WEALTH AND HEALTH IN EUROPE AND THE UNITED STATES: A COMPARATIVE ANALYSIS

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Abstract

**Background and objectives:** There are large differences among European countries and the United States in social and health expenditures, welfare policies and wealth inequality. This study assesses whether these differences translate into variations in the magnitude of wealth disparities in physical health across countries, and examines the contribution of risk factors and healthcare utilization patterns to these disparities.

**Data and methods:** Data from the SHARE and HRS studies were used. SHARE comprised data from 21,596 men and women age 50 years and over in 10 European countries who participated in the baseline survey in 2004. Data from HRS comprised 14,303 non-Hispanic white participants aged 50 years and over with information available from the 2004 interview wave. Data on physical health included: Self-perceived health, cardiovascular (heart or stroke) disease (CVD), cancer, ADL limitations (0 vs. 1 or more), maximum grip strength (kg) and walking speed (m/s). Data on wealth comprised total net worth, net financial assets and real assets. Additionally, data were used on household income, education, indicators of health-related behaviour (smoking, alcohol consumption, body mass index and physical activity), depression and health care utilization (doctor visits, hospital visits and outpatient surgery). Analyses were conducted using linear or logistic regression, entering interaction terms to allow estimates of the effect of wealth quintiles to differ according to country or region, and adjusting for confounders (US region, age and sex). Subsequently, risk factors and health care utilization variable were entered into the models to assess their contribution to wealth gradients in physical health outcomes.

**Results:** Total net worth, financial and real assets were negatively associated with most health outcomes both in Europe (SHARE) and the United States (HRS). Europeans in the lowest quintile of total net worth had consistently higher odds of cardiovascular disease (OR=1.56, 95%CI 1.38, 1.78) and ADL limitations (OR=2.40, 95%CI 2.06, 2.81). Higher odds ratios were observed for the United States and were 2.42 (95%CI 2.14, 2.73) for CVD and 3.39 (95%CI 2.86, 4.01) for ADL limitations. Mean grip strength and walking speed were also negatively associated with wealth, and associations were of similar magnitude for most European countries and the United States. These associations were largely independent from income and education. In contrast, cancer prevalence was not negatively associated with wealth. Financial and real assets showed similar associations with most health outcomes. However, real assets were more strongly associated than financial assets with disability indicators as reflected by ADL limitations and walking speed. Individual risk factors such as physical activity and alcohol consumption marginally contributed to wealth disparities in health outcomes, whereas the contribution of depression was more substantial. Health care utilization patterns also contributed to wealth disparities in both Europe and the United States. Overall, however, behavioural risk factors, depression and health care utilization explained only about half of the wealth gradient in physical health.

**Conclusions:** Total net worth, financial and real assets are independently associated with physical health in Europe and the United States. The association between wealth and physical health was stronger in the United States than in Europe for self-reported measures, but was of similar magnitude for objective health measures. More egalitarian health and wealth distribution policies may have contributed to smaller wealth disparities in some health outcomes in Europe as compared to the United States.
**Introduction**

Lower socioeconomic status is consistently associated with increased disease prevalence, mortality and disability in most industrialized countries. This association has been extensively demonstrated in different world populations and for a variety of health outcomes. Socioeconomic status is a complex construct that comprises several dimensions that range from material deprivation and reduced health care access, to broader psychosocial dimensions such as lower levels of social support and higher depression and stress. Up to now, studies have only examined the effect of specific indicators of socioeconomic status that are related to some of these dimensions, namely education, income and occupational class. Among the elderly, however, these indicators may not fully incorporate resources accumulated through the life course. An alternative indicator that addresses this problem is wealth, which reflects assets accumulated through life and remains strongly associated with mortality up to old age. No previous studies have assessed how wealth is associated to health and how this varies across populations.

While European countries have a marked tradition of equalitarian social and health policies, more liberal policy approaches have predominated in the United States. Partly as a consequence of these differences, large variation remains between European countries and the United States in the magnitude of wealth inequality, the level of access to healthcare and the level of social expenditures. Different welfare regimes may thus result in different levels of wealth inequalities in health across countries. For instance, Nordic countries such as Sweden and Denmark appear to represent a ‘social democratic’ welfare state, characterised by commitment to full employment, universal health care coverage, and increased redistribution of wealth. We hypothesise that this policy perspective will lead to smaller health inequalities as compared to ‘liberal’ regimes such as the United States, where universal transfers and social insurance plans are modest. Cross-country variation might reflect the impact of common policies in specific welfare regimes such as equitable distribution of welfare and health care services on the magnitude of wealth disparities in health. Only by comparing countries is it possible to evaluate how these policy aspects influence wealth disparities in health, and thus identify potential policy approaches that may contribute to tackle these disparities.

The aim of this study is to assess how the association between wealth and health outcomes varies between European countries and the United States, and to determine to what extent this association is independent from other socioeconomic indicators such as income and education. Our conceptual model encompasses a country’s welfare regime and how it influences individual wealth, risk factor prevalence, health care utilization and ultimately health outcomes. Thus, we also assessed the contribution of health behavioural risk factors, depression and healthcare utilization patterns to the wealth gradient in health and how this varies between Europe and the United States. Wealth is a broad category that comprises several assets, each of which may influence health through different mechanisms. Therefore, we separately assessed the effect of financial and real assets on health outcomes. We used data from the US health and retirement survey (HRS) and the Survey of health, ageing and retirement in Europe (SHARE), as they are to a large extent comparable. Using data for 2004, we were able to minimize the impact of differences in self-reported health outcomes by also assessing the association of wealth with physical measures of health, namely grip strength and walking speed. This is the first study to formally contrast wealth disparities in health across countries in Europe and the United States, using comparable data and incorporating objective measures of health.
Methods

Study population and data collection

The survey of health, ageing and retirement in Europe (Share) study

Details on the Share study in Europe have been described elsewhere\textsuperscript{13}. Briefly, in 2004, a survey on health, ageing and retirement was conducted in representative samples of 10 European countries aged 50 or older, comprising a total of 22,777 men and women. Trained interviewers in each country conducted interviews, using a computer assisted personal interviewing (CAPI) program supplemented by a self-completion paper questionnaire. The set-up allowed each country to use exactly the same underlying structure and questionnaire. Translation of the CAPI questionnaire was conducted by expert agencies, and a pre-test and a pilot were conducted. Sample designs differed slightly by population. In most countries, samples were drawn from national or regional population registries. In some countries, a multi-stage sampling procedure was followed in which regions were first selected, and subsequently individuals within these regions were invited to participate. The only exceptions were Austria, Greece and Switzerland, where telephone directories were used as sampling frames. In these three countries and in Denmark, households were the unit of selection. In all other countries, individuals constituted the sampling frame. The average household response rate was 55.4\%, ranging from 37\% in Switzerland to 69\% in France.

Individuals who agreed and responded to the health section of the survey were eligible to participate. 879 individuals who were not age-eligible but were interviewed were excluded from the survey, as well as individuals for whom valid weights to account for the sampling design could not be applied (n=51). Furthermore, we excluded 251 individuals with missing information for any of the health outcomes included in our study. The final sample comprised 21,596 participants.

The US health and retirement survey (HRS) study

Data came from the Health and Retirement Study (HRS), a longitudinal biennial interview survey of a nationally representative cohort of U.S. adults aged 50 or older. Details of the study are provided elsewhere\textsuperscript{14-16}. Individuals and their spouses were interviewed at baseline and followed-up through subsequent waves. Enrolment was staggered by birth cohort with cohorts enrolled in 1992, 1993 or 1998. New cohorts have been added subsequently to maintain population representation of this age segment. We included all HRS participants who were aged 50 or older at baseline interview, and who were alive and interviewed in the 2004 wave assessment.

19,288 participants were age-eligible and responded to the 2004 wave assessment. In order to ensure that differences with European countries were not due to specific issues in the black and Hispanic communities in the United States, data for the HRS were restricted to non-Hispanic whites. The exclusion of black respondents (n=2,728), Hispanic respondents (n=1,780), and those with other or missing information on race (n=477) resulted in a total sample of 14,303 participants.

Wealth, income and education measurements

Household total net worth was used as a summary measure of wealth. Total net worth comprises the sum of all financial and real assets minus liabilities. Financial assets were defined as the sum of all non-housing financial sources available to the household. Real assets comprised the value of primary residence net of the mortgage, value of other real estate, owned share of own business and owned cars. Equivalent definitions were applied for both real and financial assets in Share and HRS. Household income comprised information on income by all members of the household. Data coding by the RAND Institute and the Share research group have been used for the household income and wealth data using hot-deck procedures\textsuperscript{13,17}. To account for differences in household size, income, assets and total net worth were divided by the square root of the number of household members\textsuperscript{18,19}. Our study aimed at
assessing the association between relative wealth on health within each country, as opposed to absolute wealth. Therefore, values for household real and financial assets, total net worth and income were collapsed into quintiles within each country.

The Share and HRS studies comprised comparable measures of education. We constructed a common educational classification so that the distribution of each educational group was similar across Europe and the United States. In Europe, these corresponded approximately with levels 0-2 (low), 3 (middle) and 4-6 (high) of the UNESCO International classification of education. In the United States, education was separated into high school or less (0-12 years), more than high school but not a college graduate (13-15 years of schooling), and college or more (≥ 16 years). The distribution of educational level was very similar in Share and HRS: The proportion of individuals in the low educational level was 52% in Share and 54% in HRS, whereas the corresponding figures for the high educational level were 20% in Share and 23% in HRS.

**Outcome Measures**

Four major self-reported measures were included: (1) Self-perceived health was measured by asking individuals to rate their health in a 5-point scale (excellent, very good, good, fair and poor); (2) Cardiovascular disease was measured by asking individuals whether they had ever being diagnosed by a doctor with heart disease or stroke; (3) Cancer was measured by asking participants whether they had ever been diagnosed with any cancer except skin cancer; (4) Limitations with activities of daily living (ADL) was measured using a 6-point scale that was comparable for both surveys, and referred to the prevalence of reporting any limitations with one or more of the following activities: Dressing, walking across a room, bathing/showering, eating, getting in and out of bed, and using the toilet.

In addition to these self-reported measures, two physical objective health measures were incorporated: (5) Grip strength is a strong predictor of functional limitations and disability. It was measured using a handheld dynamometer (Smedley, S dynamometer, TTM, Tokyo, 100 kg) twice in both hands, and taking the maximum grip strength value. Individuals with none or only one measurement of grip strength, and those with measurements that differed more than 20kg in each hand were excluded from the analysis for this outcome. Grip strength was measured in all Share participants, but only in a sample of HRS participants aged 65 or older that represented all ages after this point. Therefore, analyses for HRS were restricted to those aged 65 or older who were eligible for the grip strength test. (6) Walking speed is a strong predictor of health impairments and functional dependence in the oldest old. Respondents were asked to walk a distance of 250 cm (8 feet in HRS) at their usual walking pace. The time walked was recorded at two examinations. Walking speed was obtained by adding the two times and lengths and calculating the speed. The test was completed by individuals aged 76 years and over who responded to the survey, where it was judged to be safe. Eligible individuals who did not perform the test were excluded from the analysis for this outcome.

**Behavioural Risk factors and depression**

Data on four major risk factors were collected: (1) Smoking: Based on their smoking status, participants were classified as current, former or never smokers. Among current smokers, the number of cigarettes smoked per day was calculated and entered as a separate variable. (2) Alcohol drinking: Individuals were asked about their frequency and intensity of drinking. Two comparable measures were available for HRS and Share: Frequency was classified as drinking any alcohol beverages daily or almost daily, 5-6 days a week, 3-4 days a week, 1-2 days a week, and 1-2 days a month or less. Intensity was defined as regularly drinking more than two glasses of alcohol almost every day or 5/6 days per week during the last six (Share) or three (HRS) months. (3) Physical activity: Individuals were asked about the frequency of engaging in vigorous physical activity such as sports, heavy housework or a job that involves physical labour in a week period. Respondents were classified as reporting vigorous physical activity more than once a week or lower. (4) Body mass index (BMI) was calculated by dividing self-reported weight by the square of self-reported height. (5) Depression: In the Share study, depression was measured using Euro-depression (Euro-D), a validated scale in the European population. Individuals were classified as depressive if they had a score of 4 or higher, which corresponded to approximately 23% of the Share population. In HRS, depression was
measured using the Center for epidemiologic studies of the elderly depression scale (CESD). Items for this scale were summed up, and those with 3 or more points were classified as depressive, corresponding to a similar proportion of cases as in Share (18%). Although these two measures are not entirely comparable, they are considered roughly indicative of depression as diagnosed by a clinician.

Health care utilization

Three summary measures of health care utilization patterns were included: (1) Doctor visits were measured by asking participants about the number of times they visited a doctor during a specific period; (2) Hospital stays were defined as the number of hospital visits during a specific period; (3) Outpatient surgery was defined as reporting at least one outpatient surgery during a specific period. HRS assessments for these three outcomes referred to the last 24 months, whereas in Share they referred to the last 24 months. Therefore, in order to standardize the number of visits to approximately one-year period in both samples, values for HRS were divided by a factor of two.

Methods of analysis

Analyses were conducted following a two-step approach: (1) the prevalence of poor or very poor self-perceived health, cardiovascular disease, cancer and one or more limitations with ADL was modelled as a function of total net worth, financial assets and real assets quintiles using ordinary least squares regression (OLS). A single model was constructed entering country and wealth as covariates. In order to allow estimates of wealth to differ, an interaction term was entered between wealth and country. All models were adjusted for age, sex, and US census region (northeast, Midwest, south, west or other), and were parameterised to the average age of the entire HRS and Share population in order to adjust for differences in the age distribution between countries. A similar approach was followed to model the mean maximum grip strength and walking speed as a function of wealth quintiles. (2) Logistic regression was used to calculate odds ratios of disease occurrence as a function of wealth quintile, before and after adjusting for household income and education. Subsequently, risk factors and health care utilization variables were entered into the models in order to assess their contribution to the association between wealth and health outcomes. Full models incorporated all variables and indicated to what extent the association between wealth and health remained after full statistical adjustment. All analyses were conducted using SAS version 8.2.
Results

The association between wealth and health by country

Figure 1 summarizes the age, sex, and region adjusted prevalence of reporting poor or very poor health according to wealth quintile in 10 European countries and the United States. There were variations in the prevalence of poor health between countries, with Sweden, Switzerland and Austria showing relatively low levels of poor health, and the United States occupying an intermediate position. In all countries, there was a graded negative association between wealth quintile and poor health, so that the prevalence was substantially higher in the bottom wealth quintile in all populations. The health gap between wealth quintiles appeared to be larger in the United States as compared to Europe as a whole. Whereas the prevalence of poor health was similar in both regions among those in the lower wealth quintile, those in the upper wealth categories in the United States were better off than those in the same level of wealth in Europe. Both real and financial assets displayed similar negative associations with self-perceived health in most countries.

The prevalence of CVD is substantially larger in the United States than in European countries (Figure 2). Although CVD prevalence was higher in the lowest wealth quintile in most populations, a more marked wealth gradient in CVD prevalence was observed in the United States. Some variations were evident within Europe. Whereas Denmark, Austria and Italy did not show a clear association between wealth and CVD prevalence, other countries showed some level of wealth disparities in CVD prevalence. Financial and real assets showed similar associations with CVD prevalence.

The prevalence of reporting one or more limitations with ADL activities varied considerably between countries, and was highest among United States and French participants in the lowest quintile of wealth (Figure 3). There was a clear wealth gradient in the prevalence of ADL limitations in all countries, but this pattern was more marked in France, Denmark and the United States. In many European countries, the prevalence of reporting one or more limitations with ADL was more strongly associated with real assets than with financial assets. This pattern was particularly marked in the Netherlands, France, Austria and Spain, which showed large disparities in ADL limitations between real assets categories, but no clear disparities according to financial assets quintile.

The prevalence of cancer was more than twice higher in the US than in Europe (Figure 4). As opposed to other health outcomes, cancer prevalence was not negatively associated with total net worth. In fact, in Europe as a whole and in the US, there was a tendency for increasing cancer prevalence with increasing level of wealth, which pattern was most marked for disparities among quintiles of financial assets in the United States.

Grips strength and walking speed were generally larger in northern and continental Europe as compared to southern European populations in all wealth quintile groups (figures 5 and 6). The United States had similar grip strength and walking speed levels as the northern and continental European countries. Individuals in the highest quintile of wealth had generally higher grip strength and walking speed than those in the middle or lower wealth quintiles. The magnitude of wealth disparities in grip strength was similar in both northern and southern Europe and in the United States. Overall, real assets were more strongly related to grip strength than financial assets. Wealth disparities in walking speed were similar in northern and continental Europe and the United States, but were smaller or nonexistent in Spain, Greece, Austria and France.

Figures 7 and 8 compare the odds ratio of CVD and ADL limitations according to total net worth quintile in Europe and the United States. Overall, wealth disparities in the prevalence of these outcomes were larger in the United States than in Europe as a whole. In contrast, wealth disparities in grip strength and walking speed were similar in Europe and the United States (Figures 5 and 6).
Is the effect of wealth independent of income and education?

Figures 9 and 10 show the impact of adjusting for income quintile and education on the association between total net worth and the prevalence of CVD, ADL limitations and mean maximum grip strength. The association between wealth and health outcomes was partly attenuated after adjustment for these socioeconomic indicators, but remained substantial and significant both in Europe and the United States. Overall, adjustment for income and education attenuated the association between wealth and health outcomes by less than 40%. These results suggest that wealth is associated with health outcomes independently of income and education.

Explaining wealth disparities in health in Europe and the United States

Figures 11 and 12 show the impact of adjusting for health behaviour related risk factors on the association of total net worth with CVD and ADL limitations prevalence. Overall, adjustment for all risk factors attenuated wealth disparities in CVD and ADL limitations by less than half. The most important risk factors were alcohol consumption and physical activity, but their individual contribution to the wealth gradient was modest. Wealth disparities in CVD and ADL prevalence were attenuated after adjustment for depression (figures 13 and 14) by about 20%, contributing more than other individual risk factors. Similarly, adjustment for health care utilization attenuated wealth disparities by about 15-20%. After adjustment for all factors wealth disparities were attenuated by about half, but remain strong and significant in both Europe and the United States. A similar pattern was observed for wealth disparities in grip strength (figure 15).
Conclusion

This study provides evidence of a strong negative association between wealth and physical health across Europe and the United States. This association was consistent for several physical health indicators and objective health measures, and was independent from other socioeconomic indicators such as income and education. Previous studies have indicated that the magnitude of socioeconomic differentials in all-cause mortality in the United States are of about average size as compared to European countries. In contrast, our study yields evidence of a steeper wealth gradient in poor self-perceived health, cardiovascular disease and ADL limitations in the United States as compared to European populations among men and women aged 50 years or over. This pattern was however not observed for wealth disparities in grip strength and walking speed, which were close to the European average in the United States. Overall, real assets seemed to be more strongly associated than financial assets with disability indicators as reflected by ADL limitations and walking speed. Behavioural risk factors such as physical activity and alcohol consumption contribute marginally to wealth disparities in health outcomes, whereas the contribution of depression was more substantial. Health care utilization patterns also contribute to wealth disparities in both Europe and the United States. Overall, however, behavioural risk factors, depression and health care utilization explain only about half of the wealth gradient in physical health. Our results provide evidence of large international variation in wealth disparities in health across Europe and the United States, which may reflect differences between countries in welfare and social policies that exert an influence on the distribution of health in the population.
Figures & research questions

Figure 1. The prevalence of poor or very poor self-perceived health by total net worth, financial and real assets quintile in men and women 50 or older in 10 European countries and the United States.
Figure 2. The prevalence of cardiovascular disease (CVD) by total net worth, financial and real assets quintile in men and women 50 or older in 10 European countries and the United States.
Financial assets

Prevalence CVD

Real assets

Prevalence CVD
Figure 3. The prevalence of reporting 1 or more limitations with activities of daily living (ADL) by total net worth, financial and real assets quintile in men and women 50 or older in 10 European countries and the United States.
Figure 4. The prevalence of cancer by total net worth, financial and real assets quintile in men and women 50 or older in 10 European countries and the United States.
Financial assets

Prevalence cancer

Real assets

Prevalence cancer
Figure 5. Mean maximum grip strength (kg) by total net worth, financial and real assets quintile in men and women 50 or older in 10 European countries and the United States

Figure 6. Mean walking speed (m/s) by total net worth, financial and real assets quintile in men and women 76 or older in 10 European countries and the United States
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Figure 9. Odds ratio of self-reported CVD by total net worth after adjustment for income and education among men and women aged 50 years or over in Europe and the United States

Figure 10. Odds ratio of reporting one or more ADL limitations by total net worth after adjustment for income and education among men and women aged 50 years or over in Europe and the United States
Figure 11. Odds ratio of self-reported CVD by total net worth after adjustment for health-related behaviour among men and women aged 50 years or over in Europe and the United States.

Figure 12. Odds ratio of reporting one more limitations with ADL by total net worth after adjustment for health-related behaviour among men and women aged 50 years or over in Europe and the United States.
Figure 13. Odds ratio of self-reported CVD by total net worth after adjustment for health-related behaviour, depression and health care utilization among men and women aged 50 years or over in Europe and the United States

Figure 14. Odds ratio of reporting one more limitations with ADL by total net worth after adjustment for health-related behaviour, depression and health care utilization among men and women aged 50 years or over in Europe and the United States
Figure 15. Mean maximum grip strength by total net worth after adjustment for health-related behaviour, depression and health care utilization among men and women aged 50 years or over in Europe and the United States.
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