I aim to focus on these research questions:

1. How do different private health insurance plans affect the retiree population's post-retire health and assets?
2. What are the patterns of change in both assets and health status among individuals before and after retirement?

1.3 Theoretical Framework



Direct Effect (Pre-retire Private Insurance Type → Health Status): The type of private insurance an individual has before retirement directly impacts their health status(mediator).

Indirect Effect (Health Status → Post-retire Asset): Health status(mediator) affects post-retirement assets indirectly.

Total Effect (Pre-retire Private Insurance Type → Post-retire Asset): An individual's private insurance before retirement would affect their financial assets after retirement through health status(mediator).

2. Research Methods

2.1 Data Source and Sample Target

Empirical analysis utilizes data from the HRS, which is a nationally representative longitudinal survey on Americans aged 50 years and above. This dataset encompasses comprehensive information on the health statuses, total household assets, and detailed demographic and socioeconomic characteristics of the respondents, for a total of 42,406 observations. The survey is conducted biennially, and the HRS Rand files now include data from 15 waves.

The current study controlled for variables such as race, age, gender, spouse, and level of education and selected the participants observed at ages 59 and 60 within the same wave, which constituted the pre-retirement population. Previous research has underscored the significance of age 62 for early retirement, which is attributed to factors such as declining pension accrual, disparity in the social security system, and financial constraint. Consequently, pre-retirement age was defined as 60 years with individuals aged 59 years included to capture the relevant population within a wave cut point.

Analysis covers the period from 1992 to 2020. In our models, we selected the sample by focusing on individuals who retired between the ages of 59 and 60 and remained in the data for 12 years (6 waves) until they reached the age of 69 or 70 and reported retirement ($n = 2777$). This coverage enables us to maintain consistency in representation within the HRS dataset and includes individuals who did not retire at ages 59 or 60, as well as those who retired at ages 69 or 70. We mainly observed their health and financial assets after retirement. We excluded respondents with incomplete information on all covariates of interest.

By specifically focusing on adults aged 59–70 years, we tailor the analysis to a demographic group that is likely to experience significant changes in health and assets during the transition to retirement. This targeted approach ensures that the findings are relevant to this particular life stage and segment of the population.

2.2 Variables

Outcome Variable

Total Household Asset

We utilized the total household wealth data of the retirees from the HRS Rand file as the primary asset indicator. Assets were selected when people reached the age of 69 or 70 and reported retirement. Total household assets were divided into five quintiles. This comprehensive measure encompasses the combined values of primary and secondary residences, real estate (excluding primary residences), vehicles, businesses, Individual retirement accounts and Keogh accounts, stocks, mutual funds, investment trusts, checking and savings accounts, CDs, government savings bonds, T-bills, bonds, other savings, mortgages/land contracts (for primary residences), other home loans (for primary residences), and other debts. This broad scope enabled a comprehensive view of household assets and debts, which provides valuable insights into overall financial well-being.

Independent Variables

Pre-Retirement Private Health Insurance

This study focuses on individuals with private insurance and used data from the HRS to categorize individuals under six private health insurance categories based on their responses to the questionnaire on primary pre-retirement private health insurance resources when they were aged 59 or 60 and without a report of retirement. Although a number of individuals held multiple private health insurance plans, the number was minimal and, thus, excluded from the study population. Cases with multiple sources of insurance were assigned to categories following a prioritized order as outlined in Table 1.

Table 1. Variables Description

Pre-retire private health insurance	Variable Definition
Health insurance com	The insurance purchased directly from an insurance company
R's current/former	The insurance is covered by the respondent's current/former employ
S's current/former	The insurance is covered by the spouse's current/former employ
Group	The insurance is covered by the group
Union	The insurance is covered by the union
Other	

Mediator

The current study assessed both objective and subjective health. Both were drawn from data collected 12 years later. When individuals reach age 69 or 70, they report being completely or partly retired.

Objective health status: Index of Health

To assess the health status of the retired population, it is essential to consider the complexity of their health compared to younger demographics. Drawing from the methodology outlined by Poterba and Venti, who developed a latent health index, offers a promising approach [8, 37]. This index has demonstrated strong predictive capabilities for future health events, including strokes or the onset of conditions such as cancer or diabetes. Adopting such a measure would provide a more comprehensive evaluation of the health status of the retired population.

We used responses to the 25 questions and obtained the first principal component of these health status indicators. The health index is constructed by obtaining the first principal component of all health indicators. The first principal component is the weighted average of the health indicators, where the weights are chosen to maximize the proportion of the variance of the individual health indicators that the first principal component can explain.

The first principal component is the weighted average of the health indicators, where the weights are chosen to maximize the proportion of the variance of the individual health indicators, which this weighted average can explain. The principal component loadings order the variables in Table 2. Notably, the study separated health status into five scores, coding 1 and 2 as "worse health" and 3, 4, and 5 as "better health."

Table 2. Health Index Loading

Variable	Loading
Difficulty walking several blocks	0.2632
Difficulty lift/carry	-0.0668
Difficulty push/pull	0.2938
Difficulty climbing stairs	0.3249
Health problems limit work	0.289
Difficulty stoop/kneel/crouch	-0.0612
Self-reported health fair or poor	0.3556
Difficulty getting up from chair	0.3491
Difficulty reach/extend arms up	0.2603
Health worse in previous period	0.0845
Difficulty sitting two hours	0.1766
Ever experience arthritis	0.2061
Difficulty pick up a dime	0.1516
Hospital stay	0.1274
Ever experience heart problems	0.1371
Home care	0.0459
Back problems	0.2256
Doctor visit	0.1041
Ever experience psychological problems	0.096
Ever experience stroke	0.0871
Ever experience high blood pressure	0.116
Ever experience lung disease	0.1035
Ever experience diabetes	0.1146
BMI at beginning of period	0.1790
Ever experience cancer	0.0540

Subjective health status: Self-report health

The previous health index, closely associated with objective health status, is enriched by subjective self-reported health status data from the HRS. Participants in the HRS report their subjective health status by answering the question, “Would you say that your health is excellent, very good, good, fair, or poor?” This measure has been validated by numerous studies linking insurance coverage to health outcomes [36, 38] and has demonstrated predictive validity for both future healthcare utilization and subsequent mortality [39, 40]. Notably, the study separated health status into five scores, coding “poor” and “fair” as "worse health" and “good,” “very good,” and “excellent” as "better health."

2.3 Analysis Approach

Univariate Analysis

The study conducted univariate analysis on variables such as total household assets, types of pre-retirement private health insurance, health status indicators, and other covariates, including race, sex, age, level of education, and spouse.

Bivariate Analysis

The study explored the relationship between health status and household assets before and after retirement across six waves. Additionally, it compares objective and subjective health statuses before and after retirement.

Generalized Structural Equation Modeling (GSEM)

This study employed GSEM using the “gsem” command in STATA to fit generalized SEM. Specifically, when referring to generalized SEM, we denote SEM with (1) generalized linear response variables and (2) multilevel mixed effects, whether linear or generalized linear. GSEM supports fitting logistic, probit,

Poisson, multinomial logistic, ordered logit, and other models. This approach enables researchers to examine the direct and indirect effects of key predictors on the outcomes of interest. The current study used the logistic model for analysis, which estimates coefficients and obtains odds ratios for all variables.

The study aims to achieve two objectives: (1) investigate the longitudinal relationship between pre-retirement private health insurance and post-retirement asset and (2) assess the influence of health status on this relationship. GSEM considers the full impact of a predictor and explains the exact path of its association with the outcome, including its impact on mediators (health status).

3. Results

Table 3 presents the descriptive analysis. The majority of people obtained pre-retirement health insurance through current or former employers (71.8%), while smaller percentages purchased it directly (1.87%) or from other sources. Sex distribution was relatively balanced (men: 53.47%; women: 46.53%). The levels of education varied, with the highest proportion obtaining a high school diploma (31.74%) followed by college (23.96%) and college graduates or above (26.59%). The majority of the respondents identified as White/Caucasian (77.52%) followed by Black/African American (14.45%), Hispanic (4.54%), or Other (3.49%).

Table 3. Descriptive Analysis

Table 3. Descriptive analysis(n=2777)		N(%)
Pre-retire health insurance		
Directly bought from health insurance com	52	(1.87%)
From Group	222	(7.99%)
Other	8	(0.29%)
From Union	44	(1.56%)
From current/former employer	1994	(71.8%)
From spouse's current/former employer	457	(16.46%)
Sex		
Female	1485	(46.53%)
Male	1292	(53.47%)
Education		
less than high school	492	(17.72%)
High school	881	(31.74%)
Some college	665	(23.96%)
College or above	738	(26.59%)
Race		
White/Caucasian	2153	(77.52%)
Black/African American	401	(14.45%)
Hispanic	126	(4.54%)
Other	97	(3.49%)

Objective and Subjective Health Status Trends

Figures 1 and 2 demonstrate the subjective (health index) and objective (self-reported health) statuses of the sample (n = 2777) across six waves. The health index slope declined more rapidly than did self-reported health. This outcome is unsurprising given that we utilized 25 variables that are strongly associated with older adults, including activities of daily living, such as difficulty in walking and climbing. These questionnaires are specifically designed to focus on the behavior of older adults. The pronounced decline in subjective health status may reflect an objective distribution of the functional behavior of older adults and place increased emphasis on their medical records.

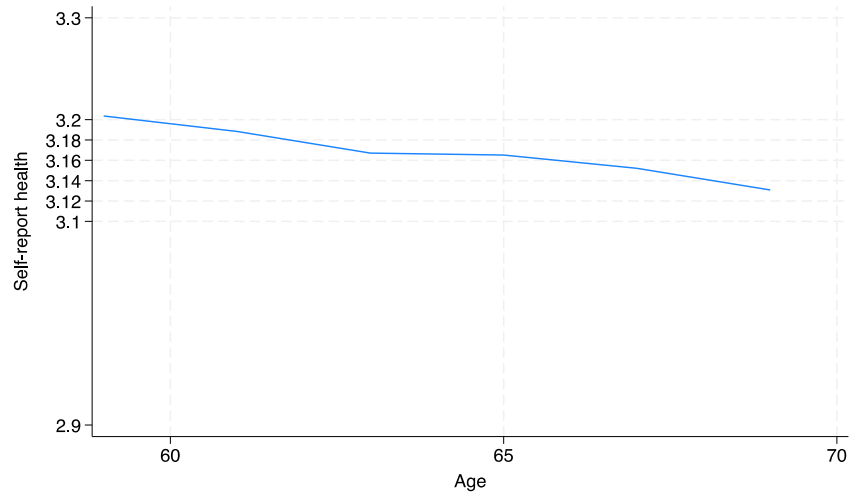


Figure 1. Subjective health status — self-reported health

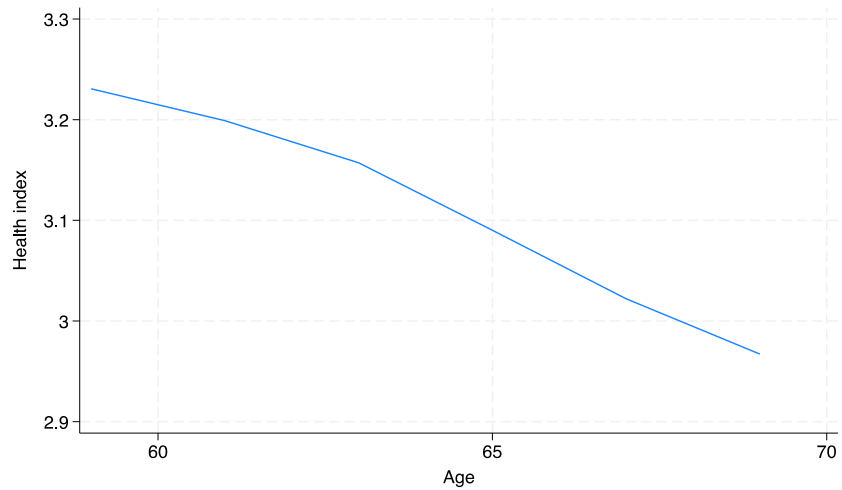


Figure 2. Objective health status — health index

Total Household Assets Trend

Figure 3 depicts the total household assets of the sample (n = 2777) across six waves. However, Figure 4 indicates that the values of primary residences began to decline before the age of 62 years. This decline contributes to the decrease in wealth, as illustrated in Figure 3, which may be attributed to several factors. Individuals may opt to sell their primary residences entirely and transition to rental properties, senior living

communities, or living with family members, which reduces the value associated with the primary residence. Additionally, individuals who retire early may sell their homes to relocate to different areas, such as retirement communities or regions with lower living costs, which also reduces the value of their primary residence.



Figure 3. Total household assets (59 to 70 years old)

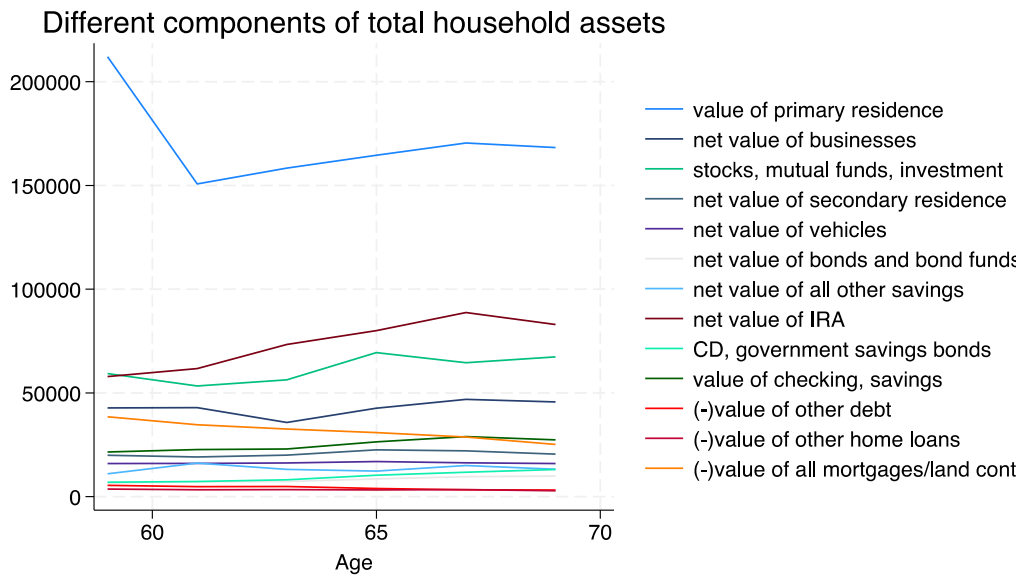


Figure 4. Components of total household assets (59 to 70 years old)

Generalized Structural Equation Modeling (GSEM) Results

In the inferential results presented in Tables 4 and 5, we examined the SEM outcomes related to post-retirement assets. We incorporated the variables of objective and subjective health status and found that using the health index in GSEM yielded similar indirect and total effects. Thus, we first interpreted the results of the health index.

Table 4 presents the GSEM result for subjective health status (health index). In the model, the direct effect model reveals no significant impacts on post-retirement asset across private health insurance groups, except those who obtained private insurance plans from Group (OR:1.05, $P < 0.5$) after adjusting for sociodemographic factors, race, health status, and level of education.

Table 4 illustrates that individuals with better health exhibit a 2.23 times higher odds ratio for post-retirement asset compared with those with worse health ($P < 0.001$). As expected, individuals with better health status have higher assets. Additionally, individuals with higher levels of education tend to have higher post-retirement assets, which aligns with our expectations. Regarding race, White/Caucasian individuals tend to have higher post-retirement assets than individuals of other races. Notably, individuals categorized as Other, which includes Asian Americans, are expected to have higher assets than Black and Hispanic individuals. Specifically, individuals of Other races exhibit a 0.88 odds ratio compared with White individuals ($P < 0.01$).

In terms of indirect effects, the results demonstrate that individuals with private health insurance from unions obtain the highest odds ratio of having higher assets among all groups. Compared with those with pre-retirement private insurance from current/former employers, individuals with private health insurance from unions (OR:1.82, $P < 0.001$) exhibit significantly higher odds of having more post-retirement assets, as mediated by health status. Additionally, people who purchased health insurance directly from insurance

companies (OR:1.40, $P < 0.001$) have 1.40 times higher odds of having higher post-retirement assets, as also mediated by health status.

After considering the indirect effects, we observe that different types of pre-retirement private insurance plans, except for individuals with private health insurance from others, exert positive and significant impacts on post-retirement assets compared with the reference group. The effects ranged from 1.00 ($P < 0.001$) to 1.60 ($P < 0.05$). This result is unsurprising, because we have adjusted for spouse status, which leads to the expectation of similar levels of asset for those covered by the health insurance program of their spouses.

Table 4. GSEM results for objective health status

Model results for GSEM of Post-Asset and pre-retire private health insurance and objective health status (using the health index) defined by labor report retire(n=2,775)				
Direct effects	Health status		Post-retire Assets	
	Health status(health index)			2.23
Pre-retire health insurance(ref. From current/former employer)				
Direct from Insurance company	1.52		1.01	
From group	1.02		1.05	*
Other	1.85		0.56	
From spouse's current/former employer	0.84		1.15	
From Union	2.11		0.89	
Female	0.94		0.97	***
Age	1.03		0.96	
Education(ref. less than high school)				
High school	1.45	**	2.41	***
Some college	1.31	**	3.69	***
College or above	1.65	***	7.96	***
Race(ref. White/Caucasian)				
Black/African American	0.94		0.27	***
Hispanic	0.93		0.47	***
Other	0.88		0.57	**
Spouse	1.44	***	2.82	***
Indirect effects though Health status				
	Health status		Post-retire Assets	
Pre-retire health insurance(ref. From current/former employer)				
Direct from Insurance company	1.40	***		
From group	1.02	***		
Other	1.64			
From spouse's current/former employer	0.87	***		
From Union	1.82	***		
Total effects				
	Health status		Post-retire Assets	
Pre-retire health insurance(ref. From current/former employer)				
Direct from Insurance company			1.42	*
From group			1.07	***
Other			0.92	
From spouse's current/former employer			1.0075	***
From Union			1.60	*

***p<0.001; **p<0.01;* p<0.05

Table 5. GSEM results for subjective health status

Model results for GSEM of Post-Asset and pre-retire private health insurance and objective health status (using the self-report health) defined by labor report retire(n=2,775)				
Direct effects	Health status		Post-retire Assets	
	Health status(health index)			2.41
Pre-retire health insurance(ref. From current/former employer)				
Direct from Insurance company	1.29		1.07	
From group	0.87		1.06	
Other	1.66		1.60	
From spouse's current/former employer	0.99		1.09	
From Union	2.29		0.92	
Female	0.31		0.91	
Age	1.04		1.00	
Education(ref. less than high school)				
High school	2.48	***	2.28	***
Some college	2.33	***	3.60	***
College or above	4.34	***	7.83	***
Race(ref. White/Caucasian)				
Black/African American	0.82		0.27	***
Hispanic	0.57	**	0.48	***
Other	0.51	**	0.57	**
Spouse	1.31	***	2.95	***
Indirect effects though Health status				
	Health status		Post-retire Assets	
Pre-retire health insurance(ref. From current/former employer)				
Direct from Insurance company	1.25	***		
From group	0.89	***		
Other	1.55			
From spouse's current/former employer	0.99	***		
From Union	2.06	*		
Total effects				
	Health status		Post-retire Assets	
Pre-retire health insurance(ref. From current/former employer)				
Direct from Insurance company			1.33	*
From group			0.94	***
Other			0.94	
From spouse's current/former employer			1.08	***
From Union			1.89	*
***p<0.001; **p<0.01;* p<0.05				

4. Discussion

The study demonstrated that different pre-retirement private insurance exerted no significant impact on the health of the retirees but only positively and indirectly impacted their post-retirement assets through mediating effects. Thus, a possibility exists that individuals with certain private health insurance may have higher levels of wealth even before retirement, because they possess the means to purchase health insurance directly from insurance companies than obtain private health insurance from groups or employees. This finding builds on previous research, which indicated that the population covered by employer-sponsored insurance typically exhibits better health status followed by nongroup private health insurance, the uninsured population, and those qualifying for public coverage based on income or medical need [36]. The results also indicated that those who obtained employee-based health insurance had better health compared with other forms of insurance. However, the current research compared all types of insurance, including public health insurance, and did not focus on private health insurance and how their assets changed. The current study further found that the impact of private insurance may extend to the assets of retirees directly and indirectly through the mediation of health.

Interestingly, the findings further suggested that individuals who purchased private health insurance from health insurance companies and unions achieve higher post-retirement assets compared with the reference group. To understand this mode, we conducted further analysis that focused on the pre-retirement assets of these populations. The findings revealed that individuals who opted for private health insurance possess \$130,048 higher assets prior to retirement compared with those who obtained health insurance coverage through current or former employees. Additionally, individuals with private health insurance directly from insurance companies are more likely to be employed in management, sales, or office occupations. These findings illustrated that these individuals may include self-employed individuals, freelancers, and small business owners.

Interestingly, although respondents with private health insurance through unions exhibited the highest post-retirement asset, they possess the lowest pre-retirement asset among all the groups. Individuals with private health insurance through unions possess \$350,235 fewer assets prior to retirement than those who obtain health insurance coverage through current or former employers. Unionized workers may benefit from more stable employment conditions, including higher wages and better retirement benefits, which can positively impact financial well-being before and after retirement. This aspect also indicates that health status is strongly related to post-retirement asset. As indicated by the health index and self-reported health, individuals with better health exhibit notably higher odds of accumulating assets in retirement, which emphasizes the importance of health as a determinant of financial well-being in later life.

Sensitive Analysis

In Figure 4, we observed a significant impact of the value of the primary residence on total household assets. The slope of assets continues to decrease until individuals reach around the age of 62. To delve deeper into this trend, we conduct further analysis. Upon closer examination, we noticed that the total effect remained relatively constant for most groups, except for the union group. Particularly noteworthy is the subgroup of individuals who have private health insurance through unions. In both Table 4 and Table 5, this subgroup previously had the highest assets among all groups. However, after adjusting for retirement timing to ages 63 and 64, the union subgroup now shows the lowest post-retirement assets.

This shift suggests that the union subgroup is influenced by the timing of retirement. It is possible that different unions have varying retirement policies. Additionally, as mentioned earlier, the decline in assets before age 62 might be attributed to individuals selling their houses to move to retirement locations. For those who have private health insurance through unions, retiring early appears to result in higher post-retirement assets. Conversely, when they retire later, especially after the age of 62, the results indicate that these individuals have lower post-retirement assets. It is possible that the union population retiring early may have better retirement plans in place.

Table 5. GSEM from age 63 to age 70

Model results for GSEM of Post-Asset and pre-retire private health insurance and objective health status (using the health index) defined by labor report retire(n=1798)

Direct effects	Health status		Post-retire Assets	
Health status(health index)			2.04	***
Pre-retire health insurance(ref. From current/former employer)				
Direct from Insurance company	2.11	*	1.01	
From group	1.26		1.05	*
Other	3.57		0.56	
From spouse's current/former employer	1.07		1.15	
From Union	0.49		0.89	
Female	0.79	*	0.97	***
Age	0.92		0.93	
Education(ref. less than high school)				
High school	1.23		1.85	***
Some college	1.27		2.96	***
College or above	2.46	***	5.89	***
Race(ref. White/Caucasian)				
Black/African American	0.89		0.26	***
Hispanic	1.08		0.33	***
Other	0.80	***	0.42	***
Spouse	1.18		2.61	***
Indirect effects though Health status				
	Health status		Post-retire Assets	
Pre-retire health insurance(ref. From current/former employer)				
Direct from Insurance company	1.71	***		
From group	1.18	***		
Other	2.48			
From spouse's current/former employer	1.04	***		
From Union	0.60	**		
Total effects				
	Health status		Post-retire Assets	
Pre-retire health insurance(ref. From current/former employer)				
Direct from Insurance company			2.13	**
From group			1.71	***
Other			3.74	
From spouse's current/former employer			1.37	***
From Union			0.77	*

***p<0.001; **p<0.01; * p<0.05

5. Conclusion

In conclusion, this study employed GSEM to explore the interrelation among pre-retirement private health insurance, health status, and post-retirement asset. The findings underscore that individuals who purchase health insurance directly from companies or unions are more likely to possess better post-retirement assets compared with those who have private health insurance from current or former employers. Furthermore, individuals with better health status generally exhibit higher post-retirement assets, which points to a robust connection between health insurance decisions and financial well-being in retirement. The results also depicted strong indicators of health status. These results propose that health status may have a stronger relationship than expected, which warrants further analysis.

The research further solidifies the strong connection between health status and post-retirement financial assets. Individuals with better health, as indicated by the health index, exhibit significantly higher chances of accumulating assets at retirement, which highlights the critical role of health in the formation of financial well-being later in life. In light of these findings, policymakers and stakeholders may contemplate the implementation of initiatives that target the improvement of access to health insurance options. These initiatives should not only aim to improve health outcomes but also strengthen financial security during retirement. In conclusion, elucidating the disparity in health status among insurance groups is imperative for the formulation of effective healthcare reform strategies and the forecast of potential impacts on healthcare utilization and expenditures.

6. Limitation

This research utilized data from the Health and Retirement Study (HRS). However, the categorization of private health insurance lacked granularity, hindering a detailed analysis of differences among specific private health insurance categories. Consequently, the study may not fully capture the nuances and distinctions within the private health insurance landscape.

Moreover, the data may not encompass all relevant variables that could influence the relationship between private health insurance decisions and retirement outcomes. Consequently, the findings may not be entirely generalizable to all populations, as certain factors specific to particular demographic groups or contexts might not have been adequately accounted for. Future research endeavors should delve deeper into the determinants and dynamics of private health insurance decisions, considering a broader array of factors that could shape these choices. By exploring additional variables and their interactions, future studies can provide a more comprehensive understanding of the implications of private health insurance choices for retirement outcomes, thereby offering more robust insights for policy formulation and individual planning strategies in aging societies.

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