The Mortality Wealth Gap in the United States and Europe

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Abstract (237/250-300)

Background:

Amid growing wealth disparity, we have little information on how older Americans' health compares to Europeans across the wealth distribution.

Methods:

This longitudinal retrospective cohort study includes adults aged 50-85 from the Health and Retirement Study (HRS) and the Survey on Health, Aging, and Retirement in Europe (SHARE), from 2010-2022. Wealth quartiles were defined by age group and country. Mortality rates and Kaplan-Meier curves were estimated per wealth quartile across the US and 16 countries in Continental, Southern and Eastern Europe. Cox proportional hazards models adjusted for baseline covariates (age, gender, marital status, education, rural area, smoking, and diagnosed chronic conditions).

Results:

Among 73,838 individuals, aged (mean) 65 (SD) 9.8, 13,802 (18.7%) died during 10-year median follow-up. Across all participants, the wealthier quartiles were associated with lower mortality (adjusted hazard ratio [aHR, 95% confidence interval] Q2: 0.80, 0.76-0.83; Q3: 0.68, 0.65-0.71; Q4: 0.60, 0.57-0.63) than the poorest quartile. The US had a wider survival gap between the top and bottom wealth quartiles compared to Europe. Survival rates amongst the top wealth quartiles in Continental and Southern Europe appeared higher than survival rates among the wealthiest Americans. The wealthiest US quartile appeared to have comparable survival rates to the poorest quartile of Continental Europeans.

Conclusions:

In cohort studies conducted in the U.S. and Europe, greater wealth was associated with lower mortality, and the association between wealth and mortality appeared more pronounced in the US than in Europe.

Key Words: wealth disparities; social determinants of health; cross-country comparisons.

Introduction

In the past 60 years, the United States (US) has experienced a massive transfer of wealth from the middle class to the richest, increasing wealth inequality.[1,2] While other high-income countries have seen concurrent growth in wealth inequities, these remain less pronounced than in the US. The US also has lower, and decreasing, life expectancy.[3] These issues are of key concern, particularly as mortality increases are most pronounced amongst the poorest.[2]

For many reasons, wealth (i.e., the total assets and resources a person controls) is important to examine with regards to health, particularly for older adults. First, the distribution of wealth across countries is more unequal than that of income.[4–7] Income inequality can be addressed through taxation and other social redistribution, though wealth inequality tends to persist due to differences in inheritance taxation and savings rates.[4,8] Second, for those in later life who are retired and may have little to no earnings, wealth may influence health outcomes, through accessibility to healthcare,[9] formal long-term care, and even informal care.[10–12]

Comparing US wealth-health disparities with European countries who have different health, long-term care and other social supports may highlight the extent of US' inequality challenges. It can shed light on whether lower US life expectancy is a product of aggregating large variations across different socio-economic groups or illustrative of worse health across the board.[13] In this study, we evaluate the wealth-mortality across a longitudinal cohort of older adults from 2010-2022 in the US and Europe using data from the Health and Retirement Study (HRS) and the Survey of Health Aging and Retirement in Europe (SHARE). We answer the following questions: (1) What is the mortality gap along the wealth distribution in the US and Europe, and across US regions?; (2) What is the association between relative wealth and mortality adjusting for socio-demographic and clinical characteristics?

Methods

Data Sources

We used the RAND Health and Retirement Study (HRS) Longitudinal Database, which provides survey data on US adults aged 50 and above on health, mortality, wealth, and sociodemographic characteristics. Educational attainment and rural-urban status were obtained from the harmonized HRS via the Gateway for Global Aging (GG2A,https://g2aging.org). We used the Survey on Health, Aging and Retirement (SHARE), designed after HRS to facilitate comparative analysis with Europe.
We used individual waves and exit interviews for mortality and follow up, and the harmonized SHARE to identify baseline health, wealth, and sociodemographic characteristics. Survey details are included in Supplement Section 1.

Study Population

We identified participants interviewed in survey waves from 2010 (HRS: wave10; SHARE:wave 4). SHARE Countries were split into three groups, given the heterogeneity in history and welfare states across Europe[14–17]: Continental Europe (Austria, Germany, Sweden, Netherlands, France, Denmark, Switzerland, Belgium), Southern Europe (Spain, Italy, Portugal), and Eastern Europe (Czech Republic, Poland, Hungary, Slovenia, Estonia). We included participants aged between 50 and 85, at baseline, and followed them until the most recent wave (HRS:wave 15, 2020-2021; SHARE:wave 9, 2021-2022).

Key variables

Our main measure of wealth was total non-housing assets (Supplement Section 3). Our primary outcome was all-cause mortality from 2010-2022. If age at death was not available, we computed the difference between years of death and birth. Overall incidence rates per 1,000 person-years were computed by survey, country, and US census region.

We controlled for baseline marital status, gender, college education, rural-urban residence, smoking, and prior diagnoses of chronic conditions (cancer, heart disease, stroke, diabetes, or high blood pressure) to estimate the independent association between wealth and all-cause mortality. (Supplement Section 6.1) We also estimated the model without these covariates in sensitivity analyses, as these could also be intermediary variables through which wealth influences health.

In assessing the association between the distribution of wealth and mortality, each participant was classified into quartiles of wealth at baseline, measured in relation to the participant's age group (50-59;60-69;70-79;80-85) and country. Within the US, participants were classified into wealth quartiles according to age group and Census region. Details on data quality are included in Supplement Section 2, and on wealth metrics in Supplement Section 3.

Statistical analysis

We computed Kaplan-Meier (KM) survival estimates by wealth quartile and survey, compared using the log-rank test. Length of survival was measured as the elapsed time from participants' age at baseline until age of death or age of their last alive survey follow-up. Using a Cox proportional hazards model, we quantified the association between wealth quartile and all-cause mortality, across surveys, expressed as adjusted hazard ratios (aHR) and 95% confidence intervals (CI) using the lowest quartile and the US as comparators for the top 3 quartiles and the European surveys, respectively. The proportional hazards (PH) assumption was assessed for all models using a test of the Schoenfeld residuals and our primary model includes time varying components for covariates that do not satisfy the PH assumption. The widths of the intervals have not been adjusted for multiplicity and may not be used in place of hypothesis testing for all outcomes other than the primary one. The model adjusted for baseline age (50-59, 60-69, 70-79, 80-85) marital status, gender, college education, rural area, and prior doctor diagnosed disease (cancer, heart disease, stroke, diabetes, or high blood pressure). A similar K-M analysis was built for US Census Regions.

Several sensitivity analyses were performed, to examine robustness to: (1) the removal of covariates, (2) different measures of wealth and comorbidity, and for different age groups (3) the use of calibrated weights at baseline. Statistical analyses were performed using Stata 18 (StataCorp LLC;College Station, TX).

Results

Study population and baseline characteristics.

We identified 73,838 individuals (HRS (N=19,528), SHARE-East (N=18,859), SHARE-Continental (N=26,797), and SHARE-South (N=8,655)) from 17 countries, aged 50-85 at baseline. Most respondents were women and married. College education ranged from 8.3% in SHARE-South to 26.3% in SHARE-Continental. Few respondents lived in rural areas, ranging from 25.5% (SHARE-South) to 37.5% (SHARE-Continental); and 12.4% (Northeast) to 39.8% (Midwest) within the US. (Table 1, Table S10) Median follow up time was 10 years for both HRS and SHARE.

Median age at baseline was 64 across surveys. HRS had slightly higher proportions of individuals aged 50-59 years; the highest proportion of participants were 60-69. Across US Census Regions, median age ranged from 61 (West) to 66 (Midwest). Across all age groups, HRS (30.4%) had the lowest proportion with no baseline doctor diagnosed conditions, and SHARE-Continental had the highest (48%). Within the US, the range was 27.3% (Midwest) to 36.3% (West).

Wealth distribution

In HRS, median (p25-p75) wealth (real 2015 1,000s USD) was $36.2 (2-235), ranging from 21.6 (1-233, South) to 75.5 (8-308, Midwest). In SHARE, median wealth (real 2015 1,000s€) ranged from 0.8 (0-4, Poland) to 157.4 (36-470, Switzerland). (Table 2) Baseline wealth increased across age groups in the US and decreased in Europe. Across surveys, the proportion of women, no college education, and smoking decreased by wealth quartile. (Table S8)

All-cause mortality rates

During 10-year median follow-up (HRS and SHARE combined), 13,802 (18.7%) participants (mean (SD) age at baseline (65 (9)) reached the primary endpoint of all-cause death (4.80 per 1000 person-years). Mortality rates ranged from 2.90 (95%CI: 2.81-3.01) in SHARE-Continental to 6.49(6.31-6.68) in HRS. Within the US, West had the lowest mortality rate (5.0, 4.6-5.3) and the Midwest the highest (7.2, 6.8-7.6). (Table 2)

Association between mortality and wealth quartiles

K-M survival estimates by wealth quartile and survey are shown in the Figure 1 (log-rank:p<0.001 for all). Uniformly across surveys, the poorest wealth quartile had the lowest survival rate, and the wealthiest quartile had the highest survival. There was no evidence of a difference in survival rates between the wealthiest HRS participants and the poorest Continental Europeans in each follow-up year (Figure S2a; Table S11a). The poorest HRS participants appeared to have worse survival than all comparator groups, including the poorest quartiles in all three European Regions (Figure S2b; Table S11b).

Across all US Census Regions (Figure S3), there seems to be an increasing gap between survival of individuals in the poorest and wealthiest quartiles, over the study period. The gap between poorest and wealthiest appeared largest in the Midwest and in the South and lowest in the West.

In analyses including participants in both HRS and SHARE, estimated adjusted hazard rates (aHR, 95% CI) showed that, compared with the poorest (quartile 1), wealthier quartiles was associated with lower mortality hazards (Q2: 0.80, 0.76-0.83; Q3: 0.68, 0.65-0.71; Q4: 0.60, 0.57-0.63). (Figure 2, Table S13) Across wealth quartiles, we compared HRS participants to European participants at three time points, 2, 5, and 8 years, because we found the effects to vary over time. In particular, at two years, SHARE-Continental participants had an aHR of 0.60 (0.54-0.65) compared to HRS participants; at five years, the aHR became 0.61 (0.56-0.65); and at eight years, aHR=0.61 (0.57-0.66). Similarly, compared to HRS participants, SHARE-South participants had aHR=0.68 (0.60-0.76) at two years; aHR=0.71 (0.64-0.78) at five years; and aHR=0.72 (0.66-0.79) at eight years. Finally, SHARE-East participants had aHRs of 0.80 (0.73-0.87), 0.85 (0.78-0.91), and 0.87 (0.81-0.93), at two, five, and eight years, respectively. (Table S16). These results were robust to alternative assumptions regarding participants' length of survival, including (a) treating those with unknown status recorded as missing; and (b) assuming those who's last interview was by a proxy respondent to have died. (Figure S4; Table S15)

We found similar results when estimating the model separately for individuals with and without prior diagnosed conditions; without education, rurality, or no history diagnosed conditions; when applying total wealth (rather than total non-housing assets) as the

wealth metric; when using self-assessed health instead of diagnosis; and when using calibrated weights at baseline (Table S19-S24).

Finally, we estimated the model separately by age group at baseline (50-59; 60-69; 70-85) and found the hazard ratio always decreased across wealth quartiles. (Table S24) The association between wealth quartiles and mortality (aHR) varied across age groups, with greater mortality in the US across all age groups relative to Continental and Southern Europe, and for ages 60-69 and 70-85 relative to Eastern Europe. In the US, the greatest inequity between wealth quartiles was in ages 60-69, followed by 50-59 and the least in ages 70-85. (Table S24)

Discussion

This cross-country cohort study reveals meaningful differences in all-cause mortality by wealth quartile from 2010 to 2022. While all countries showed an association between wealth and mortality, the US has the widest gap in mortality between the bottom and top wealth quartiles. Mortality of the wealthiest Americans appeared worse than most Continental Europeans and the wealthiest Southern Europeans, and comparable to the poorest Continental Europeans and most Eastern Europeans. The poorest Americans appeared to have the worst survival of all wealth groups in the sample. US Regional differences were minimal, except for lower mortality among the wealthiest in Western states.

Wealth can influence health by affecting access to education, job opportunities, healthcare and social networks, all of which are important predictors of health.[26–31] Cultural, economic and policy differences may influence the degree to which wealth influences these factors. For example, we observed a larger share of the lowest wealth quartiles in Continental Europe attain college education compared to the US. We also observed that in the US, fewer individuals in the lowest wealth quartile were married, and there was greater inequality in smoking and rural living compared to Europe (Table S8). This may indicate that the relationship between wealth and education, healthy behaviors and social networks is more pronounced in the US relative to Europe.

When examining the wealth distributions, we observed greater absolute wealth in the US and Continental Europe than in Southern and Eastern Europe (Table 2), likely reflecting economic and political influences on wealth accumulation. While absolute wealth can impact health outcomes, we focus on relative wealth within countries, and find a relationship between individuals' relative wealth position and mortality. This has also been shown in relation to other indicators of social standing, such as income.[32] We also find evidence suggestive of a stronger 'survivor effect' in the US, where the least wealthy die disproportionately younger than in Europe. This aligns with reports of higher mid-life mortality in the US[19,21], and is reflected in our data, where median wealth at baseline increases in the US between ages 60-69, while it decreases in Europe.

While the US is known for having lower life expectancy than many high-income countries, recent studies suggest this is driven by higher mid-life mortality, particularly amongst the poorest.[18–22] It is commonly believed that socially advantaged Americans have health outcomes comparable to – or better than – than those in other high income countries,[23–25] and that the US has better survival than peer countries after the age of 75.[22] A key insight of our results is the comparison of similar wealth groups across countries. In our study, the poorest Americans appeared to have worse survival than all other comparator groups, even the poorest in Europe. It also appeared that mortality of the wealthiest Americans may be higher than the wealthiest Continental and Southern Europeans, and there is no evidence of a difference to the poorest Continental Europeans. While weaker social structures and limited healthcare access may explain the larger wealth-mortality gap in the US compared to Europe, and the greater comparative mortality of the poorest Americans, they are less likely to account for the poorer survival of wealthy Americans. Other systematic factors may influence longevity across social strata, such as diet, environment, behavioral, cultural and social attitudes and opportunities for social mobility.[2,20,22,33] The poorest are most vulnerable to these changes, but these broad systematic factors likely affect the entirety of society. Further comparative work examining how these factors differ across cross-national wealth cohorts can help identify if this is the case.[34]

Our study has limitations. First, while the study compared the mortality gap across countries, it does not allow causal inference on how wealth influences health. Nevertheless, our findings highlight factors that may be associated with the mortality gap present in the US and Europe. Adjusting for individual characteristics suggests that wealth is independently associated with mortality, and the US disadvantage was not explained by population differences. Conversely, regional differences in the US are mitigated by individual characteristics, yet relative wealth remains associated with mortality.

Second, our analysis was limited to individuals from SHARE's wave 4 subset of European countries, restricting generalizability across Europe. Third, we were limited by survey attrition, although survival analysis accounted for non-informative censoring, and mortality data were supplemented with exit interviews. Fourth, available survey data allowed control for only a set of individual characteristics. For example, racial and ethnic disparities in US wealth[35] and health outcomes[19,36], reflecting a legacy of slavery and systemic racism, could not be compared in Europe due to lack of race/ethnicity data. Finally, while we accounted for certain diagnosed conditions, we could distinguish between disease presence and access to diagnosis, though results remained consistent when controlling for self-assessed health.

Our work makes several contributions. First, we contribute to the description of poor and worsening mortality in the US,[18,21,41] by exploring comparative mortality amongst older adults among similar social groups. Importantly, we find that not only is the comparative US health disadvantage also present in older ages but pronounced in even amongst the wealthiest. Second, we extend the literature on socioeconomic disparities in health by adding a comparative perspective to the US,[36–40] focusing on wealth rather than income[10,43,49,42,45], and using more recent data prior literature.[42–48] Unlike studies that show similar survival rates for the highest *income* groups in the US and Europe, [25,50] we found that those in the highest US *wealth* quartiles had lower longevity than many of their European counterparts. One possible explanation is the difference in *incomes* across the *wealth* distribution, with the US having a higher concentration of high-income individuals in the top wealth quartile than Europe.[51] This suggests that using income as a measure of

socio-economic status may underestimate its impact on health[11,12], and the extent of this underestimation varies across countries.

Conclusion

We found that wealth was associated with mortality across the US and Europe and that the difference in mortality between the top and bottom quartiles of wealth appeared larger in the US than in Europe. Mortality in the US was higher than in Europe, even at higher wealth levels.

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Disclosures

The co-authors report no disclosures relevant to the contents of this work.

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Table 1. Study participants' characteristics.

Baseline sociodemographic characteristics and health status								
Survey	HRS		SHARE-East		SHARE-Continental		SHARE-South	
Individuals (N=73,838)	19,528		18,859		26,797		8,655	
Mean (SD) age at baseline	65 (9.8)		66 (9.2)		65 (9.2)		65 (9.0)	
	N	%	N	%	N	%	N	%
Female	11,077	56.7%	10,854	57.6%	14,733	55.0%	4,726	54.6%
Ever married	11,611	59.5%	12,366	65.6%	17,911	66.8%	6,685	77.2%
Rural area	5,479	28.2%	6,350	35.7%	9,614	37.5%	2,105	25.5%
College education	4,356	22.3%	3,099	16.4%	7,059	26.3%	720	8.3%
No prior conditions	5,927	30.4%	7,104	37.7%	12,864	48.0%	3,677	42.5%
Current smoker	3,106	15.9%	3,933	20.9%	5,008	18.7%	1,319	15.2%
Age group								
50-59	7,185	36.8%	6,054	32.1%	8,866	33.1%	2,567	29.7%
60-69	5,267	27.0%	6,788	36.0%	9,446	35.3%	3,037	35.1%
70-79	5,349	27.4%	4,613	24.5%	6,286	23.5%	2,316	26.8%
80-85	1,727	8.8%	1,404	7.4%	2,199	8.2%	735	8.5%

Table 2. Wealth distribution and all-cause mortality per 1,000 person years, by country and US Region

	Wealth in 1,000s, baseline			All-cause mortality		
	Real 2015 $USD (US) or € (Europe)			per 1,000 person follow-up years		
Survey	N	Median	1Q-3Q	Deaths	Rate	95% CI
HRS: US Census Regions	**19,534**	**36.2**	**2-234**	**4,719**	**6.5**	**6.3-6.7**
Northeast	2,983	33.5	1-233	696	6.2	5.7-6.7
Midwest	4,332	74.7	8-306	1,119	7.2	6.8-7.6
South	8,140	21.6	1-161	2,095	7.1	6.8-7.4
West	4,028	44.3	3-294	795	5.0	4.6-5.3
SHARE Continental	**26,758**	**44.7**	**11-173**	**3,218**	**2.9**	**2.8-3.0**
Austria	4,796	19.3	5-58	682	3.5	3.2-3.7
Germany	1,540	33.1	8-107	164	2.7	2.3-3.1
Sweden	1,850	77.4	25-229	334	5.0	4.4-5.5
Netherlands	2,649	36.1	11-100	162	1.4	1.2-1.6
France	5,344	32.1	8-130	757	2.3	2.1-2.5
Denmark	2,116	90.8	22-260	339	3.9	3.4-4.2
Switzerland	3,543	157.4	36-470	322	2.1	1.9-2.3
Belgium	4,920	59.4	14-209	701	3.4	3.1-3.6
South	**8,503**	**10.4**	**2-58**	**1,668**	**4.9**	**4.7-5.2**
Spain	3,290	8.2	1-68	757	6.0	5.6-6.4
Italy	3,323	15.6	4-60	602	4.5	4.2-4.9
Portugal	1,889	5.8	1-40	309	4.0	3.6-4.4
East	**18,844**	**3.6**	**0-18**	**4,197**	**5.8**	**5.6-6.0**
Czech Republic	5,173	5.3	1-20	932	4.6	4.1-4.7
Poland	1,657	0.8	0-4	427	7.3	6.6-8.0
Hungary	2,909	1.5	0-8	615	5.4	5.0-5.9
Slovenia	2,626	7.0	1-27	458	4.4	4.0-4.8
Estonia	6,479	3.5	0-33	1,765	7.6	7.3-8.0

Notes: The difference between total HRS and US-Census Regions is due to the 51 individuals coded as belonging to “Other” or “Missing” census region or, which are excluded from the regional analysis.

Figure 1. Kaplan-Meier survival estimates, by survey and wealth quartile.

Notes: The shaded area indicates the difference between top and bottom quartile in HRS and is added to each survey's graph for comparison purposes. 10-year median follow-up for both HRS and SHARE; mean (SD) age at baseline: 65 (9).

Figure 2. Cox Proportional Hazards adjusted hazard ratios estimates.

Notes: The model was estimated pooling HRS and SHARE using HRS as comparator for SHARE-Continental, SHARE-East, SHARE-South (left-hand side). Additional models were estimated separately for the US, comparing US Northeast Census Region with the Midwest, South, and West Census Regions and for SHARE, comparing SHARE-South with SHARE-Continental and SHARE-East. All models adjust for age group, gender, marital status, living in a rural area, having college education, and having no prior diagnosed conditions, and current smoking status. (See **Table S12** for covariate definitions) Age group estimates not included in the figure for clarity, full results are available in **Table S15**.