Recommending feasible measures of wealth in health research
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Introduction

In health research, "wealth" refers to an individual's or household's total financial resources amassed over the lifetime, as opposed to income, which refers to the capital obtained during a specified period of time (e.g., annual earnings in dollars). Wealth may buffer the effects of temporary low income (e.g., in the event of illness or unemployment) and it reflects power and influence over others to a greater extent than income.[Braveman et al, JAMA, 2005] Wealth may be particularly important for the health of the elderly (whose incomes typically drop dramatically following retirement), as well as for studies examining racial/ethnic disparities in health (since differences in wealth by racial/ethnic group are far greater than the corresponding differences in income). [Braveman et al, JAMA, 2005] A systematic review of the literature found that greater wealth is associated with better health, even after adjustment for other socioeconomic factors, such as income and educational attainment [Pollack et al, AJPM, 2007]. Moreover, these positive wealth-health findings were most consistent when studies used detailed wealth measures based on multiple questions of assets (e.g., savings, home, retirement) and debts (e.g., mortgage, loans) compared with single questions on wealth (e.g., home ownership). The review also found that racial/ethnic disparities in health generally decreased when adjusting for wealth.

Despite both conceptual and empirical grounds for including wealth in population-based research on health, few studies do so. Arguably, this is mostly due to the difficulty in collecting wealth data. The topic is considered to be sensitive, is laborious to collect, and may be prone to recall biases. The values of assets and debts vary over time and may require professional appraisal. Therefore, population-based health surveys and vital statistics data generally have poor, if any, measures of wealth. In contrast, population-based surveys with detailed wealth measures typically contain little information on health. Thus, significant barriers exist in current population-based data sources to study the relationships between wealth and health. In sum, simpler approaches to wealth measurement could be beneficial for population-based health research.

Building on our earlier work, the objectives of this study were to answer two research questions: Can simplified measures of wealth be used in health research to reasonably approximate standard measures, which are based on multiple, detailed questions? To what extent are these measures related to self-reported health status and cigarette smoking? To answer these questions, we analyzed data from the Survey of Consumer Finances and the Health and Retirement Survey, which provide population-based samples with complementary age distributions.

Methods

The 2004 wave of the Health and Retirement Survey (HRS) and the 2004 Survey of Consumer Finances (SCF) were used in the analyses because each provides detailed measures of net worth as well as indicators of health. The HRS is a nationally representative dataset with an overall response rate of 86% in 2004 (*N*=20,129). Sponsored by the National Institute on Aging and the Social Security Administration, the purpose of the HRS is to provide a detailed picture of physical and mental health, insurance coverage, financial status, labor market status, and other characteristics of the aging population in the U.S. through in-person interviews. Sponsored by the Federal Reserve Board in cooperation with the Department of the Treasury, the purpose of the SCF is to provide a detailed picture of the finances of families in the U.S. A multistage area-probability sample is surveyed (in person or by

telephone) along with a supplemental sample of primarily wealthy families. In 2004, the response rate for the area-probability sample was 70% (*N*=3,007) and the response rate for the supplemental sample was 30% (*N*=1,515). For both datasets, imputation techniques were used for missing data and survey weights are used to reflect sampling probabilities. Head of household respondents aged 50 and over (HRS) or aged 25-64 (SCF) and who identified as (1) Black, non-Hispanic, (2) Hispanic, or (3) White, non-Hispanic were included (*N*=11,847 for the HRS and *N*=3,310 for the SCF) in the analytic samples. The HRS analytic sample did not include persons residing in nursing homes or who were not knowledgeable about their household's finances.

Definitions for each asset and debt included in each survey are listed in the appendix. The SCF contains more assets and debts in separate categories compared with the HRS; however, both surveys are comprehensive. For example, while the SCF asks about checking accounts, savings accounts, and money market accounts separately, those three categories are combined in the HRS. What we call the 'gold standard' measure of wealth, or net worth, was computed by adding the value of all assets minus the value of all debts. We also calculated 10 simplified measures of net worth. *Value of most prevalent assets/debts (1):* Prevalent net worth items were those that were reported to be owned by a large percentage of the sample overall (at least 25%). In the SCF, the following assets and debts were included: checking account, savings account, retirement funds, vehicles, primary residence; and mortgage, credit card balance, and installment loans. In the HRS, a similar list was found: checking/savings/money market account, mutual funds/stocks, retirement funds, vehicles, primary residence; and mortgage and other debt/credit card balance. Adding the value of assets minus the value of debts for this subset is the "prevalent assets/debts" measure of wealth. *Scale of most prevalent assets/debts (2):* People may be more willing to indicate ownership of the asset or debt rather than the actual dollar amount. Estimating the value may be difficult because the amounts may fluctuate over time. We therefore created a scale of the most prevalent items. If a respondent owned an asset, it was scored +1; if they owned a debt, it was scored -1; if they did not own an asset/debt, it was scored 0. The "prevalent assets/debts index" measure of wealth is the sum of these items (range -3 to 5 in the SCF; range -2 to 5 in the HRS). *Value of highest proportion assets/debts (3):* Though a large proportion of individuals may own a particular asset/debt, its value may be high or low with respect to their overall net worth. We therefore defined high proportion items as the assets that comprised, on average, more than 10% of an individual's overall assets and the debts that comprised more than 10% of an individual's debt. In the SCF, these assets were vehicles, retirement funds, and primary residence. The debts were mortgage, credit card balance, and installment loans. For the HRS, the items were: checking/savings/money market account, vehicles, primary residence, mortgage, and other debt/credit card balance. Adding the value of assets minus the value of debts for this subset is the "highest proportion assets/debts" measure of wealth. *Scale of highest proportion assets/debts (4):* Similar to above, we created a scale of the highest proportion items with a score of +1 given to ownership of each asset, -1 given to ownership of each debt, and 0 given to non-ownership of either. The "highest proportion assets/debts index" measure of wealth is the sum of these items (range -3 to 3 in the SCF; range -2 to 3 in the HRS). The next 5 measures were similar to the first 5 described above, except that the measures were based on assets only: (5) adding the value of all assets; (6) adding the value of the most prevalent assets; (7) creating a scale of the most prevalent assets (range 0-5); (8) adding the value of the highest proportion assets; and (9) creating a scale of the highest proportion assets (range 0-3). The last measure of wealth was (10) homeownership (yes/no) which was included because it is a widely used measure of wealth.

Two dependent variables were examined in the analyses: self-reported health, as measured on a 4- (SCF) or 5-point (HRS) Likert-scale and dichotomized as fair or poor health vs. better health status; and whether the respondent is a current smoker.

Age, gender, race/ethnicity (non-Hispanic Black, Hispanic, or non-Hispanic White), marital status (married or partnered, previously married, or never married) and family size were included as covariates in the analyses. In the HRS, census region was additionally included to account for regional variations in cost of living (it was not available in the public-use SCF dataset). Education was classified into 4 categories: less than high school, high school graduate or GED, some college, or college graduate. Annual household income from all sources was determined on a pretax basis and was log transformed.

We calculated descriptive statistics, including sociodemographic characteristics of the samples and prevalences and median values of the assets and debts. We then examined correlations between net worth and each of the simplified wealth measures, income, and education. A series of logistic regression models were then created for each dependent variable and wealth measure. The crude model included wealth only, categorized into quartiles (for measures based on dollar values), four roughly equal groups (for measures based on summary indices), or yes/no (home ownership). Next, the demographic model added age, age-squared, gender, race/ethnicity, marital status, family size, and region (HRS only). The full model added education and income to the demographic model. To determine whether the inclusion of wealth in the full model improved the model fit, we calculated log likelihood ratio tests, comparing the full model to an identical model without wealth. To compare model fit across the full models, each with a different wealth measure, we examined the Somer's D, AIC, and BIC statistics.

Summary of Results and Conclusions

Wealth, however measured, was associated with two health measures in two population-based datasets representing different life stages, after adjusting for demographic factors, education, and income. These findings, consistent with a prior review of the literature on the relationship between wealth and health [Pollack et al, AJPM, 2007], add further evidence for the importance of measuring wealth, in addition to income and education, in health research. Because measuring wealth in survey research is difficult and time consuming, we identified simplified measures of wealth that will likely reduce response burden while at the same time achieving an appropriate model fit, similar effect size of wealth, and consistent effect size of covariates.

For researchers primarily concerned with achieving an appropriate model fit while using the fewest questions, we recommend using the most prevalent assets. In both datasets, this consists of questions concerning the value of the respondent's checking and savings accounts, retirement funds, primary residence, and vehicles (as well as money markets, mutual funds, and stocks in HRS). This simplified list of assets compares to the 19 classes of assets available in the SCF and 11 classes of assets available in the HRS. For the nonelderly adult population, we also recommend highest proportion assets, reducing the questions further to only those assessing retirement funds, primary residence, and vehicles.

Summary measures based on whether the respondent owns a particular asset/debt rather than its value, are intuitively appealing because they may increase the response rate. However, for researchers

who are primarily concerned about the size of the association between wealth and health, we would recommend using measures that assess values rather than whether the respondent owns the particular wealth component. Although confidence intervals did overlap in many cases when comparing wealth measures based on indices with net worth, the magnitude of the wealth effect was underestimated for several index measures, particularly in the SCF data (e.g., prevalent assets/debts index for both health indicators). In addition, these measures were associated with poorer model fit compared to the gold standard measure of wealth. Similarly, model fit was reduced when using homeownership as compared to the gold standard measure.

The current measures were used in two different age groups. One might have expected a stronger relationship between wealth and health in the older age group due to the accumulation of wealth over their lifetime and the commonly experienced loss of income during retirement. Contrary to our expectations, the magnitude of the association between wealth and health was similar (as well as that between income and health), tending to be slightly higher in SCF compared to HRS. This may underscore the importance of wealth when examining social disparities and health throughout the lifespan and may lend support to previous research demonstrating greater inequalities in health in middle adulthood compared with older adulthood.

Several limitations deserve mention. Although we did analyze more than one health indicator, dataset, and life stage, our findings are limited to only those that we examined. Conclusions, therefore, could vary for different health indicators and populations. We also did not examine whether results were consistent within socially defined subgroups. For example, wealth values and composition vary greatly according to gender and race/ethnicity; we do not know whether our results are consistent across these subgroups. Recommendations as to which wealth measure may vary depending on whether the interest is in the association between wealth and health within a particular racial/ethnic subgroup as opposed to understanding population-level associations. In addition, we focused on the relationship between wealth and health using cross-sectional data. Studies have shown that health can affect wealth as well; our approach assumed the relationship was primarily between wealth and health, not vice versa. Next, the cutpoints for the most prevalent assets/debts (25%) and highest proportion assets/debts (10%) were chosen based on the samples' distributions as a way to decrease response burden. We may have found different results with different cutpoints.

Based on the current findings and our primary objective to develop simplified measures of wealth (that is, measures requiring the fewest questions), our preliminary recommendations would be to measure the most prevalent assets or highest proportion assets for the nonelderly adult population and the most prevalent assets for an older population (ages 50 and over). These simplified lists of assets compares to the 19 classes of assets available in the SCF and 11 classes of assets available in the HRS, which could considerably reduce respondent burden and data collection time and cost. Future studies should examine other indicators, life stages, and subgroups to determine whether our results have wider generalizability. We hope that the findings and recommendations are useful for future and on-going survey-based data collection and will contribute to reducing social inequalities in health.

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