United States Government Accountability Office

Report to the Chairman, Committee on the Budget, U.S. Senate

September 2022

OLDER HOUSEHOLDS

Comparison of Income, Wealth, and Survival in the United States with Selected Countries

Accessible Version

GAO-22-103950

GAO Highlights

Highlights of GAO-22-103950, a report to the Chairman, Committee on the Budget, U.S. Senate

Why GAO Did This Study

Some researchers and policymakers have raised questions about whether differences in income, wealth, and longevity in the United States and other countries may affect older populations' financial security in retirement.

GAO was asked to compare income, wealth, and longevity trends in the United States and other countries. This report (1) compares trends in distributions of income and wealth, and disparities in survival rates for older households in the United States with those in Canada, Germany, and the United Kingdom; and (2) describes factors that contribute to any disparities in income and wealth distributions for older households in selected countries.

GAO selected countries based on the availability of comparable data and size of their economies. GAO analyzed the countries' distributions of income and wealth from 1998-2019 using the Luxembourg Wealth Study Database. GAO examined associations with 10-year survival rates in the United States and United Kingdom using data that followed older households from 2002-2012 in the English Longitudinal Study of Ageing and the Health and Retirement Study in the United States. GAO reviewed relevant literature, interviewed researchers and government officials in the selected countries, and sought input from the U.S. Census Bureau, Departments of Labor and the Treasury, Internal Revenue Service, and Social Security Administration.

View GAO-22-103950. For more information, contact Tranchau (Kris) T. Nguyen at (202) 512-7215 or NguyenTT@gao.

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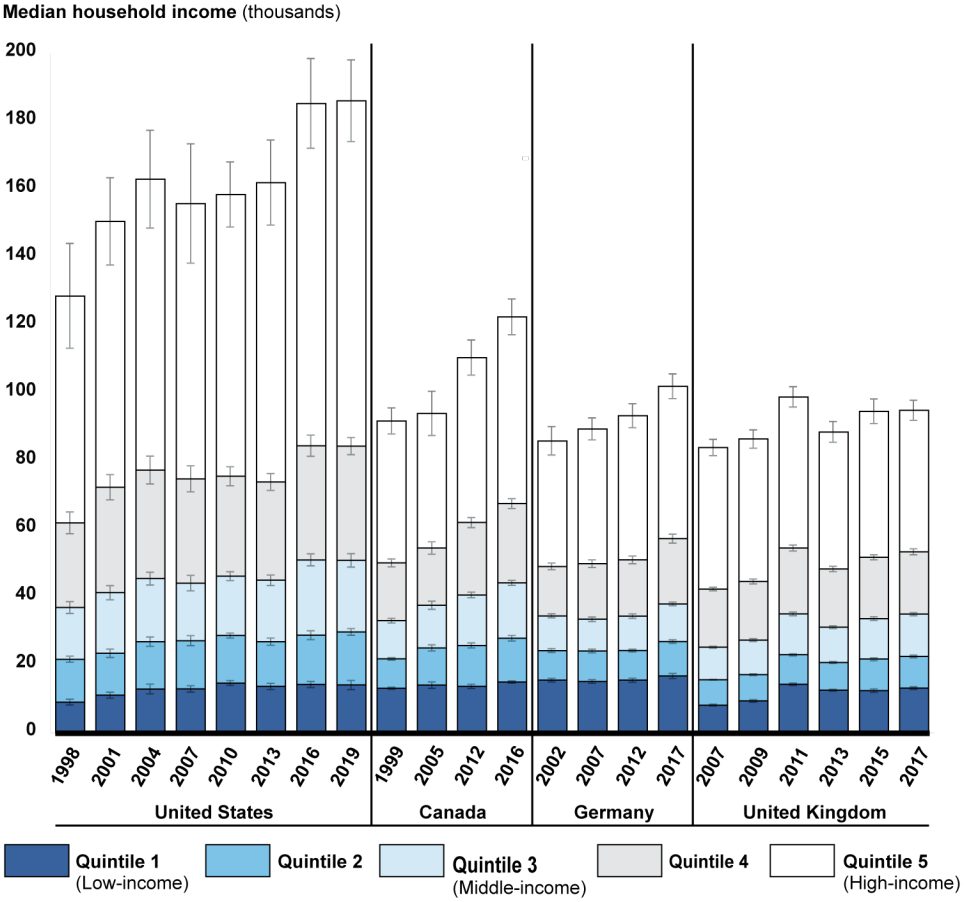
OLDER HOUSEHOLDS

Comparison of Income, Wealth, and Survival in the United States with Selected Countries

What GAO Found

Income and wealth disparities among older households were wider in the United States than in selected countries from 1998 through 2019, according to GAO's review of households headed by those 55 and older. For example, in 2007, the median, or "typical," income of high-income older households in the United States was about 12 times greater than that of low-income households, compared to about 6 times in Germany and about 10 times in the United Kingdom (see figure). GAO's analysis also indicates that income and wealth were more concentrated at the top of high-income and high-wealth older households in the United States, compared to other households in either the United States or selected countries. Further, GAO's analysis shows that high-wealth older households in the United States and United Kingdom held a greater proportion of their wealth in financial assets, relative to middle-wealth households. Still, homes and other non-financial assets made up the majority of total wealth for all older households GAO reviewed.

Median Income of Older Households in the U.S. and Selected Countries, by Quintile



Source: GAO analysis of data from the Luxembourg Wealth Study (LWS) database, 1998-2019. | GAO-22-103950

Data table for Median Income of Older Households in the U.S. and Selected Countries, by Quintile

	Year	Quintile 1 (Low-Income)	Quintile 2	Quintile 3 (Middle-Income)	Quintile 4	Quintile 5 (High-Income)
United States	1998	8,998.51	21,626	36,846.90	61,781.26	128,559.59
	2001	11,053.21	23,396	41,220.30	72,261.12	150,518.40
	2004	12,840.05	26,766	45,378.38	77,313.07	162,957.87
	2007	12,880.56	27,086	44,042.99	74,710.50	155,754.51
	2010	14,609.95	28,628	46,076.45	75,510.63	158,457.83
	2013	13,645.29	26,808	44,895.14	73,809.97	161,923.05
	2016	14,234.97	28,706	50,870.01	84,470.80	185,242.58
	2019	14,083.42	29,680	50,726.70	84,364.06	186,052.22
Canada	1999	13,101.58	21,752	32,985.29	49,983.31	91,771.32
	2005	14,009.19	24,945	37,523.84	54,396.58	93,983.56
	2012	13,642.45	25,650	40,549.55	61,890.84	110,404.63
	2016	14,909.88	27,836	44,124.69	67,461.58	122,402.18
Germany	2002	15,489.19	24,151	34,371.79	48,939.41	85,896.04
	2007	15,061.02	24,069	33,423.98	49,783.23	89,394.39
	2012	15,487.71	24,223	34,321.41	50,875.29	93,316.29
	2017	16,705.69	26,817	37,912.38	57,168.56	101,979.35
United Kingdom	2007	8,110.62	15,598	25,168.51	42,294.54	83,957.70
	2009	9,370.87	17,089	27,277.19	44,521.91	86,491.33
	2011	14,251.19	22,986	34,989.39	54,371.99	98,848.80
	2013	12,505.37	20,655	31,091.98	48,201.24	88,544.43
	2015	12,374.24	21,702	33,583.43	51,670.77	94,612.87
	2017	13,115.77	22,449	34,920.33	53,255.16	94,901.24

Confidence Intervals, Quintiles 1, 2 and 3

	Year	Quintile 1 (Low-Income)		Quintile 2		Quintile 3 (Middle-Income)	
		Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit
United States	1998	8,143.54	9,853.48	20,761	22,491	35,128.80	38,565.01
	2001	10,176.30	11,930.13	22,147	24,644	39,156.33	43,284.27
	2004	11,429.44	14,250.67	25,408	28,124	43,527.13	47,229.63
	2007	11,968.29	13,792.82	25,642	28,531	41,769.04	46,316.94
	2010	13,924.53	15,295.36	27,884	29,372	44,803.29	47,349.61
	2013	12,784.11	14,506.46	25,692	27,923	43,361.63	46,428.66
	2016	13,328.71	15,141.23	27,407	30,005	49,123.36	52,616.66
	2019	12,717.24	15,449.60	28,703	30,657	48,768.13	52,685.27
Canada	1999	12,832.71	13,370.45	21,394	22,111	32,322.10	33,648.49
	2005	13,097.81	14,920.58	24,101	25,788	36,358.08	38,689.59
	2012	13,020.05	14,264.85	24,917	26,383	39,736.02	41,363.07
	2016	14,539.53	15,280.23	27,045	28,627	43,365.51	44,883.87
Germany	2002	14,977.63	16,000.75	23,636	24,666	33,792.15	34,951.43
	2007	14,529.35	15,592.69	23,590	24,549	32,783.50	34,064.45
	2012	14,922.33	16,053.09	23,812	24,634	33,697.21	34,945.60

	Year	Quintile 1 (Low-Income)		Quintile 2		Quintile 3 (Middle-Income)	
		Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit
	2017	15,925.85	17,485.52	26,297	27,337	37,405.78	38,418.98
United Kingdom	**2007**	7,846.19	8,375.05	15,390	15,806	24,898.60	25,438.41
	2009	8,995.51	9,746.24	16,813	17,365	26,883.02	27,671.37
	2011	13,914.62	14,587.76	22,707	23,266	34,477.44	35,501.34
	2013	12,205.10	12,805.65	20,374	20,935	30,685.57	31,498.39
	2015	11,896.21	12,852.26	21,265	22,139	33,095.46	34,071.40
	2017	12,730.00	13,501.55	22,079	22,819	34,483.65	35,357.01

Confidence Intervals, Quintiles 4 and 5.

	Year	Quintile 4		Quintile 5 (High-Income)	
		Lower Limit	Upper Limit	Lower Limit	Upper Limit
United States	**1998**	58,567.33	64,995.20	113,121.81	143,997.37
	2001	68,576.85	75,945.40	137,727.20	163,309.58
	2004	73,227.50	81,398.63	148,559.86	177,355.88
	2007	70,889.22	78,531.77	138,205.08	173,303.93
	2010	72,721.48	78,299.78	148,890.43	168,025.23
	2013	71,359.26	76,260.69	149,416.75	174,429.36
	2016	81,351.12	87,590.48	172,019.93	198,465.22
	2019	81,865.15	86,862.98	174,032.91	198,071.53
Canada	**1999**	48,835.69	51,130.93	87,948.60	95,594.03
	2005	52,587.72	56,205.44	87,476.25	100,490.86
	2012	60,435.40	63,346.27	105,211.13	115,598.12
	2016	66,036.77	68,886.39	117,153.38	127,650.99
Germany	**2002**	47,945.05	49,933.77	81,737.82	90,054.27
	2007	48,660.28	50,906.18	86,191.39	92,597.40
	2012	49,751.91	51,998.68	89,792.04	96,840.54
	2017	55,832.84	58,504.27	98,341.80	105,616.91
United Kingdom	**2007**	41,768.25	42,820.84	81,551.96	86,363.44
	2009	43,836.59	45,207.22	83,780.90	89,201.76
	2011	53,487.58	55,256.40	95,879.13	101,818.48
	2013	47,407.33	48,995.15	85,505.45	91,583.41
	2015	50,944.86	52,396.68	91,002.09	98,223.64
	2017	52,383.07	54,127.24	91,936.04	97,866.44

Source: GAO analysis of data from the Luxembourg Wealth Study (LWS) database, 1998-2019. | GAO-22-103950

Note: GAO sorted households into quintiles based on income when the survey respondent, their partner or spouse, or both reported being 55 or older. For each quintile, GAO calculated median income, meaning the income of the "typical" household. GAO converted estimates to 2017 U.S. Dollar purchasing power parities, which were the most recent available at the time. Confidence intervals are reported at either the 99 or 95 percent level based on the availability of Luxembourg Wealth Study data.

Although the wealth data GAO reviewed indicate wider disparities in the United States than in selected countries over the period of review, these data did not include the estimated value of retirement benefits that older households expect to receive from public and private sources. GAO and some researchers have demonstrated how incorporating the value of these expected retirement benefits

shows wealth disparities that are somewhat smaller than measures that omit these benefits.

GAO's analysis indicates that higher income and wealth are associated with living longer among older individuals in the United Kingdom and United States. To compare survival between the United Kingdom and United States, GAO used data from 2002 through 2012, which are the most recent years for which there are reliable mortality data for both countries. The data sets GAO used for this analysis are unique in that they are representative of older individuals in the United Kingdom and United States and follow the same individuals as they age, while tracking their mortality over time, as well as their income, wealth, and other demographic information. As a result, GAO examined survival rates over a 10-year period, as a proxy for longevity.

GAO found that individuals from high-income and high-wealth households in the United States and United Kingdom were generally more likely to survive during the 10-year period compared to lower household income and wealth groups. For example, in the United States, the proportion of individuals in their seventies at the beginning of the study period who were alive at the end of the 10-year period ranged from 68 percent for those from the wealthiest households, to 44 percent for those from the least wealthy households. However, these patterns differed for the oldest individuals, who were in their eighties and nineties at the beginning of the study period. For example, survival rates for those in their nineties did not vary significantly based on wealth.

Educational attainment and homeownership in selected countries and the United States are associated with higher levels of income and wealth according to GAO's examination of data, review of research, and interviews. For example, in each of the selected countries, older households that have obtained postsecondary education tend to have higher incomes during their working years and subsequently higher levels of wealth during their older years. Homeownership is similarly associated with higher levels of wealth because, in part, a house serves as an asset that can increase in value, as well as a dwelling.

Other factors associated with income and wealth disparities include the cost of long-term care, which can quickly deplete the wealth of older households. However, research indicates that Germany mitigates the high costs of long-term care through nationwide long-term care insurance. Additionally, public retirement programs in selected countries and Social Security in the United States are designed in part to reduce disparities by providing a higher rate of payments to households with lower incomes. Similarly, income taxes in all three selected countries and the United States are designed in a way that can reduce income disparities, with marginal rates that increase by income.

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Abbreviations

DB	defined benefit
DC	defined contribution
ELSA	English Longitudinal Study of Ageing
GDP	Gross Domestic Product
HSE	Health Survey for England
HRS	Health and Retirement Study
IRA	individual retirement account
IRS	Internal Revenue Service
LIS	LIS Cross-National Data Center in Luxembourg
LWS	Luxembourg Wealth Study
OAS	Old Age Security
OECD	Organisation for Economic Co-operation and Development
SCF	Survey of Consumer Finances
USD	U.S. dollar

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September 15, 2022

The Honorable Bernard Sanders
Chairman
Committee on the Budget
United States Senate

Dear Mr. Chairman,

Income and wealth disparities among older households in the United States have increased in recent decades, and research indicates that disparities exist among older populations in other countries.[1] These disparities will likely affect an increasing share of populations in the United States and other countries that have aged markedly in recent decades.[2] While average life expectancy has generally increased, life expectancy has not increased uniformly across all income groups, and people who have lower incomes tend to have shorter lives than those with higher incomes.

As we have reported, some researchers and policymakers have raised questions about whether disparities in income, wealth, and life expectancy may affect many Americans' financial security in retirement.[3]

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[1]In 2019, we reported increased income and wealth disparities among households 55 and older based on our analysis of Survey of Consumer Finances (SCF) data from 1989 to 2016. GAO, *Retirement Security: Income and Wealth Disparities Continue Through Old Age*, GAO-19-587 (Washington, D.C.: August 9, 2019). In 2017, the United Nations reported on income and wealth disparities among older populations globally and cited inequalities in old age as an urgent challenge, because most older people live where income or wealth inequalities are highest. United Nations, *Economic Inequalities in Old Age* (June 5, 2017).

[2]See GAO, *Older Workers: Other Countries' Experiences with Phased Retirement*, GAO-19-16 (Washington, D.C.: February 28, 2019). According to the Organisation for Economic Co-operation and Development (OECD), the share of populations 65 and older in the United States and OECD countries as a whole have increased from under 10 percent in 1970 to more than 16 percent in 2020. OECD (2022), Elderly population (indicator), https://data.oecd.org/pop/elderly-population.htm, accessed on January 20, 2022. The Census Bureau projects that by 2030, those 65 and older will make up at least 20 percent of total populations in the United States, as well as in Canada, Germany and the United Kingdom. Census International Database: https://www.census.gov/data-tools/demo/idb/#/pop?COUNTRY_YEAR=2022&menu=popViz&COUNTRY_YR_ANIM=2022&POP_YEARS=2022,2030&popPages=BYAGE&FIPS=CA,GM,UK,US&ageGroup=O, accessed on January 11, 2022.

[3]GAO-19-587.

Researchers have asked similar questions about older populations in other countries. For example, the Organisation for Economic Co-operation and Development (OECD) reported that the risks of increasing inequality among future retirees have been building up and threaten to disrupt steady gains in living standards for older populations in OECD countries.[4] The experiences in other countries regarding income and wealth disparities among older households could provide useful insights for the United States.

You asked us to review how distributions of income and wealth, and longevity for older households in the United States compare to those in other countries, and how the experiences of other countries can inform the U.S. experience. This report (1) compares trends in distributions of income and wealth, and disparities in survival rates for older households in the United States with those in Canada, Germany, and the United Kingdom; and (2) describes factors that contribute to any disparities in income and wealth distributions for older households in selected countries.

We selected countries to compare with the United States based on interviews with officials at the Department of Labor, Internal Revenue Service, and Social Security Administration, and stakeholders that conduct pertinent research or administer data that can be compared across countries. We selected Canada, Germany, and the United Kingdom because these countries collect data on income, wealth, and mortality (from which survival rates can be estimated) that could be combined with U.S. data for comparisons across countries. This is referred to as harmonization.[5] We used the size of countries' economies, as measured by their Gross Domestic Product per capita, as an indicator

[4]OECD, *Preventing Ageing Unequally*, OECD Publishing (Paris, France: November 2017).

[5]Harmonization is a generic term for procedures used predominantly in official statistics that aim at achieving, or at least improving, the comparability of different surveys. Specifically, we used data sources from which the outputs of different national income and wealth surveys have been "mapped" into a unified measurement scheme, referred to as output harmonization. See Survey Research Center, *Guidelines for Best Practice in Cross-Cultural Surveys* (Ann Arbor, MI: Survey Research Center, Institute for Social Research, University of Michigan, 2016), retrieved April 7, 2022, from https://www.ccsg.isr.umich.edu/.

of the extent to which their economic and social frameworks are similar to the United States.[6]

To compare trends in distributions of income and wealth, and disparities in 10-year survival rates as a proxy for longevity,[7] between older households in the United States and those in selected countries, we pursued two sets of analyses.[8] To compare distributions of income and wealth over time, we analyzed data on households age 55 and older in the United States and in selected countries from 1998 through 2019,

[6]We recognize that other countries have different cultures, histories, and legal systems than the United States. Additionally, the laws, regulations, policies, and customs of other countries may not have the same effects if applied in the United States.

[7]For our longitudinal analysis, we used Gateway to Global Aging Data, a set of protocols that harmonizes income and wealth surveys conducted in other countries with the Health and Retirement Study (HRS) conducted in the United States. HRS is a nationally representative, longitudinal survey produced by the University of Michigan that follows the same set of Americans from their fifties through the remainder of their lives, and asks questions about income and wealth. We harmonized HRS with data from the English Longitudinal Study of Ageing (ELSA), which is conducted in England. For simplicity, in this report we refer to ELSA as providing data for the United Kingdom. There are 10 years of reliable data to analyze due to the limitations of the Harmonized ELSA data, as opposed to 22 years of reliable data in the RAND HRS. As a result, we cannot analyze longevity to the extent we did in our prior report, GAO-19-587. Because we have fewer years of data to analyze and compare, we use 10-year survival rates as a proxy for longevity in this analysis. See appendix IV for more information.

[8]Throughout the report, we use the term older households to refer to the populations used in our analyses. These variously included households age 50 and older, or age 55 and older, consistent with our prior review, see GAO-19-587. Specifically, for our cross-sectional analysis, we defined older households as those in which the household head or any spouses or partners were 55 or older. For our longitudinal analysis, we use data for households age 50 and older based on the design of the survey data on older households in selected countries.

using cross-sectional data.[9] To examine associations between household income or wealth and survival, we conducted longitudinal analyses of households age 50 and older in the United States and United Kingdom from 2002 through 2012, which are the most recent years for which there are reliable mortality data. The datasets we used for this analysis are unique in that they are representative of older individuals in the United Kingdom and United States and follow the same individuals as they age, while tracking their mortality over time, as well as their income, wealth, and other demographic information.[10] For each analysis, we sorted samples of older households into quintiles according to their level of income or wealth and calculated mean and median income and wealth for each quintile.

Countries we selected for review conduct national income and wealth surveys on varying schedules, which limited our ability to make comparisons across all four countries in a given year, or examine changes in a single country at regular intervals. Despite this limitation, the

[9]We used data from the Luxembourg Wealth Study (LWS) database, which harmonizes data from income and wealth surveys conducted in other countries with the Survey of Consumer Finances (SCF) conducted in the United States. SCF is a nationally representative survey of U.S. households produced by the Board of Governors of the Federal Reserve System. A different group of households is interviewed every 3 years about their debt, assets, and income, among other topics. For simplicity, in this report, we refer to LWS as providing data for the United Kingdom. Wealth and Assets Survey data used in LWS actually cover populations on the island of Great Britain, and do not include Northern Ireland or certain other areas within the United Kingdom. See appendix II for information on income and wealth surveys in Canada, Germany, and the United Kingdom. Although income and wealth data in LWS for Germany and the United Kingdom are longitudinal—meaning these countries generally surveyed the same households over time—we limited our analysis to an examination of cross-sections of older households. This is because data in LWS for Canada and the United States are cross-sectional, meaning each wave of surveys conducted in these countries may include different households.

[10]For our longitudinal analysis, we used Gateway to Global Aging Data, a set of protocols that harmonizes income and wealth surveys conducted in other countries with the Health and Retirement Study (HRS) conducted in the United States. HRS is a nationally representative, longitudinal survey produced by the University of Michigan that follows the same set of Americans from their fifties through the remainder of their lives, and asks questions about income and wealth. We harmonized HRS with data from the English Longitudinal Study of Ageing (ELSA), which is conducted in England. For simplicity, in this report we refer to ELSA as providing data for the United Kingdom. We have 10 years of reliable data to analyze due to the limitations of the Harmonized ELSA data, as opposed to 22 years of reliable data in the RAND HRS. As a result, we cannot analyze longevity to the extent we did in the prior report (GAO-19-587). Because we have fewer years of data to analyze and compare, we use 10-year survival rates as a proxy for longevity in this analysis. See appendix IV for more information.

data we reviewed provide useful insights about general disparities in distributions of income and wealth between the United States and selected countries, and their association with 10-year survival rates in the United States and the United Kingdom. For each of the datasets used in our study, we reviewed documentation, interviewed and corresponded with officials responsible for the data, and tested for outliers and missing data or variables. We determined that these data are sufficiently reliable for the purposes of this report.

To describe factors that contribute to disparities in income and wealth distributions among older households in our comparison countries, we interviewed government officials, academic researchers, and research organizations in Canada, Germany, and the United Kingdom. We also coordinated with national audit offices in selected countries. Where possible, we examined factors cited by interviewees using data for the United States and selected countries.[11] To provide additional context on factors associated with income and wealth distributions, we reviewed relevant government reports, scholarly and peer reviewed articles, working papers, and publications by research associations from January 2010 to May 2020. See appendix I for additional information on our scope and methodology.

We conducted this performance audit between November 2019 and September 2022 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

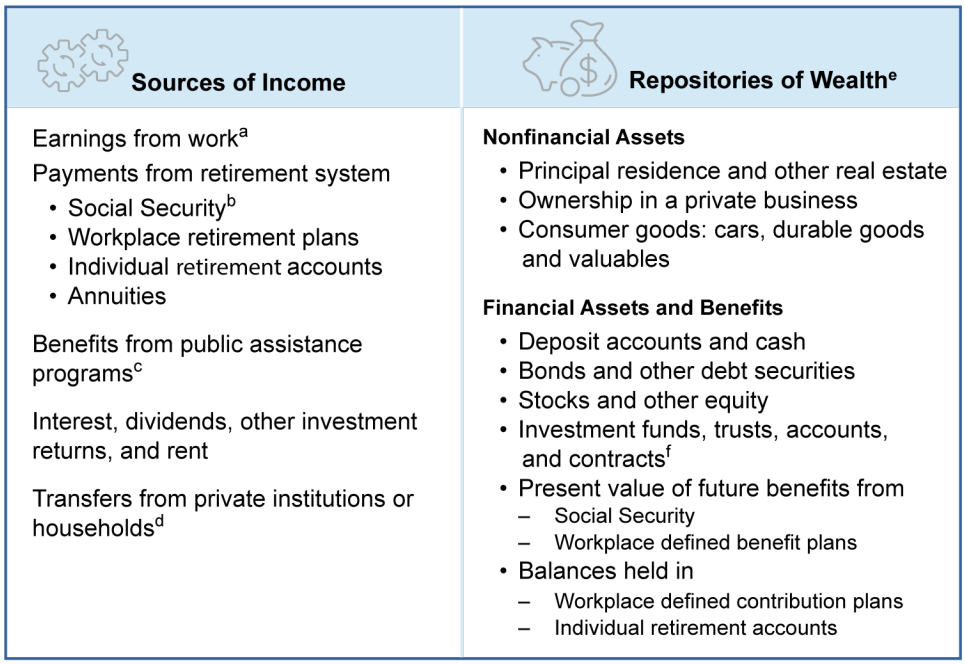
Background

Older households may derive income from a range of sources, such as earnings or retirement benefits. They may also have accumulated wealth

[11]A legal, regulatory, or policy feature leading to certain outcomes in one or more of the countries we studied, which may have significantly different cultures, histories, and legal systems than the United States, does not necessarily indicate that similar measures would lead to comparable outcomes in the United States. We did not conduct an independent legal analysis to verify all the information we gathered about selected countries' laws, regulations, or policies. Instead, we relied on appropriate secondary sources and interviews to support our work.

in a variety of assets, including a home, a family business, or stocks and bonds (see fig. 1).

Figure 1: Selected Sources of Income and Repositories of Wealth for Older Households



Source: GAO analysis of documents from LIS Cross-National Data Center. | GAO-22-103950

Text of Figure 1: Selected Sources of Income and Repositories of Wealth for Older Households

Sources of Income	Repositories of Wealth[e]

Earnings from work[a]
Payments from retirement system:
• Social Security[b]
• Workplace retirement plans
• Individual retirement accounts
• Annuities
Benefits from public assistance programs[c]
Interest, dividends, other investment returns, and rent
Transfers from private institutions or households[d]
	Nonfinancial Assets
	• Principal residence and other real estate
	• Ownership in a private business
	• Consumer goods: cars, durable goods and valuables
	Financial Assets and Benefits
	• Deposit accounts and cash
	• Bonds and other debt securities
	• Stocks and other equity
	• Investment funds, trusts, accounts, and contractsf
	• Present value of future benefits from
	  • Social Security
	  • Workplace defined benefit plans
	• Balances held in
	  • Workplace defined contribution plans
	  • Individual retirement accounts

Source: GAO analysis of documents from LIS Cross-National Data Center. | GAO-22-103950

[a]Payment for regular, intermittent, and self-employment. Reflects salary and monetary supplements such as overtime pay, employer bonuses, and tips. Also reflects fringe benefits such as the value of company cars, meals, housing, the value of medical expenses, or child care. Further includes the value of goods produced at home for consumption, such as food grown in a garden.

[b]As in the United States, retirement systems in Canada, Germany, and the United Kingdom include: a national pension, similar to the U.S. Social Security program; workplace traditional pensions or retirement savings plans; and individual savings, for example in Individual Retirement Accounts.

[c]Includes replacement of wages for parental leave and allowances for dependent children, unemployment and disability benefits, housing assistance, and in-kind benefits such as food assistance.

[d]Includes the value of scholarships, merit-based grants, and other goods and services provided by nonprofit institutions. Also reflects the payment of alimony and child support, or other remittances paid by a household member who is absent.

[e]In addition to saving and investing income, households may also inherit wealth.

[f]Includes pooled investment funds such as mutual funds, exchange-traded funds, hedge funds, private equity funds, venture capital funds, real estate investment funds, and managed future funds. Similarly includes investments trusts, such as unit investment trusts, real estate investment trusts, and natural resource trusts. Also includes managed investment accounts and derivative contracts, such as those based on the value of stock indices, currencies, interest rates, or commodity futures.

Retirement systems are a key source of income and wealth for many older households.[12] Similar to the United States, retirement systems in

[12]See appendix II for more information on selected countries' retirement systems.

other developed countries can be described as consisting of three main pillars: national pensions; workplace employer-sponsored pensions or retirement savings plans; and individual savings.[13] National pensions can be earnings-based and require employer and employee contributions over a number of years. They can also offer the same benefits, or a flat benefit, to everyone meeting criteria such as the number of years lived in a country.

Retirement plans can be broadly classified as defined benefit (DB) or defined contribution (DC). A DB plan promises retirement income—a stream of payments for the life of the retiree based on a formula that typically takes into account factors such as former salary, years of service, and age at retirement. A DC plan, such as a 401(k) plan in the United States, allows individuals to accumulate retirement wealth through employee and/or employer contributions to an individual account, and for

[13]National pensions may also be called public, statutory, or state pensions in some countries. The Old-Age, Survivors, and Disability Insurance program in the United States, referred to as Social Security, is an example of a national earnings-related public pension, in which beneficiaries' monthly payments are determined by a formula. The term employer-sponsored retirement plans refers to retirement plans that employers sponsor and make available to employees to participate. They are also called occupational, workplace, or company plans. We have reported on other retirement arrangements, such as state-run programs that encourage or require certain employers to offer workers the chance to contribute to retirement accounts. See GAO, *Retirement Security: Federal Action Could Help State Efforts to Expand Private Sector Coverage*, GAO-15-556 (Washington, D.C.: September 10, 2015). We have also reported on retirement plans and investment options offered to federal employees, as well as those established or operated by other countries and made available to workers, such as the United Kingdom's National Employment Savings Trust and Sweden's AP7. See GAO, *Retirement Savings: Federal Workers' Portfolios Should Be Evaluated For Possible Financial Risks Related to Climate Change*, GAO-21-327 (Washington, D.C.: May 25, 2021).

the investment returns earned on the account.[14] Individual savings include any home equity, investments, and other non-retirement savings.[15]

A household's overall financial condition can be assessed in different ways, for example, by looking at household wealth or income, which themselves can be measured in different ways. Wealth can be measured by the household's assets reduced by the household's liabilities, creating a measure of household net worth.[16] A household's liabilities include amounts owed on credit cards and loans, which can be used to buy houses, vehicles, and other consumer goods, invest in a business, pursue an education, or consolidate multiple sources of debt. We have reported that net worth is a measure often used by researchers studying retirement security.[17] A household's income can be measured before or

[14]In the United States, DC plans are far more common than DB plans. In 2019, there were nearly 15 times more DC plans than DB plans in the United States. These plans had more than three times the total participants of DB plans, took in more than five times the contributions, held more than twice the total assets managed by DB plans, and paid out more than twice the benefits. U.S. Department of Labor, Employee Benefits Security Administration, Form 5500 Annual filings for plan years ending in 2019, Table A1. DC plans typically offer workers more control over managing their retirement assets but also shift responsibility from employers to workers. For instance, workers often have to elect to participate in DC plans, whereas they are usually enrolled automatically in DB plans. Additionally, DC participants' savings at retirement depend on how much is contributed and the performance of their investments. In contrast, employers typically bear the investment risk of DB plans and generally must offer the option to take benefits as a lifetime annuity, or periodic payments until death. 26 U.S.C. § 401(a)(11). We have reported about potential challenges for households with low savings in DC plans, particularly low-income, Black, and Hispanic households. GAO, *Retirement Security: Low Defined Contribution Savings May Pose Challenges*, GAO-16-408 (Washington, D.C.: May 5, 2016).

[15]IRA balances can include assets rolled over from retirement plans, such as 401(k) plans. According to Internal Revenue Service (IRS) Statistics of Income data for tax year 2019, the most recent available, rollovers to IRAs totaled more than $554 billion, while contributions to IRAs totaled about $76 billion. IRS Statistics of Income Division, *Individual Retirement Arrangements Study, Table 1. Taxpayers with Individual Retirement Arrangements (IRA) Plans, by Type of Plan, Tax Year 2019* (February 2022).

[16]For the purposes of our analysis, we defined wealth to be a household's net worth. Our estimates of household net worth did not include the present value of benefits expected from Social Security or DB plans. This is because needed data were not available for all four countries. To address this limitation, we supplemented our analysis with findings from our past work, and that of others, on the impact of including these expected retirement benefits. See appendix I for more information on our scope and methodology.

[17]GAO-19-587.

after paying taxes, referred to as gross household income or disposable household income, respectively.[18]

Greater Income and Wealth Disparities Persisted among Older Households in the U.S.; Higher Household Income and Wealth Were Linked to Living Longer

Disparities in Income and Wealth among Older Households Were Greater in the United States Than in Selected Countries, but Data Do Not Fully Reflect Households' Retirement Wealth

Disparities between the typical incomes of older households in the United States with the highest and lowest incomes were wider than in our selected comparison countries, according to our analysis of data from the Luxembourg Wealth Study (LWS) database for 1998 to 2019.[19] Figure 2 shows that disparities in median incomes between high-income and other households were greater in the United States over the period of our review than in Canada, Germany, or the United Kingdom.[20] In 2007, 2013, and 2016—the 3 years in which data were available for both the United States and another selected country, allowing for the closest

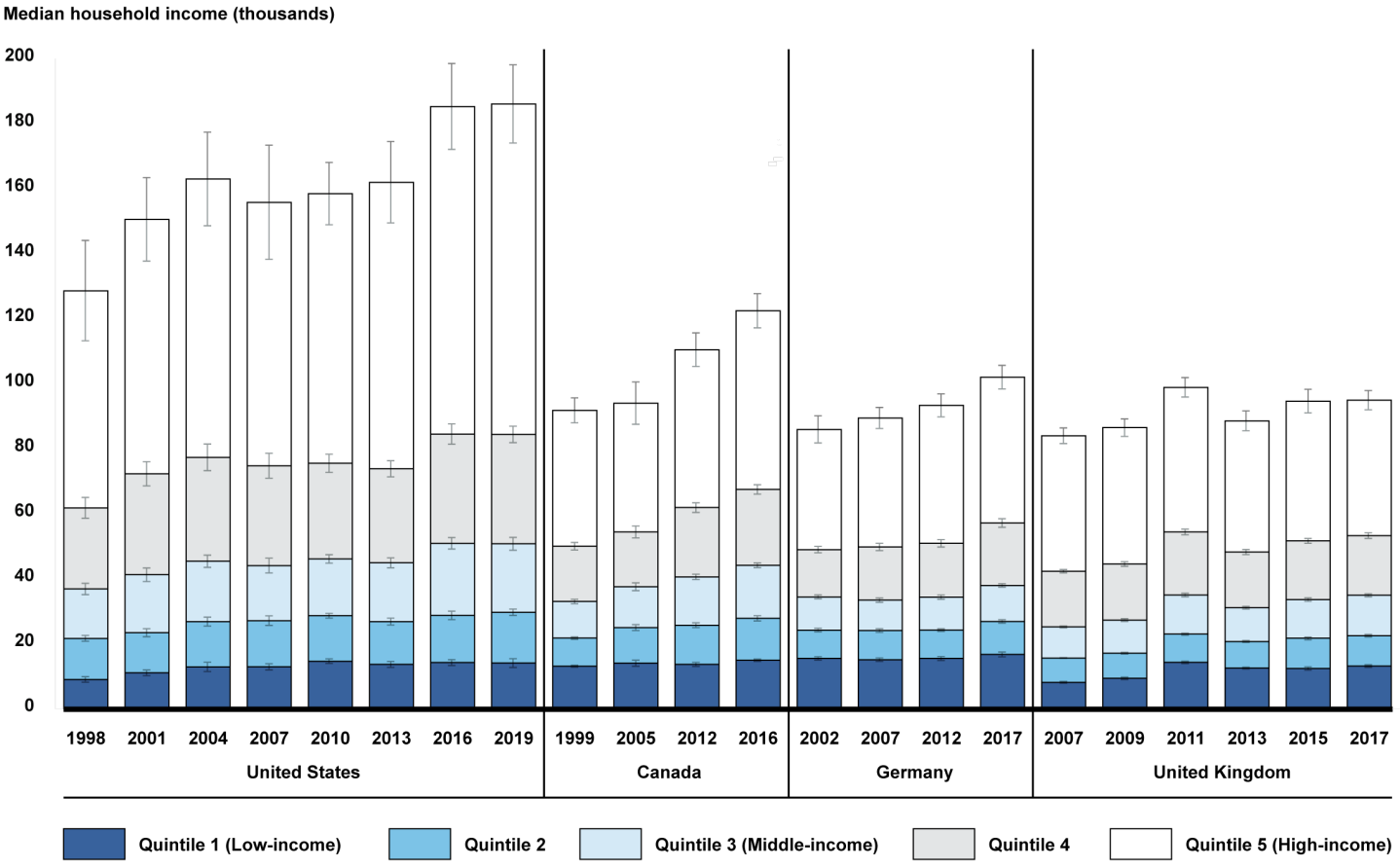
[18]Additionally, households may owe taxes on their property, capital gains, financial transactions, and inheritances or gifts. Households may also pay payroll taxes to finance Social Security programs, health care benefits, unemployment insurance, and other work-related benefits. While we report income measures before and after taxes, we report wealth measures only before taxes, such as capital gains taxes.

[19]For analysis of LWS data, we define "older households" as any household where the survey respondent, their partner or spouse, or both reported being 55 or older during the year of the survey. We convert all income and wealth estimates to 2017 U.S. Dollar purchasing power parities to adjust for inflation and allow comparisons between countries over time.

[20]To establish low-, middle- and high-income older households, we sorted older households in each country into quintiles based on income. We calculated median income, representing the "typical" household, for each quintile. For this analysis, we consider the 20 percent of households with the lowest incomes, or first quintile, to be low-income. We consider the 20 percent of households with incomes in the middle of the distribution, or third quintile, to be middle-income households. And we consider the 20 percent of households with the highest incomes, or fifth quintile, to be high-income.

comparisons— disparities between median high- and low-income households were greatest in the United States.[21] For example, in 2007, median income of high-income older households in the United States was about 12 times greater than that of low-income older households, as compared to about 6 times greater in Germany, and about 10 times greater in the United Kingdom. Similarly, in 2016 this differential was 13 times in the United States, compared to about 8 times in Canada.

Figure 2: Median Incomes of Older Households in the United States and Selected Countries, by Quintile



Source: GAO analysis of data from the Luxembourg Wealth Study (LWS) database, 1998-2019. | GAO-22-103950

[21]Although the data we used were harmonized to account for varying levels of inflation and currency values among countries, they do not account for variation in legal, regulatory, cultural, or historical influences that could affect the incomes of older households in different countries. Analyzing the potential impact of these influences was beyond the scope of this report.

Data table for Figure 2: Median Incomes of Older Households in the United States and Selected Countries, by Quintile

		Quintile 1 (Low-Income)	Quintile 2	Quintile 3 (Middle-Income)	Quintile 4	Quintile 5 (High-Income)
United States	1998	8,998.51	21,626	36,846.90	61,781.26	128,559.59
	2001	11,053.21	23,396	41,220.30	72,261.12	150,518.40
	2004	12,840.05	26,766	45,378.38	77,313.07	162,957.87
	2007	12,880.56	27,086	44,042.99	74,710.50	155,754.51
	2010	14,609.95	28,628	46,076.45	75,510.63	158,457.83
	2013	13,645.29	26,808	44,895.14	73,809.97	161,923.05
	2016	14,234.97	28,706	50,870.01	84,470.80	185,242.58
	2019	14,083.42	29,680	50,726.70	84,364.06	186,052.22
Canada	1999	13,101.58	21,752	32,985.29	49,983.31	91,771.32
	2005	14,009.19	24,945	37,523.84	54,396.58	93,983.56
	2012	13,642.45	25,650	40,549.55	61,890.84	110,404.63
	2016	14,909.88	27,836	44,124.69	67,461.58	122,402.18
Germany	2002	15,489.19	24,151	34,371.79	48,939.41	85,896.04
	2007	15,061.02	24,069	33,423.98	49,783.23	89,394.39
	2012	15,487.71	24,223	34,321.41	50,875.29	93,316.29
	2017	16,705.69	26,817	37,912.38	57,168.56	101,979.35
United Kingdom	2007	8,110.62	15,598	25,168.51	42,294.54	83,957.70
	2009	9,370.87	17,089	27,277.19	44,521.91	86,491.33
	2011	14,251.19	22,986	34,989.39	54,371.99	98,848.80
	2013	12,505.37	20,655	31,091.98	48,201.24	88,544.43
	2015	12,374.24	21,702	33,583.43	51,670.77	94,612.87
	2017	13,115.77	22,449	34,920.33	53,255.16	94,901.24

Confidence Intervals, Quintiles 1, 2 and 3

	Year	Quintile 1 (Low-Income)		Quintile 2		Quintile 3 (Middle-Income)	
		Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit
United States	1998	8,143.54	9,853.48	20,761	22,491	35,128.80	38,565.01
	2001	10,176.30	11,930.13	22,147	24,644	39,156.33	43,284.27
	2004	11,429.44	14,250.67	25,408	28,124	43,527.13	47,229.63
	2007	11,968.29	13,792.82	25,642	28,531	41,769.04	46,316.94
	2010	13,924.53	15,295.36	27,884	29,372	44,803.29	47,349.61
	2013	12,784.11	14,506.46	25,692	27,923	43,361.63	46,428.66
	2016	13,328.71	15,141.23	27,407	30,005	49,123.36	52,616.66

	Year	Quintile 1 (Low-Income)		Quintile 2		Quintile 3 (Middle-Income)	
		Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit
	2019	12,717.24	15,449.60	28,703	30,657	48,768.13	52,685.27
Canada	**1999**	12,832.71	13,370.45	21,394	22,111	32,322.10	33,648.49
	2005	13,097.81	14,920.58	24,101	25,788	36,358.08	38,689.59
	2012	13,020.05	14,264.85	24,917	26,383	39,736.02	41,363.07
	2016	14,539.53	15,280.23	27,045	28,627	43,365.51	44,883.87
Germany	**2002**	14,977.63	16,000.75	23,636	24,666	33,792.15	34,951.43
	2007	14,529.35	15,592.69	23,590	24,549	32,783.50	34,064.45
	2012	14,922.33	16,053.09	23,812	24,634	33,697.21	34,945.60
	2017	15,925.85	17,485.52	26,297	27,337	37,405.78	38,418.98
United Kingdom	**2007**	7,846.19	8,375.05	15,390	15,806	24,898.60	25,438.41
	2009	8,995.51	9,746.24	16,813	17,365	26,883.02	27,671.37
	2011	13,914.62	14,587.76	22,707	23,266	34,477.44	35,501.34
	2013	12,205.10	12,805.65	20,374	20,935	30,685.57	31,498.39
	2015	11,896.21	12,852.26	21,265	22,139	33,095.46	34,071.40
	2017	12,730.00	13,501.55	22,079	22,819	34,483.65	35,357.01

Confidence Intervals, Quintiles 4 and 5

	Year	Quintile 4		Quintile 5 (High-Income)	
		Lower Limit	Upper Limit	Lower Limit	Upper Limit
United States	**1998**	58,567.33	64,995.20	113,121.81	143,997.37
	2001	68,576.85	75,945.40	137,727.20	163,309.58
	2004	73,227.50	81,398.63	148,559.86	177,355.88
	2007	70,889.22	78,531.77	138,205.08	173,303.93
	2010	72,721.48	78,299.78	148,890.43	168,025.23
	2013	71,359.26	76,260.69	149,416.75	174,429.36
	2016	81,351.12	87,590.48	172,019.93	198,465.22
	2019	81,865.15	86,862.98	174,032.91	198,071.53
Canada	**1999**	48,835.69	51,130.93	87,948.60	95,594.03
	2005	52,587.72	56,205.44	87,476.25	100,490.86
	2012	60,435.40	63,346.27	105,211.13	115,598.12
	2016	66,036.77	68,886.39	117,153.38	127,650.99
Germany	**2002**	47,945.05	49,933.77	81,737.82	90,054.27
	2007	48,660.28	50,906.18	86,191.39	92,597.40

	Year	Quintile 4		Quintile 5 (High-Income)	
		Lower Limit	Upper Limit	Lower Limit	Upper Limit
	2012	49,751.91	51,998.68	89,792.04	96,840.54
	2017	55,832.84	58,504.27	98,341.80	105,616.91
United Kingdom	2007	41,768.25	42,820.84	81,551.96	86,363.44
	2009	43,836.59	45,207.22	83,780.90	89,201.76
	2011	53,487.58	55,256.40	95,879.13	101,818.48
	2013	47,407.33	48,995.15	85,505.45	91,583.41
	2015	50,944.86	52,396.68	91,002.09	98,223.64
	2017	52,383.07	54,127.24	91,936.04	97,866.44

Source: GAO analysis of data from the Luxembourg Wealth Study (LWS) database, 1998-2019. | GAO-22-103950

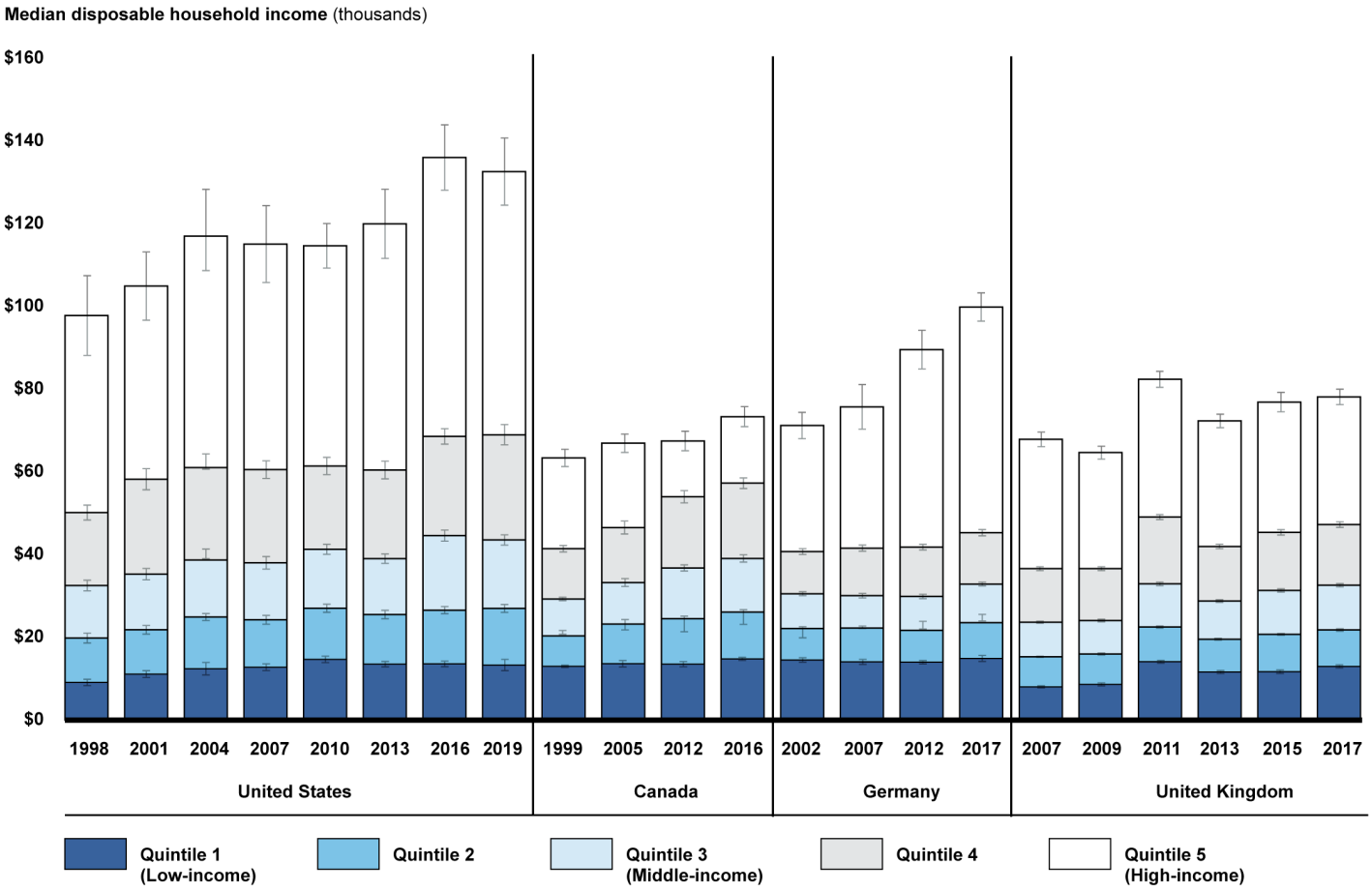
Notes: Median household income includes household income derived from work and investments, cash and non-cash transfers of a private nature—such as scholarships for college—and cash benefits from public retirement systems and other programs of assistance. It also includes payments from private retirement plans that recur at least once a year, such as monthly payments from a defined benefit plan, or annual programmed withdrawals from a defined contribution plan to satisfy minimum distribution requirements. It does not include one-time withdrawals from defined contribution plans, such as lump sum payments from 401(k) plans in the United States. It also does not include non-cash income, such as that derived by homeowners from living in their home, or by beneficiaries of public programs who receive assistance in the form of health care, housing, child care, or education benefits.

To establish low-, middle- and high-income older households for each country, we sorted households where the survey respondent, their partner or spouse, or both reported being 55 or older into quintiles based on income. We calculated median income, meaning the income of the “typical” household, for each quintile. For this analysis, we consider the 20 percent of households with the lowest incomes, or first quintile, to be low-income. We consider the 20 percent of households with incomes in the middle of the distribution, or third quintile, to be middle-income households. And we consider the 20 percent of households with the highest incomes, or fifth quintile, to be high-income.

We converted estimates to 2017 U.S. Dollar purchasing power parities—the most recent available at the time of our analysis—to adjust for inflation and differences in currency values. We report confidence intervals at either the 99 or 95 percent level based on the availability of supporting data in the LWS database.

Our analysis indicates that income disparities were higher in the United States compared to selected countries even after older households paid their taxes. Figure 3 shows that disparities between the disposable household incomes of typical high- and low-income households in the United States exceeded those in selected countries throughout the period of our review.

Figure 3: Median Incomes of Older Households After Taxes in the U.S. and Selected Countries, by Quintile



Source: GAO analysis of data from the Luxembourg Wealth Study (LWS) database, 1998-2019. | GAO-22-103950

Data table for Figure 3: Median Incomes of Older Households After Taxes in the U.S. and Selected Countries, by Quintile

	Year	Quintile 1 (Low-income)	Quintile 2	Quintile 3 (Middle-income)	Quintile 4	Quintile 5 (High-income)
United States	**1998**	9,107.84	19,852.86	32,537.42	50,205.31	97,839.19
	2001	11,130.70	21,843.93	35,302.18	58,262.02	104,991.09
	2004	12,423.73	24,930.71	40,190.78	62,554.49	118,544.24
	2007	12,806.23	24,260.68	38,042.88	60,583.51	115,134.79
	2010	14,694.90	27,065.04	41,315.08	61,460.85	114,712.61
	2013	13,536.12	25,530.46	39,048.31	60,479.41	120,030.86
	2016	13,620.01	26,586.78	44,632.03	68,621.78	136,068.11

	Year	Quintile 1 (Low-income)	Quintile 2	Quintile 3 (Middle-income)	Quintile 4	Quintile 5 (High-income)
	2019	13,324.93	27,000.89	43,574.18	69,006.37	132,652.21
Canada	**1999**	13,020.54	20,352.54	29,299.51	41,472.10	63,418.50
	2005	13,641.55	23,233.77	33,244.65	46,572.71	66,979.07
	2012	13,543.17	24,522.54	36,785.67	54,013.21	67,501.08
	2016	14,816.52	26,131.71	39,100.71	57,309.98	73,376.12
Germany	**2002**	14,546.88	22,136.07	30,564.40	40,763.70	71,249.01
	2007	14,085.51	22,271.89	30,109.72	41,592.59	75,759.68
	2012	14,003.03	21,692.58	29,920.07	41,829.28	89,604.53
	2017	14,920.93	23,555.64	32,886.67	45,337.42	99,890.85
United Kingdom	**2007**	8,054.30	15,309.36	23,667.58	36,620.24	67,900.43
	2009	8,641.54	15,977.89	24,079.40	36,635.96	64,704.25
	2011	14,130.53	22,521.99	32,946.35	49,100.07	82,417.99
	2013	11,645.18	19,565.55	28,808.62	41,996.26	72,350.75
	2015	11,715.49	20,736.14	31,352.86	45,400.24	76,904.21
	2017	12,997.09	21,833.21	32,635.19	47,289.05	78,155.34

Confidence Intervals, Quintiles 1, 2, and 3

	Year	Quintile 1 (Low-wealth)		Quintile 2		Quintile 3 (Middle-wealth)	
		Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit
United States	**1998**	8,344.59	9,871.08	18,665.47	21,040.25	31,233.53	33,841.31
	2001	10,301.93	11,959.47	20,798.30	22,889.55	33,932.66	36,671.69
	2004	10,906.66	13,940.80	24,108.45	25,752.97	39,020.22	41,361.34
	2007	11,988.26	13,624.19	23,209.53	25,311.84	36,547.15	39,538.61
	2010	13,916.19	15,473.61	26,078.07	28,052.02	40,105.28	42,524.89
	2013	12,875.52	14,196.72	24,508.89	26,552.02	37,890.78	40,205.83
	2016	12,930.48	14,309.53	25,709.97	27,463.59	43,310.66	45,953.40
	2019	11,971.98	14,677.87	26,041.82	27,959.97	42,335.56	44,812.79
Canada	**1999**	12,742.22	13,298.87	19,927.99	20,777.09	28,877.75	29,721.28
	2005	12,875.69	14,407.41	22,136.52	24,331.03	32,290.28	34,199.02
	2012	12,912.69	14,173.65	23,910.42	25,134.66	36,048.83	37,522.51
	2016	14,444.15	15,188.90	25,562.52	26,700.90	38,236.17	39,965.25
Germany	**2002**	14,016.97	15,076.80	21,676.40	22,595.74	30,110.95	31,017.85
	2007	13,484.11	14,686.91	21,811.86	22,731.91	29,569.94	30,649.50

	Year	Quintile 1 (Low-wealth)		Quintile 2		Quintile 3 (Middle-wealth)	
		Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit
	2012	13,586.36	14,419.71	21,378.25	22,006.92	29,401.21	30,438.93
	2017	14,202.11	15,639.76	23,150.78	23,960.50	32,419.95	33,353.39
United Kingdom	2007	7,799.07	8,309.52	15,164.76	15,453.95	23,437.93	23,897.23
	2009	8,285.70	8,997.38	15,735.06	16,220.72	23,765.36	24,393.45
	2011	13,791.02	14,470.03	22,252.53	22,791.44	32,533.98	33,358.72
	2013	11,288.05	12,002.31	19,355.72	19,775.39	28,477.76	29,139.48
	2015	11,294.30	12,136.68	20,526.31	20,945.97	30,959.88	31,745.84
	2017	12,626.07	13,368.11	21,534.35	22,132.06	32,234.43	33,035.96

Confidence Intervals, Quintiles 4 and 5

	Year	Quintile 4		Quintile 5 (High-wealth)	
		Lower Limit	Upper Limit	Lower Limit	Upper Limit
United States	1998	48,401.72	52,008.91	88,184.17	107,494.21
	2001	55,711.36	60,812.68	96,730.86	113,251.33
	2004	60,705.84	64,403.14	108,722.82	128,365.66
	2007	58,461.94	62,705.08	105,849.28	124,420.31
	2010	59,352.25	63,569.45	109,329.64	120,095.59
	2013	58,318.65	62,640.17	111,684.27	128,377.44
	2016	66,760.38	70,483.17	128,164.72	143,971.49
	2019	66,554.54	71,458.21	124,528.49	140,775.94
Canada	1999	40,066.51	41,460.89	61,333.67	65,503.32
	2005	40,856.10	42,329.08	64,752.16	69,205.99
	2012	41,162.47	42,496.09	65,149.35	69,852.81
	2016	44,583.68	46,091.15	70,959.94	75,792.29
Germany	2002	40,701.21	42,243.00	68,064.74	74,433.28
	2007	45,000.98	48,144.45	70,382.30	81,137.06
	2012	52,521.33	55,505.09	84,911.08	94,297.98
	2017	56,040.07	58,579.88	96,462.65	103,319.04
United Kingdom	2007	36,160.29	37,080.19	66,137.70	69,663.17
	2009	36,185.62	37,086.30	63,138.91	66,269.60
	2011	48,522.91	49,677.23	80,506.54	84,329.44
	2013	41,467.76	42,524.76	70,724.43	73,977.07
	2015	44,753.22	46,047.26	74,543.30	79,265.12

	Year	Quintile 4		Quintile 5 (High-wealth)	
		Lower Limit	Upper Limit	Lower Limit	Upper Limit
	2017	46,609.37	47,968.73	76,301.07	80,009.62

Source: GAO analysis of data from the Luxembourg Wealth Study (LWS) database, 1998-2019. | GAO-22-103950

Notes: Median disposable household income includes income from the following sources, less the amount of taxes and social contributions paid. Sources include household income derived from work and investments, cash and non-cash transfers of a private nature—such as scholarships for college—and cash benefits from public retirement systems and other programs of assistance. Median disposable household income also includes payments from private retirement plans that recur at least once a year, such as monthly payments from a defined benefit plan, or annual programmed withdrawals from a defined contribution plan to satisfy minimum distribution requirements. It does not include one-time withdrawals from defined contribution plans, such as lump sum payments from 401(k) plans in the United States. It also does not include non-cash income, such as that derived by homeowners from living in their home, or by beneficiaries of public programs who receive assistance in the form of health care, housing, child care, or education benefits.

To establish low-, middle- and high-income older households for each country, we sorted households where the survey respondent, their partner or spouse, or both reported being 55 or older into quintiles based on income. We calculated median disposable household income, meaning the income, after taxes, of the "typical" household, for each quintile. For this analysis, we consider the 20 percent of households with the lowest incomes, or first quintile, to be low-income. We consider the 20 percent of households with incomes in the middle of the distribution, or third quintile, to be middle-income households. And we consider the 20 percent of households with the highest incomes, or fifth quintile, to be high-income.

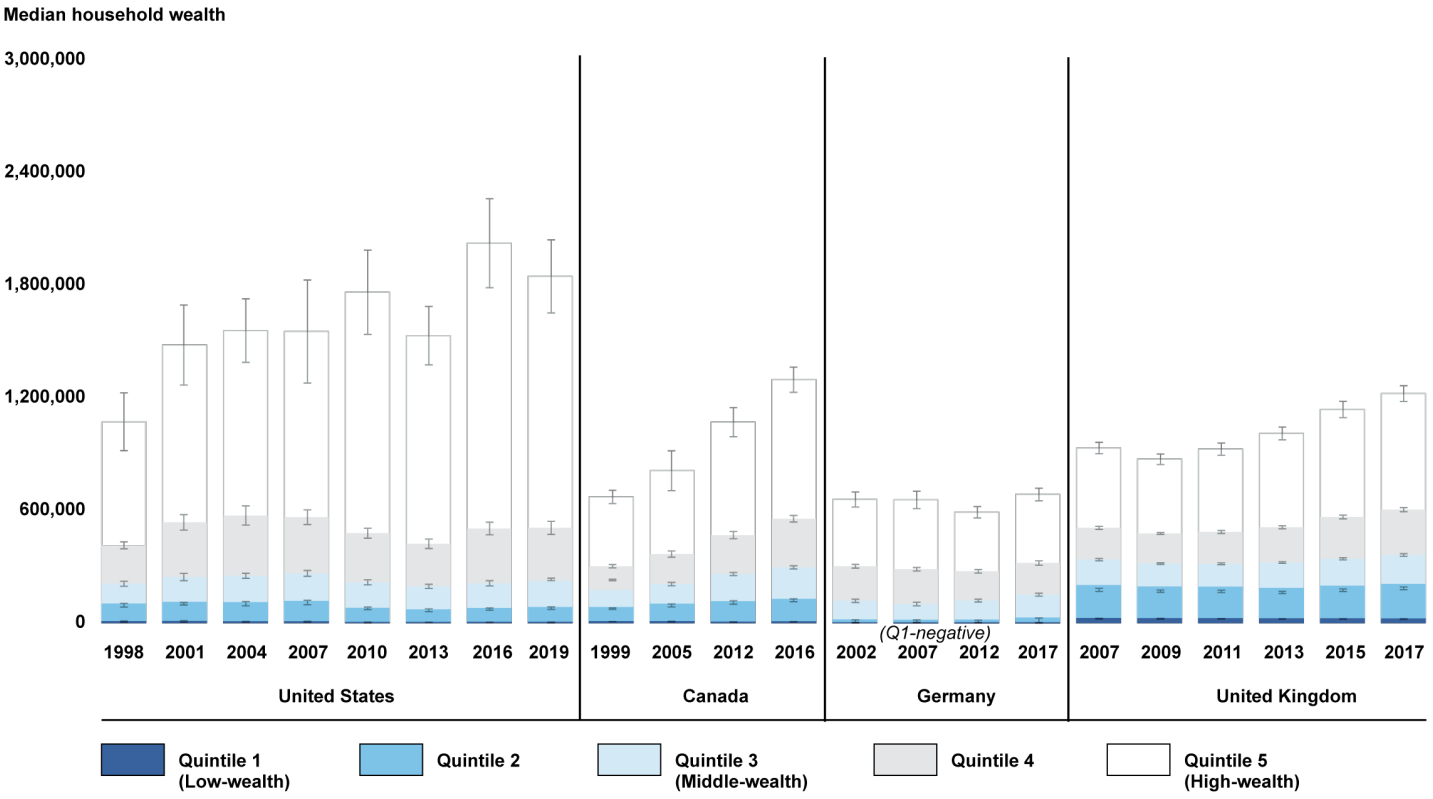
We converted estimates to 2017 U.S. Dollar purchasing power parities—the most recent available at the time of our analysis—to adjust for inflation and differences in currency values. We report confidence intervals at either the 99 or 95 percent level based on the availability of supporting data in the LWS database.

Our analysis of older households' assets and liabilities over the same period indicates that disparities between typical high- and low-wealth households were similarly greater in the United States.[22] Figure 4 indicates that disparities in median wealth between high-wealth and other older households were greater in the United States over the period of our review when compared to Canada, Germany, or the United Kingdom. However, the data we analyzed lacked key sources of retirement wealth

[22]We define household wealth as net worth, which includes financial and non-financial assets—such as homes, cars, or family-owned businesses—minus the value of total liabilities. This measurement of wealth does not include the present value of future benefits to be paid from public retirement programs or defined benefit workplace retirement plans. For example, wealth estimates for the United States do not include the present value of future Social Security benefits, or lifetime income expected from employer-sponsored defined benefit plans. In contrast, our measure of household wealth does include the value of assets held in defined contribution workplace retirement plans, such as 401(k) plans in the United States, and individual retirement accounts.

that could affect distributions, discussed in further detail below, which prevented direct comparisons between countries in a given year.[23]

Figure 4: Median Wealth of Older Households in the United States and Selected Countries, by Quintile



Source: GAO analysis of data from the Luxembourg Wealth Study (LWS) database, 1998-2019. | GAO-22-103950

[23]Additionally, Treasury officials and an agency official in the United Kingdom cited concerns about the accuracy of private business assets in the data used in LWS for the two countries. Treasury officials cited other recent estimates of wealth distributions in the United States that use different sources of data on private business assets, and a different method for deriving wealth, through the use of "capitalization models." This method relies on data other than the national income and wealth survey responses used in LWS. Instead, capitalization models incorporate data on household assets from sources such as the Financial Accounts of the United States and income tax returns. In 2020, the Federal Reserve reported that one of two wealth distributions created using capitalization models indicates increasing concentration of wealth among the top 1 percent of households in the United States since the Great Recession of 2007-2009, compared to survey data that we used in LWS, which do not indicate this trend. We acknowledge that using different methods and sources of data may show additional wealth disparities in particular segments of the wealth distribution. We maintain that the harmonized LWS data we used are sufficiently reliable to demonstrate the general trend that the United States had wider wealth disparities than selected countries over the period of our review.

Data table for Figure 4: Median Wealth of Older Households in the United States and Selected Countries, by Quintile

	Year	Quintile 1 (Low-wealth)	Quintile 2	Quintile 3 (Middle-wealth)	Quintile 4	Quintile 5 (High-wealth)
United States	**1998**	6,155.31	93,950.95	208,576.78	413,291.88	1,071,111.49
	2001	7,492.53	101,743.14	244,088.85	535,437.86	1,480,271.40
	2004	5,031.34	102,324.51	250,586.83	571,962.25	1,557,513.37
	2007	5,638.54	108,352.28	263,199.29	562,953.57	1,552,650.37
	2010	2,280.11	77,743.13	216,002.39	477,746.43	1,761,480.44
	2013	2,246.56	66,878.07	194,688.82	421,353.58	1,529,897.59
	2016	2,827.72	73,736.29	210,750.69	502,508.98	2,023,012.06
	2019	3,027.06	78,585.73	224,836.36	506,036.64	1,846,259.82
Canada	**1999**	6,132.84	75,506.58	174,851.79	301,363.87	671,128.90
	2005	6,312.84	92,887.99	206,695.35	366,846.13	810,667.26
	2012	3,705.60	108,787.58	260,471.09	467,457.22	1,069,636.17
	2016	5,488.11	119,849.90	295,815.50	554,847.36	1,295,705.65
Germany	**2002**	(11.76)	15,479.73	117,447.76	301,710.57	656,968.50
	2007	(116.84)	14,280.87	100,015.54	285,713.12	655,174.38
	2012	(40.00)	14,420.39	118,538.62	274,926.31	589,230.75
	2017	(12.36)	25,652.61	150,357.63	318,806.83	684,148.73
United Kingdom	**2007**	22,692.68	175,909.42	336,887.44	506,391.26	931,485.00
	2009	21,995.67	168,586.89	315,859.92	476,078.01	871,954.80
	2011	21,991.23	167,715.32	314,636.13	484,417.44	925,374.35
	2013	21,018.44	162,088.55	321,408.29	509,301.40	1,009,195.52
	2015	21,122.75	173,908.79	341,124.24	563,983.51	1,136,928.34
	2017	20,618.71	183,990.68	361,797.92	603,007.78	1,221,203.86

Confidence Intervals, Quintiles 1, 2, and 3

	Year	Quintile 1 (Low-wealth)		Quintile 2		Quintile 3 (Middle-wealth)	
		Lower Limit	Upper Limit	Lower Limit	Lower Limit	Lower Limit	Upper Limit
United States	1998	2,680.13	9,630.49	83,923.95	103,977.95	195,392.91	221,760.66
	2001	3,505.75	11,479.30	95,331.19	108,155.09	224,721.59	263,456.10
	2004	2,740.59	7,322.10	90,700.34	113,948.68	237,079.56	264,094.11
	2007	2,856.88	8,420.20	96,211.80	120,492.76	247,897.74	278,500.83
	2010	802.81	3,757.42	71,132.56	84,353.70	202,446.17	229,558.61
	2013	617.40	3,875.73	59,354.76	74,401.37	183,501.43	205,876.20
	2016	1,200.21	4,455.24	67,407.68	80,064.89	196,887.26	224,614.11
	2019	1,368.63	4,685.50	72,277.57	84,893.90	212,614.79	237,057.93
Canada	1999	5,170.42	7,095.25	71,648.38	79,364.79	169,212.55	180,491.04
	2005	3,838.18	8,787.51	84,831.73	100,944.25	197,836.53	215,554.17
	2012	1,999.74	5,411.45	99,726.66	117,848.50	251,951.94	268,990.24
	2016	4,067.68	6,908.53	112,488.84	127,210.96	287,488.19	304,142.81
Germany	2002	(2,491.22)	2,467.70	13,923.92	17,035.53	108,630.74	126,264.77
	2007	(2,943.73)	2,710.05	13,116.02	15,445.71	90,088.05	109,943.03
	2012	(1,327.71)	1,247.72	12,781.00	16,059.77	110,952.70	126,124.55
	2017	(1,335.91)	1,311.19	23,066.25	28,238.97	143,073.42	157,641.84
United Kingdom	2007	20,695.11	24,690.25	167,506.45	184,312.39	331,301.12	342,473.76
	2009	19,974.46	24,016.87	162,745.15	174,428.64	311,899.80	319,820.04
	2011	21,018.24	22,964.22	161,144.24	174,286.39	310,027.08	319,245.17
	2013	19,874.57	22,162.30	156,184.42	167,992.69	316,862.58	325,954.00
	2015	20,036.76	22,208.74	167,041.17	180,776.42	335,632.01	346,616.48
	2017	19,233.12	22,004.31	176,986.46	190,994.89	355,033.99	368,561.85

Confidence Intervals, Quintiles 4 and 5

	Year	Quintile 4		Quintile 5 (Middle-wealth)	
		Lower Limit	Lower Limit	Lower Limit	Lower Limit
United States	1998	394,687.84	431,895.93	917,305.68	1,224,917.31
	2001	494,459.04	576,416.68	1,267,408.31	1,693,134.49

	Year	Quintile 4		Quintile 5 (Middle-wealth)	
		Lower Limit	Lower Limit	Lower Limit	Lower Limit
	2004	520,912.12	623,012.37	1,388,552.38	1,726,474.37
	2007	524,073.50	601,833.63	1,278,354.82	1,826,945.93
	2010	451,441.50	504,051.36	1,536,933.91	1,986,026.98
	2013	396,510.47	446,196.69	1,374,044.95	1,685,750.24
	2016	468,583.02	536,434.94	1,785,677.16	2,260,346.95
	2019	471,253.92	540,819.35	1,651,587.28	2,040,932.36
	1999	292,352.12	310,375.62	635,697.62	706,560.17
	2005	350,462.60	383,229.65	704,507.50	916,827.02
	2012	448,586.43	486,328.01	991,855.04	1,147,417.31
Canada	2016	537,229.44	572,465.29	1,228,436.40	1,362,974.90
	2002	291,438.18	311,982.97	616,856.36	697,080.63
	2007	276,503.03	294,923.21	608,763.10	701,585.66
	2012	265,274.04	284,578.59	559,173.39	619,288.11
Germany	2017	307,197.49	330,416.18	650,836.20	717,461.26
	2007	498,518.26	514,264.26	901,444.47	961,525.53
	2009	470,908.63	481,247.40	843,903.94	900,005.66
	2011	476,830.09	492,004.79	893,178.26	957,570.44
	2013	501,754.50	516,848.31	975,437.32	1,042,953.72
	2015	554,362.48	573,604.54	1,093,105.33	1,180,751.35
United Kingdom	2017	592,379.30	613,636.25	1,179,428.55	1,262,979.16

Source: GAO analysis of data from the Luxembourg Wealth Study (LWS) database, 1998-2019. | GAO-22-103950

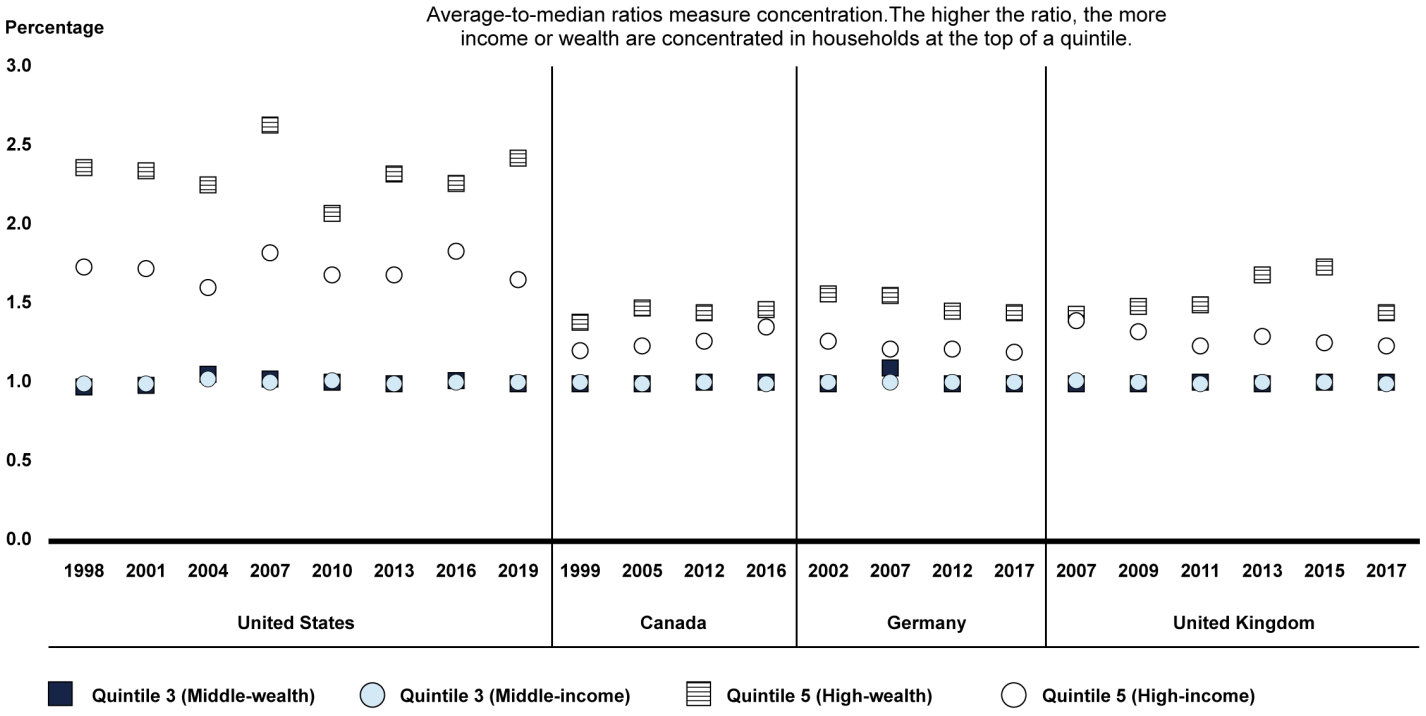
Notes: We define household wealth as net worth, which includes financial and non-financial assets—such as homes, cars, or family-owned businesses—minus the value of their total liabilities. This measurement of wealth does not include the present value of future benefits to be paid from public retirement programs or defined benefit workplace retirement plans. For example, wealth estimates for the United States do not include the present value of future Social Security benefits, or lifetime income from an employer-sponsored defined benefit plan. According to documentation for LWS, information on the present value of future retirement benefits is currently seldom available. In contrast, household net worth does include the value of balances held in defined contribution workplace retirement plans, such as 401(k) plans in the United States, and individual retirement accounts.

To establish low-, middle- and high-wealth older households for each country, we sorted households where the survey respondent, their partner or spouse, or both reported being 55 or older into quintiles based on wealth. We calculated median wealth, meaning the wealth of the "typical" household, for each quintile. For this analysis, we consider the 20 percent of households with the least wealth, or first quintile, to be low-wealth. We consider the 20 percent of households in the middle of the distribution, or third quintile, to be middle-wealth households. And we consider the 20 percent of households with the most wealth, or fifth quintile, to be high-wealth.

We converted estimates to 2017 U.S. Dollar purchasing power parities—the most recent available at the time of our analysis—to adjust for inflation and differences in currency values. We report confidence intervals at either the 99 or 95 percent level based on the availability of supporting data in the LWS database.

Our analysis indicates that income and wealth were more concentrated at the top of high-income and high-wealth older household groups in the United States compared to other household groups in either the United States or selected countries. Concentrations of income or wealth can be measured by calculating average-to-median ratios. These ratios measure the mean value of income or wealth (total value divided by the number of households) relative to the median value of income or wealth (the value of the middle household). The higher the ratio, the higher the mean value of income or wealth relative to the median value, suggesting that income or wealth are concentrated in households at the top of the quintile. Figure 5 shows that over the period of our review, average-to-median ratios for high-income and high-wealth older households exceeded those for middle-income and middle-wealth households in the United States. This indicates that income and wealth were more concentrated in the high-income and high-wealth groups than in the middle-income and middle-wealth household groups. Ratios for high-income and high-wealth households in the United States were also greater than those in selected countries, for corresponding household groups.

Figure 5: Concentration of Income and Wealth among High-Income and High-Wealth Older Households



Source: GAO analysis of data from the Luxembourg Wealth Study (LWS) database, 1998-2019. | GAO-22-103950

Data table for Figure 5: Concentration of Income and Wealth among High-Income and High-Wealth Older Households

	Year	Quintile 5 (High-Income)	Quintile 5 (High-wealth)	Quintile 3 (Middle-income)	Quintile 3 (Middle-wealth)
United States	**1998**	174.43%	237.32%	100.48%	98.31%
	2001	173.11%	235.14%	100.13%	98.83%
	2004	161.09%	225.84%	103.10%	106.00%
	2007	183.06%	263.52%	101.25%	102.77%
	2010	168.93%	207.52%	102.22%	101.30%
	2013	169.16%	233.24%	100.46%	100.47%
	2016	184.14%	226.95%	100.87%	102.45%
	2019	165.71%	242.83%	101.15%	100.12%
Canada	**1999**	121.27%	139.12%	101.28%	100.06%
	2005	124.09%	148.27%	100.06%	99.66%
	2012	127.06%	145.29%	100.87%	101.46%
	2016	135.54%	147.07%	100.41%	101.47%

	Year	Quintile 5 (High-Income)	Quintile 5 (High-wealth)	Quintile 3 (Middle-income)	Quintile 3 (Middle-wealth)
Germany	**2002**	126.97%	157.38%	100.56%	100.38%
	2007	122.37%	155.65%	100.95%	109.69%
	2012	121.70%	146.43%	100.78%	100.11%
	2017	119.57%	144.64%	101.22%	99.60%
United Kingdom	**2007**	139.73%	144.25%	101.69%	100.23%
	2009	133.23%	148.78%	101.31%	100.31%
	2011	123.58%	150.30%	100.41%	100.56%
	2013	130.13%	168.93%	100.87%	100.46%
	2015	125.94%	174.14%	100.78%	101.10%
	2017	124.30%	144.58%	100.32%	100.73%

Source: GAO analysis of data from the Luxembourg Wealth Study (LWS) database, 1998-2019. | GAO-22-103950

Notes: Average and median household income include household income derived from work and investments, cash and non-cash transfers of a private nature—such as scholarships for college—and cash benefits from public retirement systems and other programs of assistance. They also include payments from private retirement plans that recur at least once a year, such as monthly payments from a defined benefit plan, or annual programmed withdrawals from a defined contribution plan to satisfy minimum distribution requirements. They do not include one-time withdrawals from defined contribution plans, such as lump sum payments from 401(k) plans in the United States. They also do not include non-cash income, such as homeowners who derive benefits from living in their home, or by beneficiaries of public programs who receive assistance in the form of health care, housing, child care, or education benefits.

We define household wealth as net worth, which includes financial and non-financial assets—such as homes, cars, or family-owned businesses—minus the value of their total liabilities. This measurement of wealth does not include the present value of future benefits to be paid from public retirement programs or lifetime income from defined benefit workplace retirement plans. For example, wealth estimates for the United States do not include the present value of future Social Security benefits, or lifetime income from defined benefit workplace retirement plans. According to documentation for LWS, information on the present value of future retirement benefits is currently seldom available. In contrast, household net worth does include the value of balances held in defined contribution workplace retirement plans, such as 401(k) plans in the United States, and individual retirement accounts.

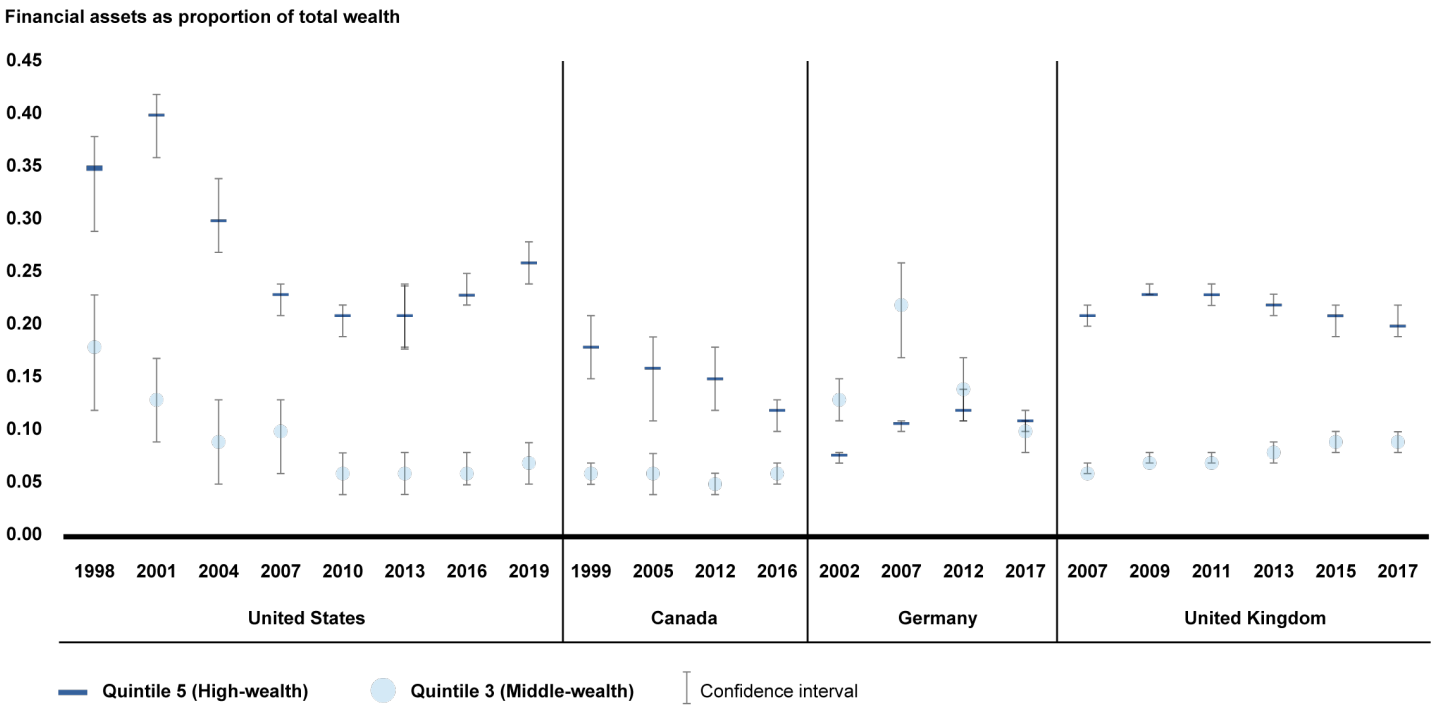
To establish middle- and high-income and middle- and high-wealth older households for each country, we sorted households where the survey respondent, their partner or spouse, or both reported being 55 or older into quintiles based on income or wealth. We calculated median income and wealth, meaning the income and wealth of the “typical” household, for the two quintiles. For this analysis, we consider the 20 percent of households in the middle of the distribution, or third quintile, to be middle-income or middle-wealth households. We consider the 20 percent of households with the most wealth, or fifth quintile, to be high-income or high-wealth.

We did not include the 20 percent of older households with the least income or wealth, which we refer to as low-income and low-wealth. This is because some low-wealth households in Germany and the United States had negative wealth in certain years. This can happen when, for example, a household’s credit card debt exceeds its savings.

We converted estimates to 2017 U.S. Dollar purchasing power parities—the most recent available at the time of our analysis—to adjust for inflation and differences in currency values. We report confidence intervals at either the 99 or 95 percent level based on the availability of supporting data in the LWS database.

Our analysis shows that, while homes and other non-financial assets made up the majority of total wealth for all middle-and higher-wealth older households, high-wealth older household in the United States and United Kingdom generally held a greater proportion of that wealth in financial assets, as opposed to homes and other nonfinancial assets, relative to middle-wealth households. As shown in figure 6, this occurred to a lesser extent in Canada, but was not the case in Germany.

Figure 6: Financial Assets as Proportion of Wealth Held by High- and Middle-Wealth Older Households



Source: GAO analysis of data from the Luxembourg Wealth Study (LWS) database, 1998-2019. | GAO-22-103950

Data table for Figure 6: Financial Assets as Proportion of Wealth Held by High- and Middle-Wealth Older Households

Quintile 5 (High-wealth)

	Year	Financial Assets as Proportion of Total Wealth	Lower Confidence Limit	Upper Confidence Limit
United States	**1998**	0.35	0.29	0.38
	2001	0.40	0.36	0.42
	2004	0.30	0.27	0.34
	2007	0.23	0.21	0.24

	Year	Financial Assets as Proportion of Total Wealth	Lower Confidence Limit	Upper Confidence Limit
	2010	0.21	0.19	0.22
	2013	0.21	0.18	0.24
	2016	0.23	0.22	0.25
	2019	0.26	0.24	0.28
Canada	**1999**	0.18	0.15	0.21
	2005	0.16	0.11	0.19
	2012	0.15	0.12	0.18
	2016	0.12	0.10	0.13
Germany	**2002**	0.08	0.07	0.08
	2007	0.11	0.10	0.11
	2012	0.12	0.11	0.14
	2017	0.11	0.10	0.12
United Kingdom	**2007**	0.21	0.20	0.22
	2009	0.23	0.23	0.24
	2011	0.23	0.22	0.24
	2013	0.22	0.21	0.23
	2015	0.21	0.19	0.22
	2017	0.20	0.19	0.22

Quintile 3 (Middle-wealth)

	Year	Financial Assets as Proportion of Total Wealth	Lower Confidence Limit	Upper Confidence Limit
	1998	0.18	0.12	0.23
	2001	0.13	0.09	0.17
	2004	0.09	0.05	0.13
	2007	0.10	0.06	0.13
	2010	0.06	0.04	0.08
	2013	0.06	0.04	0.08
	2016	0.06	0.05	0.08
United States	**2019**	0.07	0.05	0.09
	1999	0.06	0.05	0.07
	2005	0.06	0.04	0.08
	2012	0.05	0.04	0.06
Canada	**2016**	0.06	0.05	0.07

	Year	Financial Assets as Proportion of Total Wealth	Lower Confidence Limit	Upper Confidence Limit
Germany	2002	0.13	0.11	0.15
	2007	0.22	0.17	0.26
	2012	0.14	0.11	0.17
	2017	0.10	0.08	0.11
United Kingdom	2007	0.06	0.06	0.07
	2009	0.07	0.07	0.08
	2011	0.07	0.07	0.08
	2013	0.08	0.07	0.09
	2015	0.09	0.08	0.10
	2017	0.09	0.08	0.10

Source: GAO analysis of data from the Luxembourg Wealth Study (LWS) database, 1998-2019. | GAO-22-103950

Notes: We define household wealth as net worth, which includes financial and non-financial assets—such as homes, cars, or family-owned businesses—minus the value of their total liabilities. This measurement of wealth does not include the present value of future benefits to be paid from public retirement programs or defined benefit workplace retirement plans. For example, wealth estimates for the United States do not include the present value of future Social Security benefits, or lifetime income from an employer-sponsored defined benefit plan. According to documentation for LWS, information on the present value of future retirement benefits is currently seldom available. In contrast, household net worth does include the value of balances held in defined contribution workplace retirement plans, such as 401(k) plans in the United States, and individual retirement accounts.

To establish middle- and high–wealth older households for each country, we sorted households where the survey respondent, their partner or spouse, or both reported being 55 or older into quintiles based on wealth. We calculated median wealth and the median value of financial assets by quintile, meaning the wealth and financial assets of the "typical" household in each. For this analysis, we consider the 20 percent of households in the middle of the distribution, or third quintile, to be middle-wealth households. We consider the 20 percent of households with the most wealth, or fifth quintile, to be high-wealth.

We did not include the 20 percent of older households with the least wealth, or first quintile, which we refer to as low-wealth. This is because some low-wealth households in Germany and the United States had negative wealth in certain years. This can happen when, for example, a household's credit card debt exceeds its savings.

We converted estimates to 2017 U.S. Dollar purchasing power parities—the most recent available at the time of our analysis—to adjust for inflation and differences in currency values. We report confidence intervals at either the 99 or 95 percent level based on the availability of supporting data in the LWS database.

OECD researchers similarly reported in 2018 that financial assets were much more important at the top of household wealth distributions in OECD countries, particularly in the United States, followed by the United

Kingdom.[24] They found that high-wealth households of all ages in the United States primarily held financial assets in the form of nonpublicly traded stocks,[25] mutual funds, and other investment funds, while high-wealth households in the United Kingdom primarily held wealth in voluntary private pension funds, business assets, and deposits. By comparison, high- and middle-wealth households in most other OECD countries held the majority of their wealth in homes and other real estate assets. OECD researchers noted that middle-wealth households in Germany held a larger proportion of their wealth in financial assets than middle-wealth households in many OECD countries. Middle-wealth households in Germany also held the lowest proportion of their wealth in homes and other-real estate assets compared to other OECD countries.[26] Additionally, a researcher at the International Monetary Fund reported that, in contrast to other economies with large industrial bases, the majority of corporate assets and profits in Germany are generated by firms in private ownership, meaning there is generally less opportunity for the population to take ownership of public companies, for example by purchasing stocks or mutual funds.[27]

[24]Carlotta Balestra and Richard Tonkin, *Inequalities in household wealth across OECD Countries: Evidence from the OECD Wealth Distribution Database*, Working Paper No. 88 (Paris, France: June 20, 2018).

[25]We reported that a few individuals, for example, founders of companies, can use IRAs to invest in nonpublicly traded shares of their newly formed companies and realize many millions of tax-favored gains on their investment if the company is successful. We found that Congress likely did not intend for IRAs to accumulate such large balances, having originally authorized them largely to ensure equitable tax treatment for individuals without access to an employer-sponsored retirement plan. As a result, we included a matter that Congress consider revisiting its legislative vision for the use of IRAs and made five recommendations to IRS. IRS implemented three recommendations to improve IRS's ability to detect and pursue noncompliance associated with undervalued assets sheltered in IRAs and prohibited transactions. Further, IRS implemented one of our two recommendations to improve compliance by helping taxpayers better understand compliance and risks associated with certain IRA choices. GAO, *Individual Retirement Accounts: IRS Could Bolster Enforcement on Multimillion Dollar Accounts, but More Direction from Congress Is Needed*, GAO-15-16 (Washington, D.C.: October 20, 2014).

[26]OECD researchers reported that real-estate wealth represented the largest share of gross assets for middle wealth households in 28 OECD countries, ranging from 53 percent in Germany to 89 percent in both Slovenia and Chile. The researchers reported data as of 2015 or the most recent year available at the time. Balestra and Tonkin (2018).

[27]Mai Chi Dao and Shekhar Aiyar, *Wealth Inequality and Private Savings: The Case of Germany*, Working Paper 20/107 (International Monetary Fund, June 2020).

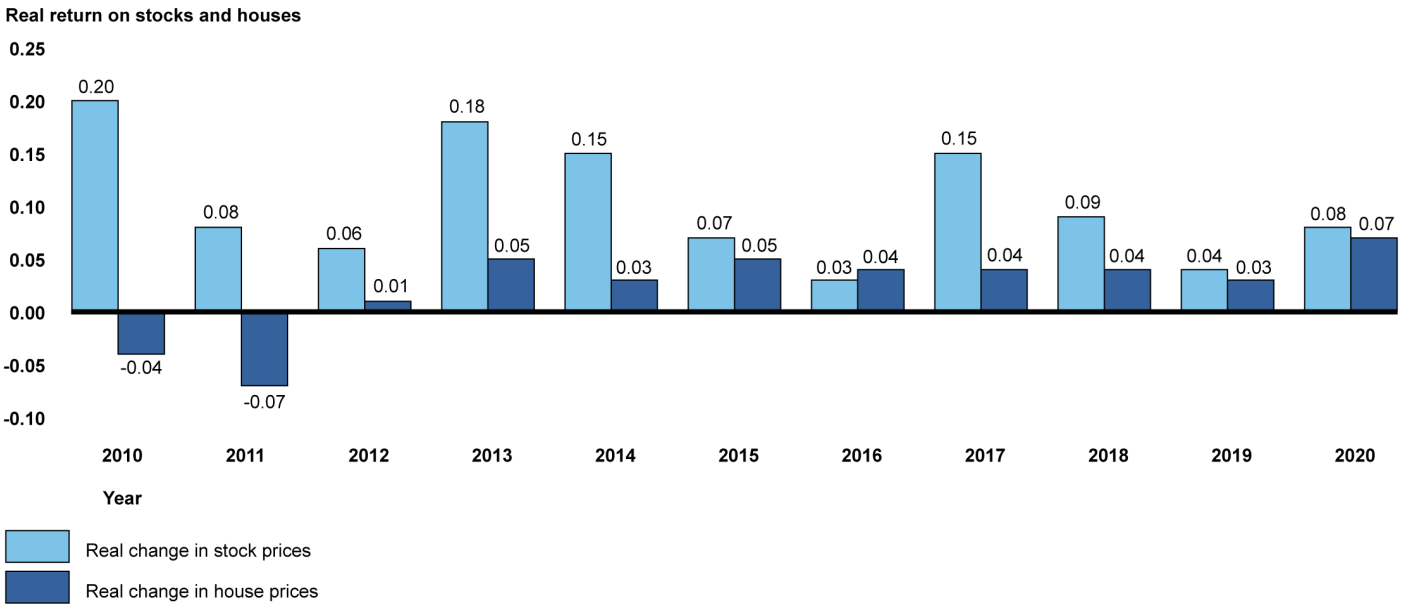
Some research suggests that in the United States, high-wealth households' greater stake in financial assets made them more resilient in the aftermath of the Great Recession of 2007-2009 than middle-wealth households, whose wealth was primarily composed of houses and other real estate assets. Researchers from the Federal Reserve found that declines in housing prices had a disproportionately negative effect on middle-wealth households, while high-wealth households experienced moderate to large wealth increases in part from their ownership of financial assets that increased in value.[28] Further, the researchers found that despite broad ownership of financial assets in the United States, only certain families at the top of the wealth distribution experienced particularly large gains in the values of their financial assets in the years after the Great Recession.[29] Researchers at OECD concluded that these trends—increases in stock prices relative to housing prices in the wake of the Great Recession (see fig. 7)—contributed to a significant rise in wealth inequality in the United States from 2007 to 2016.[30]

[28]Returns from this period cannot be generalized. Further, older Americans may invest in houses instead of stocks for reasons other than investment returns. For example, homes serve as place in which to live, as well as an investment from which to generate wealth.

[29]Jesse Bricker, Lisa J. Dettling, Alice Henriques, Joanne W. Hsu, Lindsay Jacobs, Kevin B. Moore, Sarah Pack, John Sabelhaus, Jeffrey Thompson, and Richard A. Windle, "Changes in U.S. Family Finances from 2013 to 2016: Evidence from the Survey of Consumer Finances," *Federal Reserve Bulletin*, Vol. 103, No. 3 (Board of Governors of the Federal Reserve System, September 2017).

[30]Balestra and Tonkin (2018).

Figure 7: Average Annual Returns of Stocks and Houses, 2010-2020



Source: GAO analysis of data from the Luxembourg Wealth Study (LWS) database, 1998-2019. | GAO-22-103950

Data table for Figure 7: Average Annual Returns of Stocks and Houses, 2010-2020

Year	Real Change in Stock Prices	Real Change in House Prices
2010	0.20	-0.04
2011	0.08	-0.07
2012	0.06	0.01
2013	0.18	0.05
2014	0.15	0.03
2015	0.07	0.05
2016	0.03	0.04
2017	0.15	0.04
2018	0.09	0.04
2019	0.04	0.03
2020	0.08	0.07

Source: GAO analysis of data from the Luxembourg Wealth Study (LWS) database, 1998-2019. | GAO-22-103950

Note: Change in housing prices based on average annual returns compiled from the monthly FHFA Purchase-Only index. Returns are not seasonally adjusted. Change in stock index prices based on annual averages calculated from monthly returns. We report real, or inflation-adjusted returns, in 2020 dollars. We adjusted for inflation using the Consumer Price Index for All Urban Consumers.

The wealth data we reviewed do not include key sources of retirement wealth that we and others have reported could affect distributions. For

example, to enable comparisons across countries, the wealth data we reviewed do not include estimates of the present value of benefits that households expect to be paid from public retirement programs, such as Social Security in the United States. Nor do they include the present value of benefits expected from defined benefit retirement plans.[31] Our previous analysis of retirement resources for older households in the United States did include these two sources of expected future payments from public and private pensions, and indicated they generally reduced wealth disparities, as illustrated by the examples below.[32]

- For older households that did not expect benefits from a DB plan, we found that in 2016, high-wealth older households had, on average, about $6.1 million in assets, about 272 times the assets of low-wealth households, which had estimated assets, on average, of about $22,000. However, when looking at a broader definition of retirement resources that includes expected benefits from Social Security, high-wealth households had, on average, $6.6 million in total resources (assets plus the present value of future income Social Security). This was only about 27 times as much as low-wealth households, which had, on average, about $241,000.
- The results were similar for high-wealth older households that also expected benefits from a DB plan. These households had, on average, $3.2 million in assets. This was about 61 times as much as low-wealth older households that expected benefits from a DB plan, which had estimated assets, on average, of about $52,000. Using the broader definition of retirement resources (assets plus the present value of future income from Social Security and DB pensions), we estimated that high-wealth households that also expected benefits from a DB plan had, on average, about $4.3 million in retirement resources. This was only about 8 times as much as low-wealth households that expected benefits from a DB plan, which had, on average, about $535,000.

[31]Social Security Administration officials told us that incorporating data on the present value of retirement income expected from public retirement systems and DB plans could increase the detail of our comparisons between countries. For example, we might be able to determine if wealth disparities in the United States are actually higher than they appear, because selected countries public retirement programs' have higher replacement rates than Social Security in the United States. However, officials further told us that the effects of higher replacement rates from public retirement programs in selected countries might be offset to some extent. They said this is because older households in these countries may be less reliant on retirement income from an employer's DB plan.

[32]GAO-19-587. We used assets in the two examples because there were insufficient data to estimate net worth for low-wealth households in 2016.

Other researchers have similarly reported that public and private retirement income benefits can reduce wealth disparities:

- In 2017, researchers compared one year of wealth data for the United States to wealth data from Germany and found that including the present value of expected retirement benefits from public and private sources in the measurement reduced the gap between the wealthiest and less wealthy segments of both populations. For example, using their research, we estimate that the wealthiest 20 percent of Americans had about 37 times the average wealth of the middle 20 percent before taking pension wealth into account and 8 times the average wealth after. In Germany, the ratio was 13 times before taking pension wealth into account and 4 times after.[33]
- In 2001, a researcher examined one year of wealth data for a sample of married households in Canada and found that adding the present value of expected benefits from Canada's public retirement system substantially reduced wealth inequality. For example, before accounting for these benefits, the wealthiest 20 percent of households held on average 148 times the wealth of the least wealthy 20 percent; after adding them, the wealthiest households held 6.8 times the wealth of the least wealthy.[34]

The extent to which expected benefits from employer-sponsored DB plans continue to reduce wealth disparities among future retirees in the United States could diminish, as fewer current workers have access to these kinds of retirement plans. We and others have reported on a decades-long shift away from employers in the United States offering

[33]Timm Bönke, Markus M. Grabka, Carsten Schröder, and Edward N. Wolff, *A Head-to-Head Comparison of Augmented Wealth in Germany and the United States*, The German Socio-Economic Panel Study at DIW Berlin, 899-2017 (2017).

[34]Abul F.M. Shamsuddin, "Public pension and wealth inequality in Canada," *Applied Economics Letters*, 8, 315-320 (2001).

traditional DB pension plans to DC plans as the primary type of retirement plan.[35]

Higher Household Income and Wealth Are Associated with Living Longer in the United States and United Kingdom for All but the Oldest Individuals

Higher household income and wealth are associated with living longer among older individuals in the United Kingdom and United States for all but the oldest individuals, according to our analysis of English Longitudinal Study of Ageing (ELSA) and Health and Retirement Study (HRS) data.[36] These data allowed us to follow a nationally representative sample of older individuals from each country over time and track their income, wealth, and mortality, as well as other demographic information. We examined the association of household income and wealth with survival over a 10-year portion of the lifespan, which we use as a proxy for longevity, in both countries from 2002 through 2012 among individuals

[35]GAO, *The Nation's Retirement System: A Comprehensive Re-evaluation Is Needed to Better Promote Future Retirement Security*, GAO-18-111SP (Washington, D.C.: October 18, 2017). Similarly, researchers at the Federal Reserve found that DB retirement plan coverage for working age families (ages 25-54) decreased from 1989 to 2016 among workers at all levels of the wealth distribution. Sabelhaus, John, and Alice Henriques Volz, "Are Disappearing Employer Pensions Contributing to Rising Wealth Inequality?" FEDS Notes (Washington, D.C.: Board of Governors of the Federal Reserve System, updated November 7, 2019).

[36]ELSA and HRS are nationally representative surveys of individuals age 50 and over and their spouses. The data are longitudinal and follow the same individuals over time and track variables like income, wealth, and mortality. ELSA and HRS are harmonized by the Gateway to Global Aging Data, which facilitates comparative studies between countries using these data. ELSA includes individuals in England and does not include individuals in Wales, Scotland, or Northern Ireland. For more information on this analysis, see appendix IV.

age 50 and over.[37] We accounted for age at the beginning of each study in 2002 when examining the association between income and wealth and survival because those in higher income and wealth groups were younger, on average, and thus inherently more likely to survive during the study period than those in lower income and wealth groups.[38] Overall we found that individuals from high-income and high-wealth households were generally more likely to survive during the 10-year period we analyzed in both the United Kingdom and the United States, though patterns differed

[37]In this report, we use the likelihood of surviving to older ages during the 10-year study period as a proxy for longevity. In order to examine the association between income and wealth and survival to older ages, we used survival analysis methods to estimate the proportion of individuals in the 2002 sample alive in 2012, which are the most recent years for which there are reliable mortality data in both the ELSA and HRS data. Although these data are lagged, the datasets are unique in that they are representative of older individuals in the United Kingdom and United States, respectively, and follow the same individuals as they age, while tracking their mortality over time, as well as their income, wealth, and other demographic information. Survival analysis is a standard approach for measuring time to death, where time to death provides information about how long people live, including by various economic and demographic groups. In previous work (GAO-19-587), we examined the association between income and wealth and longevity using 22 years of data from HRS. In this report, in order to facilitate a comparison between the United States and United Kingdom, we have 10 years of data to analyze due to the limited timeframe of the ELSA data. As a result, we examine survival during the 10-year study period. Survival analysis accounts for survey respondents with complete or incomplete longevity data and allowed us to estimate the chance of death by any given time in the observation period. Because we observe reliable mortality data through 2012, this analysis is a partial survival analysis. We do not observe survival over the lifetime. Thus, the period during which we observe mortality may exhibit more disparities in survival by different groups compared to later periods of life when disparities in mortality by economic and demographic characteristics may tend to mitigate.

[38]In our univariate analyses of the association of income and wealth and survival, we estimated survival rates by income and wealth groups in each country within age groups, including those age 50-59, 60-69, 70-79, 80-89, and over 90 when the studies began in 2002. In our multivariate analyses, we controlled for age at the beginning of the study in 2002 in our regressions.

for the oldest individuals who were in their eighties and nineties at the beginning of the study period.[39]

Higher household income was generally associated with surviving to older ages in both the United Kingdom and United States, but we observed different patterns at very old ages, according to our univariate analyses of income and survival (see table 1).[40] In each country, individuals from high-income households were more likely to survive during the 10-year period than individuals from the majority of the lower household income groups for age groups below age 80. The difference in survival rates between the highest and lowest income groups was generally greater than the difference in survival rates between the two highest income groups for age groups below 80. For example, the proportion of individuals in their fifties from high-income households alive at the end of the 10-year period in the United Kingdom was an estimated 96 percent, compared to an estimated 91 percent of individuals of the same age in

[39]We created income and wealth groups by breaking the sample into quintiles based on their income or wealth. To determine an individual's place in the income distribution, we measured their household income at the beginning of the survey in 2002. Income includes individual and spouse earnings, family capital income, income from private and public pensions, government transfers, and other regular payments. In previous work (GAO-19-587), we used mid-career earnings data to determine an individual's place in the income distribution. We did not use administrative earnings data to measure income in this report because we did not have this type of income measure in the ELSA data, as we did in the HRS data, because there were limitations in obtaining available administrative income data from the United Kingdom. We conducted sensitivity analyses to ensure that the trends with respect to survival we saw using the lifetime earnings variable in HRS were consistent with the household income variable at the beginning of the study. For wealth, we used the household's initial net worth in 2002, including the net value of primary residence, net value of business, net value of non-housing financial wealth, net value of secondary home residence and other property, and the total value of other physical assets. The wealth variable is similar to what we used in prior work (GAO-19-587). Older individuals from high-income and high-wealth households are in the 5th quintile of the income and wealth distributions, respectively. Older individuals from lower-income and wealth households are in the lower four income and wealth groups, respectively. The 1st quintile is the lowest income and wealth quintile.

[40]We used univariate survival analyses, also known as Kaplan-Meier survival analyses, to estimate survival rates in the United Kingdom and United States by income quintiles (groups) for five 10-year age groups. We tested that the survival rates between individuals from high-income and lower-income households were significantly different for each of the five 10-year age groups using Cox proportional hazard models. Our findings are based on statistically significant differences in survival between the 5th quintile (high-income group) and lower four income quintiles (lower- income groups) at the 10 percent level or lower, and where we note a lack of clear pattern between income and survival, there were not consistently statistically significant differences in survival between the 5th quintile and lower quintiles. A limitation of our analysis for the age 90 and older age group is that the sample size is smaller than the other age groups, especially in the United Kingdom.

the second highest household income group and an estimated 86 percent of individuals of the same age from the lowest household income group. The relationship between income and survival in each country among those in the two oldest age groups was mixed, and we did not observe similar patterns between household income and the likelihood of survival over the 10-year period.

Table 1: Estimated 10-Year Survival Rates of Older Individuals in the United Kingdom and United States from 2002-2012, by Household Income Quintile and Age Group

	Individuals from the U.K. by age group (percentage)					Individuals from the U.S. by age group (percentage)				
Income quintile	50-59	60-69	70-79	80-89	90+	50-59	60-69	70-79	80-89	90+
1st (lowest)	86***	76***	48***	23	13	80***	69***	48***	26**	11
2nd	89***	78***	53***	18**	12	88**	75***	53***	23***	11
3rd	90***	78***	53***	26	34*	88***	80***	61***	28	4
4th	91***	86	59	22	23	91**	85**	66	33	15
5th (highest)	96	89	64	29	0	94	88	68	32	0
Number of Observations	3,696	3,080	2,373	1,089	111	2,580	6,893	4,475	2,252	365

Source: GAO analysis of RAND HRS and Harmonized ELSA data. | GAO-22-103950

Note: We used Cox proportional hazard models to assess whether estimated survival rates for individuals from households in the first four income quintiles were statistically significantly different from estimated survival rates for individuals from households in the fifth income quintile.

*** statistically significantly different from the 5th quintile at the 1 percent level.

** statistically significantly different from the 5th quintile at the 5 percent level.

* statistically significantly different from the 5th quintile at the 10 percent level.

Higher household wealth was generally associated with surviving to older ages in the United Kingdom and United States, though patterns differed for the oldest age group (see table 2).[41] In the United Kingdom, individuals from high-wealth households were more likely to survive during the 10-year period than individuals from the two lowest household wealth groups for all but the oldest age group. In the United States,

[41]We used univariate survival analyses, also known as Kaplan-Meier survival analyses, to estimate survival rates in the United Kingdom and United States by wealth quintiles (groups) for five 10-year age groups. We tested that the survival rates between individuals from high-wealth and lower-wealth households were significantly different for each of the five 10-year age groups using Cox proportional hazard models. Our findings are based on statistically significant differences in survival between the 5th quintile (high-wealth group) and lower four wealth quintiles (lower-wealth groups) at the 10 percent level or lower, and where we note a lack of clear pattern between wealth and survival, there were not consistently statistically significant differences in survival between the 5th quintile and lower quintiles. A limitation of our analysis for the age 90 and older age group is that the sample size is smaller than the other age groups, especially in the United Kingdom.

survival rates from the high household wealth groups were higher than survival rates for the three lower household wealth groups in each age group except the oldest. For example, in the United States, the proportion of individuals in their seventies alive at the end of the 10-year period from high-wealth households was an estimated 68 percent, which was higher than the proportion of individuals alive of the same age from the middle household wealth group (an estimated 59 percent), the second lowest wealth group (an estimated 53 percent), and the lowest wealth group (an estimated 44 percent). For both countries, the difference in survival rates between the highest and lowest wealth groups is generally greater than the difference in survival rates between the two highest wealth groups. For the oldest age group in both countries, we did not observe similar patterns in the associations between household wealth and the likelihood of survival over the 10-year period.

Table 2: Estimated 10-Year Survival Rates of Older Individuals in the United Kingdom and United States from 2002-2012, by Household Wealth Quintile and Age Group

	Individuals from the U.K. by age group (percentage)					Individuals from the U.S. by age group (percentage)				
Wealth quintile	50-59	60-69	70-79	80-89	90+	50-59	60-69	70-79	80-89	90+
1st (lowest)	81***	68***	43***	19***	13	80***	66***	44***	21**	5
2nd	90***	77***	49***	19***	21	90**	79***	53***	26***	6
3rd	93	84***	58	23*	11	90***	81***	59***	25***	6
4th	96	85**	59	25	21	95	85**	62**	26***	3
5th (highest)	95	90	63	32	0	95	88	68	37	0
Number of observations	3,696	3,080	2,373	1,089	111	2,580	6,893	4,475	2,252	365

Source: GAO analysis of RAND HRS and Harmonized ELSA data. | GAO-22-103950

Note: We used Cox proportional hazard models to assess whether estimated survival rates for individuals from households in the first four wealth quintiles were statistically significantly different from estimated survival rates for individuals from households in the fifth wealth quintile.

*** statistically significant at the 1 percent level.

** statistically significant at the 5 percent level.

* statistically significant at the 10 percent level.

According to our analysis, other demographic characteristics were also associated with living longer in both the United Kingdom and United

States.[42] Similar to our analysis described above, we estimated survival rates by demographic groups, including by gender, educational attainment, and race, in each country for each of the five 10-year age groups.

- With respect to gender, we found that women were more likely to survive during the 10-year period compared to men in the United Kingdom and in the United States.
- In terms of educational attainment, in the United Kingdom, we found that those with less than a high school education were less likely to survive during the study period compared to those with a college degree or higher for age groups below age 80. In the United States, we found that those with a high school degree or less were less likely to survive than those with a college degree or higher for all but the oldest age group.
- According to our analysis of survival by race, we did not observe differences in survival between Whites and non-Whites in any age groups in the United Kingdom over the study period in any age group. In the United States, we observed that Whites were more likely to survive than non-Whites among those in the age groups below age 80.

Disparities in survival in both countries between individuals from high-income and high-wealth households and lower-income and lower-wealth households were evident even after accounting for demographic variables that are also associated with surviving to older ages, according to our

[42]We used univariate survival analyses, also known as Kaplan-Meier survival analyses, to estimate survival rates in the United Kingdom and United States by demographic groups, including gender, race, and education level, for five 10-year age groups, which indicate the 10-year age range the individuals were in when the study period began in 2002. We tested that the survival rates between individuals of different characteristics within each demographic, including gender, educational attainment, and race, were significantly different for each of the five 10-year age groups using Cox proportional hazard models. For more information on this analysis, see appendix IV.

multivariate analysis (see app. IV).[43] Specifically, we found disparities in survival between the high-income and high-wealth and lower-income and lower-wealth groups after accounting for age at the beginning of the survey in 2002, gender, race and ethnicity, and education level.[44] Other research supports the idea that income, as well as other demographic characteristics, such as gender, educational level, and race and ethnicity, are associated with mortality in the United Kingdom and United States.[45]

Research in other selected countries demonstrates an association between income and living longer, using similar methods as our analysis.[46] Using administrative income data for a cohort of older

[43]We used multivariate survival analyses, also known as known as multivariate Cox proportional hazard models, to analyze the relationship between income and wealth and survival during the 10-year period for which we have data, while controlling for related demographic variables, including age at the beginning of the study in 2002, gender, educational level, and race. Our results have limitations and should be interpreted with caution. Importantly, results from the Cox proportional hazard model regressions present correlations, not causal estimates. We report on associations and make no determination of the potential causality of income or wealth or any other demographic variable on survival. For more information on these analyses, see appendix IV.

[44]These results are based on an analysis that excluded self-reported health status from the beginning of the survey. In our univariate survival analyses, we found that that self-reported health status at the beginning of the survey was highly correlated with survival during the study period. Those who reported being in poor health in 2002 were much more likely to die during the study period than those who reported being in better health. While some studies control for health status in multivariate survival analyses, others do not given the close relationship between health and mortality. As a result, we conducted our survival analyses both including and excluding measures of health. In alternative analyses, when we included self-reported health status at the beginning of the survey in 2002 in addition to the other demographic variables in our analysis of income, we found significant disparities in survival across all income groups in both the United Kingdom and United States, consistent with the other results. When we included self-reported health status at the beginning of the survey in our analysis of wealth, we found significant disparities in survival across all wealth groups in the U.S. and most wealth groups in the United Kingdom. The difference in survival across the third (middle), fourth, and fifth (top) wealth quintiles in the United Kingdom were not statistically significant when we controlled for self-reported health status in 2002. Overall, these findings suggest that self-reported health status is a critical channel through which wealth affects survival, as wealth and initial self-reported health status are positively correlated.

[45]See A. Cairns, T. Kleinow, and J. Wen, “Drivers of Mortality: Risk Factors and Inequality,” Actuarial Research Centre Working Paper (2021). Also see M. Barbieri “Mortality by Socioeconomic Category in the United States,” *Society of Actuaries* (2020).

[46]Due to limitations in obtaining the available longitudinal data on income, wealth, and mortality needed to conduct this analysis for Canada and Germany, our analysis is limited to the United Kingdom and United States. We rely on findings from other research to inform our discussion on income, wealth, and longevity in Canada and Germany.

Canadians starting at age 50, researchers found a strong relationship between survivorship and income, which were similar to the United States, particularly among men.[47] For example, they found that a man in the top 10 percent of the income distribution had a 25 percent greater chance of living to age 75 than a man in the bottom 10 percent of the income distribution. In another analysis using administrative data on income for several cohorts of older German men beginning at age 65, researchers found that survival rates were highest for individuals in the top 10 percent of the income distribution and declined with lower income.[48] For example, they found that the chance of surviving to age 70 for men in the top 10 percent of the income distribution was above 90 percent, which was 10 percentage points higher than for men in the bottom 10 percent of the income distribution.

Factors Such As Education Level and Public Retirement Benefits Are Associated with Disparities in Income and Wealth among Older Households in Selected Countries

Education Level, Homeownership, and Other Factors Are Associated with Disparities in Income and Wealth among Older Households in Selected Countries

Several factors are associated with disparities in income and wealth among older households in Canada, Germany, and the United Kingdom,

[47]See K. Milligan and T. Schirle, "The Evolution of Longevity: Evidence from Canada," *National Bureau of Economic Research Working Paper* (2018). This study follows one birth cohort, born in the 1930s, starting at age 50 and uses a measure of lifetime earnings to measure income. This approach is similar to our analysis in prior work (GAO-19-587), which followed a cohort of older Americans ages 51 to 61 in 1992 through 2014 across income groups, measured as household mid-career earnings quintiles. We found that after 22 years, the proportion of those alive in the top income group (top 20 percent) was 74.4 percent, compared to 52.2 percent in the bottom income group (bottom 20 percent), a 22.2 percentage point gap in survival.

[48]See P. Haan, D. Kemptner, and Holger Lüthen, "The Rising Longevity Gap by Lifetime Earnings – Distributional Implications for the Pension System," Deutsches Institut für Wirtschaftsforschung Discussion Paper (2017). This analysis is different from GAO's work in this area given that the analysis only includes men and starts at age 65, as opposed to closer to 50.

including education level, homeownership, long-term care, and intergenerational wealth transfers.[49]

Education level. In each of the three selected countries and the United States, older households that have obtained postsecondary education tend to have higher incomes. However, the extent to which postsecondary education shapes income disparities varies across the selected countries. For example, research indicates that postsecondary education plays a more substantial role in the growth of income inequality in Germany than it does in the United Kingdom.[50]

Stakeholders from both Canada and the United Kingdom said that incomes are higher among college graduates than non-graduates. One researcher in Canada noted the importance of postsecondary education in shaping income attainment. Another told us that there was a linear relationship between education and income, such that as education levels increase, so do incomes.[51] Government officials in Canada also discussed the relationship between postsecondary education and income disparities, particularly since job security is more challenging for those with only a high school diploma. Similarly, stakeholders from the United Kingdom told us that postsecondary education is a factor in disparities between those with higher incomes and those with lower incomes. In Germany, basic decisions about college typically start in fourth grade.[52]

[49]Measuring whether and to what extent factors such as education and homeownership cause income or wealth disparities was beyond the scope of this report.

[50]Florian Hoffman, David Lee, and Thomas Lemieux, *Growing income Inequality in the United States and Other Advanced Economies*, *Journal of Economic Perspectives*, Volume 34, Number 4 (Fall 2020). Additionally, the authors found that, in comparison to European countries with large economies, education had a much larger impact on the rise of income disparities in the United States.

[51]Analysis of data from the Canadian Survey of Labour and Income Dynamics for 1996 and 2006 indicates that most of the increase in senior income inequality over this period can be attributed to increases in education levels. Tammy Schirle, *Income Inequality Among Seniors in Canada: The Role of Women's Labour Market Experience*, Department of Economics, Wilfrid Laurier University Working Paper (2009).

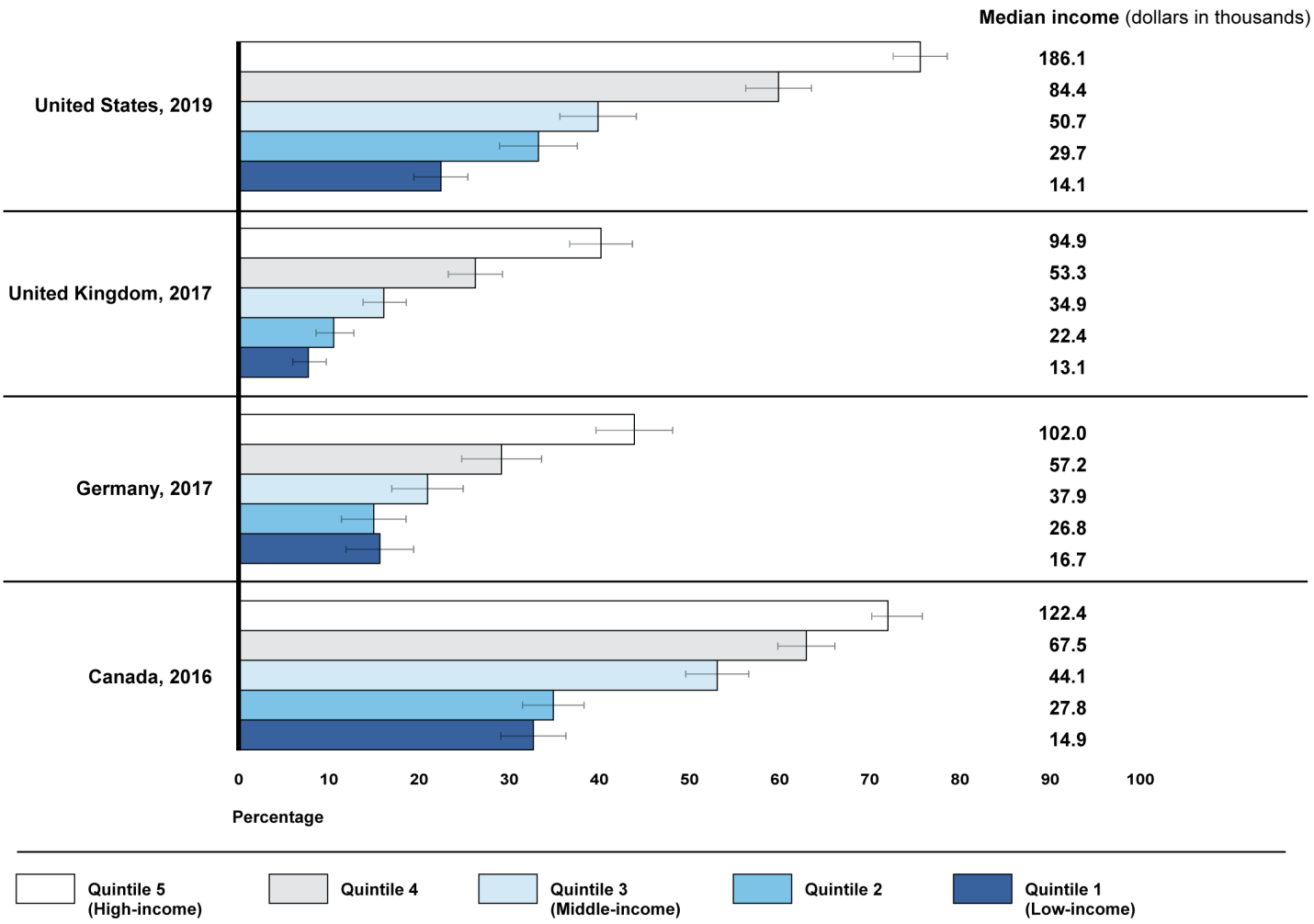
[52]OECD has recommended that Germany delay the age of the "tracking decision"—that is, the date families choose an educational track that either leads to college or to vocational training. OECD cautioned that, if not managed carefully, this practice could reduce equity in Germany, by stratifying the educational system and fostering informal forms of segregation between schools. In 2020, OECD reported that federal states within Germany had taken steps to address stratification, by delaying the age of the tracking decision, and by combining educational tracks. OECD, Education Policy Outlook: Germany (June, 2020).

Research indicates that options for changing these decisions are limited. This increases the risk that failure to complete an educational pathway in Germany will entail a permanent loss of education and income.[53]

Our analysis of LWS data supports what stakeholders told us and research reports, and shows a similar association between education and income among older households in the United States. Figure 8 shows that larger proportions of high-income older households in selected countries completed some level of higher education.

[53]Fabian T. Pfeffer and Martin Hällsten, *Mobility regimes and parental wealth: The United States, Germany and Sweden in comparison*, SOEPpapers on Multidisciplinary Panel Data Research, No. 500-2012, The German Socio-Economic Panel Study at DIW Berlin (July 2012). The authors found that although educational pathways in the United States are not as rigidly differentiated as in Germany, cost plays a larger role in access to education in the United States. This is in part because funding for K-12 public schools in the United States is to a large extent based on property taxes and thus directly tied to a neighborhood's average home values. The authors conclude this provides incentives for parents to move into higher-cost neighborhoods or put their children in private school. Additionally, the authors found that high and increasing tuition costs in the United States play a central role in the decision whether or where to attend college.

Figure 8: Proportion of Older Households Reporting a College Degree or Higher, by Income Quintile



Source: GAO analysis of data from the Luxembourg Wealth Study (LWS) database, 1998-2019. | GAO-22-103950

Data table for Figure 8: Proportion of Older Households Reporting a College Degree or Higher, by Income Quintile

	Quintile 1 (Low-Income)	Quintile 2	Quintile 3 (Middle-Income)	Quintile 4	Quintile 5 (High-Income)
Canada, 2016	32.68%	34.90%	53.08%	62.97%	73.02%
Germany, 2017	15.66%	14.99%	20.95%	29.15%	43.89%
United Kingdom, 2017	7.73%	10.54%	16.10%	26.26%	40.19%
United States, 2019	22.44%	33.25%	39.87%	59.87%	75.61%

Confidence Intervals, Quintiles 1, 2, 3, 4 and 5

	Quintile 1 (Low-Income)		Quintile 2		Quintile 3 (Middle-Income)		Quintile 4		Quintile 5 (High-Income)	
	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit
Canada, 2016	29.08%	36.29%	31.48%	38.32%	49.59%	56.57%	59.81%	66.13%	70.22%	75.82%
Germany, 2017	11.91%	19.41%	11.41%	18.57%	16.99%	24.92%	24.72%	33.59%	39.64%	48.14%
United Kingdom, 2017	6.02%	9.71%	8.58%	12.77%	13.80%	18.60%	23.25%	29.27%	36.71%	43.67%
United States, 2019	19.45%	25.42%	28.95%	37.56%	35.62%	44.11%	56.23%	63.52%	72.60%	78.61%

Median income (dollars in thousands)

	Quintile 1 (Low-Wealth)	Quintile 2	Quintile 3 (Middle-Wealth)	Quintile 4	Quintile 5 (High-Wealth)
Canada, 2016	$14.9	$27.8	$44.1	$67.5	$122.4
Germany, 2017	$16.7	$26.8	$37.9	$57.2	$102.0
United Kingdom, 2017	$13.1	$22.4	$34.9	$53.3	$94.9
United States, 2019	$14.1	$29.7	$50.7	$84.4	$186.1

Source: GAO analysis of data from the Luxembourg Wealth Study (LWS) database, 1998-2019. | GAO-22-103950

Note: Median household income includes household income derived from work and investments, cash and non-cash transfers of a private nature—such as scholarships for college—and cash benefits from public retirement systems and other programs of assistance. It also includes payments from private retirement plans that recur at least once a year, such as monthly payments from a defined benefit plan, or annual programmed withdrawals from a defined contribution plan to satisfy minimum distribution requirements. It does not include one-time withdrawals from defined contribution plans, such as lump sum payments from 401(k) plans in the United States. It also does not include non-cash income, such as that derived by homeowners from living in their home, or by beneficiaries of public programs who receive assistance in the form of health care, housing, child care, or education benefits.

To establish low-, middle- and high-income older households for each country, we sorted households where the survey respondent, their partner or spouse, or both reported being 55 or older into quintiles based on income. We calculated median income, meaning the income of the "typical" household, for each quintile. For this analysis, we consider the 20 percent of households with the lowest incomes, or first quintile, to be low-income. We consider the 20 percent of households with incomes in the middle of the distribution, or third quintile, to be middle-income households. And we consider the 20 percent of households with the highest incomes, or fifth quintile, to be high-income.

We converted estimates to 2017 U.S. Dollar purchasing power parities—the most recent available at the time of our analysis—to adjust for inflation and differences in currency values. We report confidence intervals at either the 99 or 95 percent level based on the availability of supporting data in the LWS database.

Homeownership. Across selected countries and the United States, homeownership is similarly associated with higher levels of wealth for

older households (see fig. 9).[54] Homeownership is associated with household wealth because a house serves as an asset that can increase in value, as well as a dwelling.[55] For example, one researcher told us that in the United Kingdom it can mitigate the effects of low earnings, as older households with low incomes can still achieve retirement security if they did well in the housing market. In addition, research indicates that homeownership is associated with wealth accumulation in countries we reviewed. For instance, homeowners may benefit from an increase in the value of their property, either due to increased prices of their land, their dwelling or both.[56] As a result, those who own their own home tend to have higher levels of wealth than those who do not. This finding mirrors our previous work, which indicates that home equity has historically been an important source of retirement security for older households in the United States.[57]

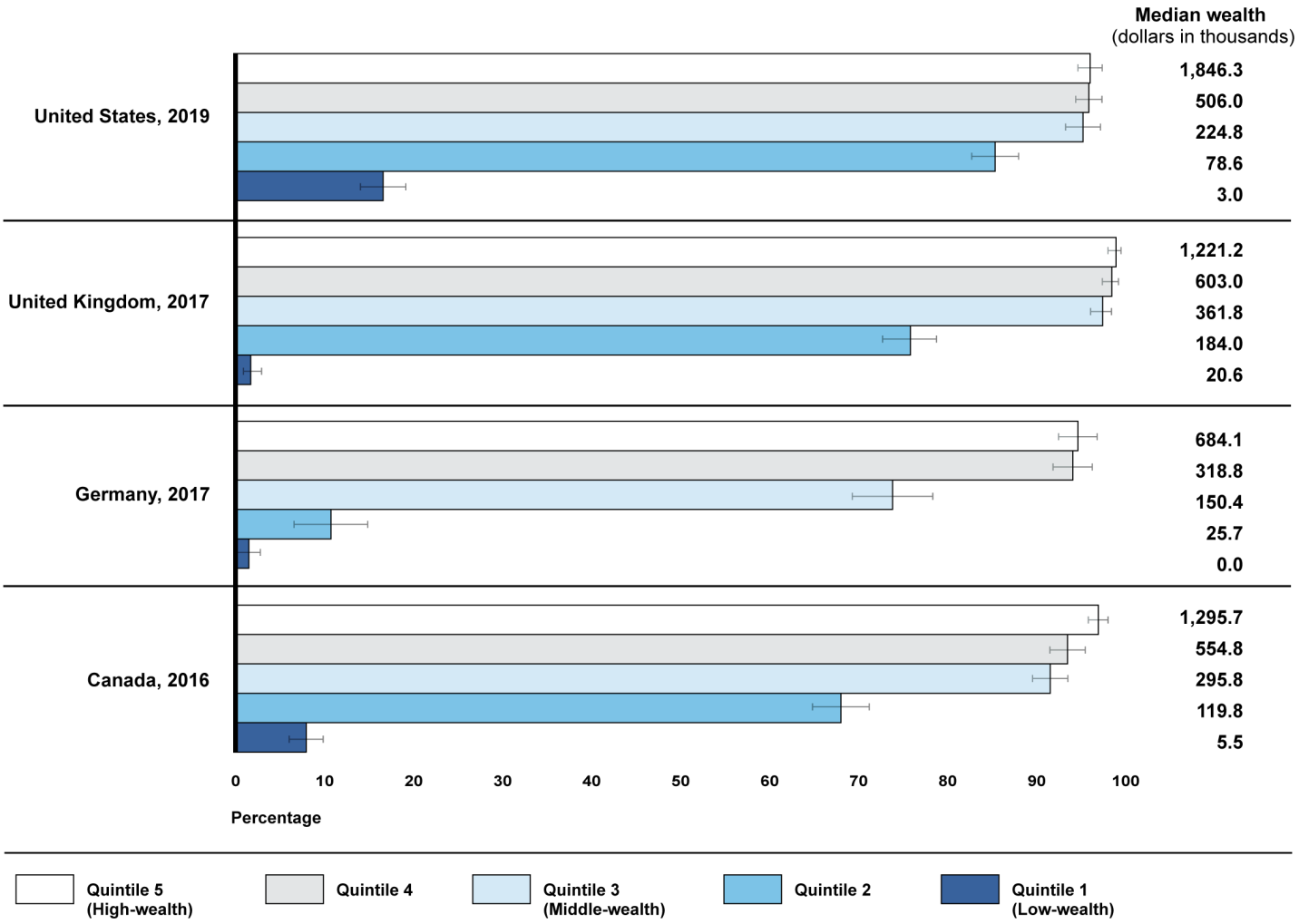
[54]We previously reported that, despite the increase in overall debt among older households, an increase in mortgage debt may have positive effects on retirement security because a home is generally a wealth-building asset. GAO, *Retirement Security: Debt Increased for Older Americans over Time but the Implications Vary by Debt Type,* GAO-21-170 (Washington, D.C.: April 16, 2021).

[55]We have reported that homeowners can build equity by making a down payment then (1) by making regular mortgage payments to reduce the principal amount outstanding, (2) by making additional payments to further reduce the principal amount outstanding, and (3) through appreciation in their home's value. GAO, *Homeownership: Information on Mortgage Options and Effects on Accelerating Home Equity Building*, GAO-18-297 (Washington, D.C.: March 15, 2018).

[56]Thomas Y. Mathä, Alessandro Porpiglia, Michael Ziegelmeyer, *Household wealth in the euro area: the importance of intergenerational transfers, homeownership and house price dynamics*, ECB Working Paper, No. 1690 (European Central Bank, Frankfurt a. M., 2014).

[57]GAO, *Millennial Generation: Information on the Economic Status of Millennial Households Compared to Previous Generations*, GAO-20-194 (Washington, D.C.: December 13, 2019).

Figure 9: Proportion of Older Households Reporting Principal Residence as an Asset, by Wealth Quintile



Source: GAO analysis of data from the Luxembourg Wealth Study (LWS) database, 1998-2019. | GAO-22-103950

Data table for Figure 9: Proportion of Older Households Reporting Principal Residence as an Asset, by Wealth Quintile

	Quintile 1 (Low-Wealth)	Quintile 2	Quintile 3 (Middle-Wealth)	Quintile 4	Quintile 5 (High-Wealth)
Canada, 2016	7.93%	68.01%	91.52%	93.47%	96.92%
Germany, 2017	1.48%	10.71%	73.81%	94.06%	94.63%
United Kingdom, 2017	1.70%	75.81%	97.41%	98.44%	98.91%

	Quintile 1 (Low-Wealth)	Quintile 2	Quintile 3 (Middle-Wealth)	Quintile 4	Quintile 5 (High-Wealth)
United States, 2019	16.57%	85.34%	95.21%	95.86%	96.00%

Confidence Intervals, Quintiles 1, 2, 3, 4 and 5

	Quintile 1 (Low-Wealth)		Quintile 2		Quintile 3 (Middle-Wealth)		Quintile 4		Quintile 5 (High-Wealth)	
	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit	Lower Limit	Upper Limit
Canada, 2016	6.03%	9.84%	64.82%	71.20%	89.54%	93.50%	91.49%	93.50%	95.82%	98.02%
Germany, 2017	0.19%	2.78%	6.57%	14.84%	69.28%	78.33%	91.86%	96.25%	92.45%	96.80%
United Kingdom, 2017	0.88%	2.92%	72.69%	78.75%	96.06%	98.41%	97.34%	99.18%	98.02%	99.48%
United States, 2019	14.02%	19.13%	82.70%	87.97%	93.25%	97.17%	94.39%	97.33%	94.64%	97.36%

Median wealth (dollars in thousands)

	Quintile 1 (Low-Wealth)	Quintile 2	Quintile 3 (Middle-Wealth)	Quintile 4	Quintile 5 (High-Wealth)
Canada, 2016	$5.5	$119.8	$295.8	$554.8	$1,295.7
Germany, 2017	$0.0	$25.7	$150.4	$318.8	$684.1
United Kingdom, 2017	$20.6	$184.0	$361.8	$603.0	$1,221.2
United States, 2019	$3.0	$78.6	$224.8	$506.0	$1,846.3

Source: GAO analysis of data from the Luxembourg Wealth Study (LWS) database, 1998-2019. | GAO-22-103950

Note: We define household wealth as net worth, which includes financial and non-financial assets—such as homes, cars, or family-owned businesses—minus the value of the total liabilities. This measurement of wealth does not include the present value of future benefits to be paid from public retirement programs or defined benefit workplace retirement plans. For example, wealth estimates for the United States do not include the present value of future Social Security benefits, or lifetime income from an employer-sponsored defined benefit plan. According to documentation for LWS, information on the present value of future retirement benefits is currently seldom available. In contrast, household net worth does include the value of balances held in defined contribution workplace retirement plans, such as 401(k) plans in the United States, and individual retirement accounts.

To establish low-, middle- and high-income wealth households for each country, we sorted households where the survey respondent, their partner or spouse, or both reported being 55 or older into quintiles based on income. We calculated median wealth, meaning the wealth of the “typical” household, for each quintile. For this analysis, we consider the 20 percent of households with the least wealth, or first quintile, to be low-wealth. We consider the 20 percent of households in the middle of the distribution, or third quintile, to be middle-wealth households. And we consider the 20 percent of households with the most wealth, or fifth quintile, to be high-wealth.

We converted estimates to 2017 U.S. Dollar purchasing power parities—the most recent available at the time of our analysis—to adjust for inflation and differences in currency values. We report

confidence intervals at either the 99 or 95 percent level based on the availability of supporting data in the LWS database.

Homeownership is strongly associated with retirement outcomes in each of our selected countries. Government officials told us that housing assets make up a significant portion of wealth in Canada. One researcher told us that housing assets make up the bulk of wealth for approximately 75 percent of the population in Canada. Government officials noted that the strong growth in household wealth in Canada since 2000 is largely due to trends in housing values, from which younger generations have been excluded if they do not own housing assets. In addition, research indicates that home equity makes an important contribution to the finances of older households.[58]

Stakeholders from the United Kingdom also noted the importance of homeownership in wealth accumulation in their country. Government officials in the United Kingdom cited research stating that recent generations have accumulated significantly less wealth, including lower rates of homeownership. Despite this generational decline in homeownership, stakeholders said that homeownership has generally had an equalizing effect on wealth distribution, disproportionally benefiting homeowners on the lower end of the wealth distribution. They said this is because most Baby Boomers (born 1946-1964), the generation in which most housing wealth in the United Kingdom is concentrated, have paid off their mortgages. In comparison, homeownership has less of an effect on the wealth of the very richest households in the United Kingdom. This is because relative to households in the rest of the distribution, housing wealth represents a lower percentage of their overall wealth. Specifically, in addition to owning homes, households at the very top of the wealth distribution also have large amounts of financial wealth. Conversely, research indicates that households lower in the distribution tend to have a higher percentage of their total wealth in homes, if they own one.[59]

[58]Sharanjit Uppal and Sébastien LaRochelle-Côté, “Changes in wealth across the income distribution, 1999 to 2012,” *Insights on Canadian Society*, Statistics Canada Catalogue no. 75-006-X (June 2015).

[59]In 2022, the Office of National Statistics reported that physical wealth, such as a car, was the main wealth component for the least wealthy households, whereas property was the largest component for households in the middle of the distribution. Office of National Statistics, *Household total wealth in Great Britain: April 2018 to March 2020*, Statistical Bulletin (January 7, 2022). Research also confirms that homeownership plays less of a role in wealth disparities at the top of the wealth distribution than at the bottom. Mathã, Porpiglia, and Ziegelmeyer (2014).

Although Germany has lower rates of homeownership compared to other selected countries,[60] stakeholders from Germany told us that homeownership plays a significant role in the wealth of older households. Importantly, there are regional differences in homeownership within the country that are distinct to Germany. One researcher told us there is a substantial difference in the distribution of wealth between Eastern and Western regions of Germany, in part due to the significantly lower homeownership rate in Eastern areas that made up the former German Democratic Republic. This is supported by research stating that, despite a rapid increase of homeownership rates in the 1990s, Eastern Germany's homeownership rate remains significantly lower than in Western Germany. This study concludes that lower homeownership in Eastern Germany can be explained by the policies of the former German Democratic Republic, which did not promote the possession of property.[61] Nonetheless, government officials in Germany stated that homeownership is increasingly important in the distribution of wealth, and that approximately two-thirds of German wealth now originates from this asset class. Another researcher told us that older households in Germany have generally paid off their mortgages and have lower housing expenses than renters. For this reason, older households that own their homes outright tend to retain more of their wealth and so have lower rates of poverty. Like postsecondary education and its association with income disparities, homeownership is associated with wealth disparities.

Long-term care costs. The cost of long-term care is another factor that is associated with income and wealth disparities in selected countries. Stakeholders from the United Kingdom told us that long-term care costs can cause challenges for less wealthy older households, such as having

[60]Research states that the homeownership rate in Germany is one of the lowest among advanced economies for various reasons, including high taxes for purchasing real estate and limited tax benefits for homeownership. This body of research also indicates that social housing in Germany is a key determinant of low homeownership, given that individuals are able to pay subsidized rent. Leo Kaas, Georgi Kocharkov, Edgar Preugschat, and Nawid Siassi, *Low Homeownership in Germany-A Quantitative Exploration*, CESifo Working Paper No. 6775, Category 6: Fiscal Policy, Macroeconomics and Growth (Munich, Germany: November 2017).

[61]Timo Zumbro, "The Relationship Between Homeownership and Life Satisfaction in Germany," *Housing Studies*, Vol. 29, No. 3 (Muenster, Germany: 2014): 319-338.

to sell their homes to pay for costly or extended care.[62] Similarly, a researcher from Canada told us that entering a long-term care facility can quickly deplete the wealth of older households. We previously reported that Germany implemented long-term care insurance in 1995 to address factors including the increase in the number of people needing care due to longer life expectancies and the high cost of long-term care.[63] Research indicates that through these reforms, Germany has expanded access to long-term care to all individuals who need it without spending substantially more than other countries.[64] Additionally, research indicates that Germany's reform has led to increased delivery of long-term care

[62]We have reported that in the United States, long-term care costs complicate planning and managing retirement for DC plan retirees. Specifically, we found that rising and unpredictable long-term care costs may affect individuals' financial security in retirement by leading them to draw down their retirement savings faster than expected. See GAO-18-111SP.

[63]GAO, *Retirement Security: Other Countries' Experiences with Caregiver Policies*, GAO-20-623 (Washington, D.C.: October 30, 2020). The United Kingdom offers long-term care coverage to those with limited income and assets, as does the United States, through the Medicaid program. In Canada, although not required by law, all provinces and territories allocate some public funds to cover long-term care costs. For example, public funds accounted for 74 percent of total spending on nursing home care in 2018. Library of Parliament, *Long-Term Care Homes in Canada—How are They Funded and Regulated?* (October 22, 2020).

[64]Benjamin W. Veghte, *Designing Universal Long-Term Services and Supports Programs: Lessons from Germany and Other Countries* (National Academy of Social Insurance, 2021). OECD data for 2019, the most recent available, indicate that spending on long-term care in Germany was about 1.6 percent of its Gross Domestic Product (GDP), compared to 1.6 percent in Canada and 1.2 percent in the United Kingdom. In the United States, spending on long-term care was about 0.5 percent. However, OECD reported in 2020 that it substantially underestimates long-term care spending in the United States due to reporting gaps. Using an alternate method to compensate for these gaps, OECD estimated spending on long-term care in the United States is about 1.25 percent of GDP. Emily Bourke, David Morgan, and Michael Mueller, *Assessing the Comparability of Long-Term Care Spending Estimates Under the Joint Health Accounts Questionnaire* (Paris, France: OECD, 2020). OECD reported in 2021 that households in Germany pay about 20 percent of the total costs of long-term care. OECD, *Health at a Glance 2021: OECD Indicators* (Paris, France: OECD, 2021).

services at home or in the community, which some may prefer to institutional care.[65]

Intergenerational wealth transfers. Stakeholders told us that intergenerational wealth transfers such as inheritances are also associated with income and wealth disparities among older households; however, it is difficult to assess reliably, according to published research.[66] While discussing intergenerational wealth transfers, one researcher in Canada told us that the number one factor in the financial stability of Canadians is whether they are born into poverty or wealth.[67] Research further indicates an association between social advantages passed on from parents—such as access to a high-quality education in childhood, and a robust social network to help find a first job—and the subsequent retirement security of individuals in Canada and, to a greater

[65]Yanick Labrie, *Rethinking Long-Term Care in Canada: Lessons on Public-Private Collaboration from Four Countries with Universal Health Care* (Fraser Institute, 2021). In 2020, OECD reported that spending on long-term care in Germany is evenly split between in-patient and home-based settings. In contrast, spending on in-patient long-term care accounted for 66.5 percent of all spending in the United Kingdom, 83.7 percent of spending in Canada, and virtually all spending in the United States. See Bourke, Morgan, and Mueller (2020).

[66]Brian Nolan, Juan Palomino, Philippe Van Kerm, and Salvatore Morelli*, The Wealth of Families: The Intergenerational Transmission of Wealth in Britain in Comparative Perspective* (Institute for New Economic Thinking at the Oxford Martin School, August 6, 2020).

[67]Relatedly, research indicates that parental wealth, which can be passed down to children, can serve as a form of private insurance that constitutes an important dimension of inequality. This perspective on wealth focuses on how even the potential of wealth to be transferred across generations can shape inequality by providing a buffer against the socioeconomic consequences of negative outcomes by their children. In addition, parental wealth is important for educational attainment in the United States and Germany. Pfeffer and Hällsten (2012). As previously stated, educational attainment is associated with distributions of income among older households.

extent, the United States.[68] Research focused on the United States similarly cites the significance of intergenerational wealth transfers, but notes that there are gender disparities. Specifically, one study indicates that women's financial outcomes are less dependent on intergenerational transfers than men's, in part, due to the greater role that financial assets made available through marriage have on women's incomes than on men's.[69]

Other research indicates that intergenerational transfers are commonly reported to be associated with the wealth accumulation process. Specifically, gifts and inheritances significantly increase total household wealth in several European countries, including Germany.[70] In addition, research indicates that approximately one-third of wealth inequality in Germany can be attributed to intergenerational wealth transfers.[71]

Retirement Benefits, Government Policies, and Public Assistance Affect Income and Wealth Disparities among Older Adults in Selected Countries

Public retirement programs and other government policies reduced income disparities among older adults in selected countries. For example, benefits from public retirement programs provide basic retirement income

[68]M.C. Wolfson and R.F. Beall, "Contingent Inequalities: An exploration of health inequalities in the United States and Canada," *Growing Inequality: Bridging Complex Systems, Population Health, and Health Disparities*, G.A. Kaplan, A.V. Diez Roux, C.P. Simon, S. Galea, eds. (Washington, D.C: Westphalia Press, 2017). This finding is similar to 2013 research that sought to quantify the social advantages or disadvantages passed from one generation to the next. To do this, the researcher used a metric called intergenerational mobility, which compares the income of individuals to their parents and found that Canada had twice the overall rate of intergenerational mobility as the United States. This was due primarily to outcomes for families at the top and bottom of the income distribution. Specifically, in the United States, sons of fathers in the top and bottom deciles of the income distribution were more likely to occupy the same position in the income distribution as their fathers, relative to those in Canada. Miles Corak, "Income Inequality, Equality of Opportunity, and Intergenerational Mobility," *Journal of Economic Perspectives*, Volume 27, Number 3 (Summer 2013).

[69]Chadwick, Laura and Gary Solon, "Intergenerational Income Mobility Among Daughters," *American Economic Review*, 92 (1) (2002): 335-344.

[70]Mathã, Porpiglia, and Ziegelmeyer (2014).

[71]B. Nolan, J.C. Palomino, P. Van Kerm, and S. Morelli, "Intergenerational wealth transfers and wealth inequality in rich countries: What do we learn from Gini Decomposition?" *Economics Letters*, 199 (2021): 109701.

for older households, and can be designed to reduce income disparities among retirees by providing a higher rate of payments to households with lower incomes. Similarly, progressive tax rates, which apply higher marginal tax rates to higher incomes, can reduce disparities in after-tax household incomes.

Public retirement benefits. Selected countries provide public retirement benefits to supplement the retirement income of older households, which decrease income and wealth disparities among older households.[72] Research focused on the United States reports that Social Security similarly reduces disparities in income among older households.[73]

Government officials stated that most Canadian families are on track to have adequate savings to replace their income in retirement, with households in the lowest income quintiles being eligible for public retirement benefits that offer high income-replacement rates. Depending on the poverty measure used, poverty has been relatively stable or has declined among seniors due to an increase in public benefits available for households in the lowest income quintiles once they reach retirement age, according to the government officials and other researchers we interviewed.

Researchers in the United Kingdom told us that public retirement benefits are a key source of income for older households. Specifically, researchers told us that the lower end of the income distribution for older households is compressed relative to the overall population due to public retirement benefits. They said that as a result, public retirement benefits help to reduce the income gap between lower and higher income households by ameliorating the lack of retirement savings among low earners.

[72]We use the term public retirement benefits to refer to benefits from public retirement systems at the national level, including basic, or flat pensions that give a similar benefit based on factors such as citizenship, as well as earnings-related pensions similar to Social Security in the United States. Public retirement benefits may also include need-based, social assistance benefits for older households whose income and assets fall below a given standard. See appendix II for additional information on selected countries.

[73]Thomas L. Hungerford, "The Course of Income Inequality as a Cohort Ages into Old-Age," *The Journal of Economic Inequality*, Springer; Society for the Study of Economic Inequality, vol. 18(1) (March 2020): 71-90.

Government officials and other stakeholders told us that Germany's statutory pension insurance is the most important program in the German retirement system.[74] Research similarly notes that Germany's statutory pension system is the most important source of income for senior citizens in Germany.[75] Stakeholders said that although Germany's public retirement system is based primarily on employee earnings, it also has features and programs that redistribute benefits to those with lower earnings and assets, thereby acting as social insurance.[76] For example, government officials told us Germany's earnings-related pension considers periods of childrearing, unemployment, and family care, allowing individuals who have lower earnings due to these life events to receive higher benefits in retirement. In addition, in 2021, the government introduced a basic pension targeted to people with below-average earnings who have paid into the statutory pension system for multiple decades.[77]

Public retirement systems may also create income disparities between older households headed by women relative to men, since women are less likely to have participated in the labor market as much as men. We have reported that in the United States, to the extent that women earn less than men, on average, earnings-based public retirement benefits would provide less retirement income to women.[78] Gender disparities also emerge in selected countries. For instance, government officials told us

[74]As we reported, Germany's statutory pension insurance is earnings-related, and requires at least 5 years of contributions. In 2018, the employer and employee contribution rates were 18.6 percent of covered earnings. GAO, *Older Workers: Other Countries' Experiences with Phased Retirement,* GAO-19-16 (Washington, D.C.: April 1, 2019).

[75]Stefan Krenz and Wolfgang Nagl, "A Fragile Pillar: Statutory Pensions and the Risk of Old-Age Poverty in Germany," *FinanzArchiv / Public Finance Analysis*, Volume 66, Number 4 (December 2010).

[76]Germany's earnings-based retirement program provides slightly lower benefits to retirees in the Eastern parts of Germany. This reflects lower average earnings that have persisted in the former East Germany, relative to the Western parts of the country. In 2017, Germany passed legislation that phases out the use of separate benefit formulas for beneficiaries in Eastern and Western Germany by 2024. Federal Ministry of Labour and Social Affairs, *Pension Projections Exercise 2021* (November 2020).

[77]Federal Ministry of Labour and Social Affairs (November 2020).

[78]We have also reported on the particular challenges faced by women in the United States who are divorced or widowed during their retirement years. See GAO, *Retirement Security: Older Women Report Facing a Financially Uncertain Future*, GAO-20-435 (Washington, D.C.: July 14, 2020) and GAO, *Retirement Security: Women Still Face Challenges*, GAO-12-699 (Washington, D.C.: July 19, 2012).

that men tend to have more pension wealth than women in the United Kingdom. In addition, stakeholders in Germany told us that women generally receive lower public retirement benefits than men, though the gap has decreased in recent years due to increased workforce participation. More broadly, OECD reported in 2021 that a gender pension gap existed in all 34 OECD countries it reviewed, although this gap has generally narrowed in recent decades, particularly in Canada.[79]

Government policies and public assistance programs. Stakeholders in selected countries said the distribution of income and wealth among older households is also shaped by policies and programs, such as tax systems.[80] Each of these countries have progressive income tax rates, meaning higher incomes are subject to a higher marginal tax rate than lower incomes.[81]

Much of the wealth in the selected countries is concentrated in high-wealth households, though one researcher told us that Germany's tax policies are more progressive than those in the United States, which could facilitate the accumulation of wealth by lower-income households. Another researcher from Germany cited that country's progressive inheritance tax, whereby larger inheritances are subject to higher tax rates than smaller ones. The researcher noted that Germany's progressive tax structure, in combination with other government programs, such as the payment of unemployment and housing benefits,

[79]OECD measured pension gender gaps as the difference between the mean retirement income from all sources for men and women 65 and older, as a percentage of the average retirement income among male beneficiaries. OECD reported that the average gender pension gap for the 34 OECD countries it reviewed was 25.6 percent, as compared to 21.8 percent in Canada. The gap decreased in Canada by 14.7 percentage points from a prior measurement in the early 2000's. This was the largest decline among 21 OECD countries reviewed, and nearly double that of any other countries reviewed, in percentage points. OECD, *Towards Improved Retirement Savings Outcomes for Women*, OECD Publishing (Paris, France: 2021).

[80]OECD officials told us their research indicates that through their tax systems, countries can reverse inequalities in retirement that accumulated over individuals' working years.

[81]The United States similarly administers a progressive federal income tax, with marginal rates in 2022 that increase from 10 percent to 37 percent, depending on the taxpayer's reported income. However, disparities in the average tax rates that individuals or households actually pay is more complicated, affected by factors such as opportunities for tax-exempt, tax-deferred, and tax-sheltered income. In addition, even if national income tax rates are progressive, the overall incidence of taxes would also take into account state or provincial income taxes, payroll taxes, sales or value-added taxes, and property taxes, for example. We did not review selected countries' tax policies.

can result in a redistribution of wealth from higher-wealth to lower-wealth households.[82]

Our review indicates that public assistance programs in Canada, such as tax credits and transfer payments, have a significantly redistributive impact on older households. For instance, lower-income households can reduce, eliminate, or in some cases more than offset their tax liability and increase their incomes through refundable tax credits, which research has noted to be very important for those in the bottom half of the income distribution.[83] Research also shows that, despite the substantial rise in pre-tax income inequality since the 1980s, much of the inequality in Canada was offset by the tax and transfer system. For example, one study found that the tax and transfer system plays a role in compressing income inequality, particularly at the bottom of the income distribution.[84]

Agency Comments

We provided a draft of this report to the Department of Labor, Department of the Treasury and its Internal Revenue Service, Social Security Administration, and Census Bureau for their review and comment. We received technical comments from the Department of Labor, Department

[82]We did not review selected countries tax policies and government programs, so we could not independently verify the redistributive effects of various tax policies.

[83]See Kevin Milligan, "Income Inequality and Income Taxation in Canada: Trends in the Census 1980-2005," SPP Research Papers, The School of Public Policy University of Calgary, vol. 6(24) (August 2013). Also see Matthew Brzozowski, Martin Gervais, Paul Klein, and Michio Suzuki, "Consumption, Income, and Wealth Inequality in Canada," *Review of Economic Dynamics*, Elsevier for the Society of Economic Dynamics, vol. 13(1) (January 2010): 52-75.

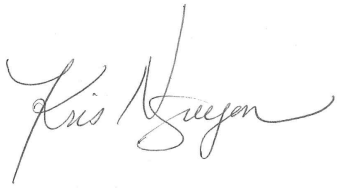
[84]Research indicates that the following transfer payments assist in mitigating income inequality in Canada: social assistance, unemployment benefits, and child benefit programs. Social assistance refers to assistance from the government to cover basic needs such as food, shelter, and clothing. Unemployment benefits, also known as Employment Insurance, provides regular benefits to individuals who lose their job. In addition, various child benefit programs exist in Canada. For instance, low-income workers and households with children can use refundable tax credits—where the amount claimed is payable to the taxpayer as a refund to the extent that the tax credit exceeds the taxpayer's tax liability—for goods, services, and other benefits. Brzozowski, Gervais, Klein, Suzuki (2010). In the United States, the Internal Revenue Service implemented three of our four recommendations to identify and address noncompliance with refundable tax credits. See GAO, *Refundable Tax Credits: Comprehensive Compliance Strategy and Expanded Use of Data Could Strengthen IRS's Efforts to Address Noncompliance*, GAO-16-475 (Washington, D.C.: May 27, 2016).

of the Treasury and its Internal Revenue Service, and the Social Security Administration, which we incorporated as appropriate.

As agreed with your office, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies to the Secretary of Labor, the Secretary of the Treasury, the Commissioner of the Internal Revenue Service, the Acting Commissioner of the Social Security Administration, the Director of the Census Bureau, the Chairman of the Senate Committee on the Budget, and other interested parties. In addition, the report will be available at no charge on the GAO website at http://www.gao.gov.

If you or your staff have any questions about this report, please contact me at (202) 512-7215 or nguyentt@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix V.

Sincerely yours.



Tranchau (Kris) T. Nguyen, Director
Education, Workforce, and Income Security Issues

Appendix I: Objectives, Scope, and Methodology

In this report, we (1) compare trends in distributions of income and wealth, and disparities in survival rates for older households in the United States with those in Canada, Germany, and the United Kingdom; and (2) describe factors that contribute to any disparities in income and wealth distributions for older households in selected countries.

To answer both objectives, we developed criteria for selecting countries for comparison with the United States through interviews or requests for input from officials at the Department of Labor, Department of the Treasury's Office of Tax Policy and Internal Revenue Service, and Social Security Administration; members of the Society of Actuaries; OECD representatives; an academic researcher with relevant experience; and administrators of four sources of data that enable comparisons between countries.[1] They recommended we select countries that collect with sufficient regularity data on income, wealth, and mortality (from which survival rates can be estimated) that can be combined with data for the United States to enable comparisons across countries. This is referred to as data harmonization.[2] They also recommended we select countries with

[1]With respect to potential data sources, we spoke with researchers at the University of Southern California's Dornsife Center for Economic and Social Research, who maintain a set of protocols for harmonizing longitudinal survey data compiled by the United States and other countries; the LIS Cross-National Data Center in Luxembourg, who harmonize data from countries' national income and wealth surveys and make them publicly available for cross-sectional analysis by maintaining databases of harmonized income and wealth data; the Munich Center for the Economics of Aging at the Max Planck Institute for Social Law and Social Policy, who compile income and wealth survey data for European Union countries; and the World Inequality Database, a publicly-available source of income and wealth distributions, created by combining countries' income and wealth survey responses with administrative data and data from countries' national accounts.

[2]Harmonization is a generic term for procedures used predominantly in official statistics that aim at achieving, or at least improving, the comparability of different surveys. Specifically, we used data sources from which the outputs of different national income and wealth surveys have been "mapped" into a unified measurement scheme, referred to as output harmonization. See Survey Research Center, *Guidelines for Best Practice in Cross-Cultural Surveys* (Ann Arbor, MI: Survey Research Center, Institute for Social Research, University of Michigan, 2016), retrieved April 7, 2022, from http://www.ccsq.isr.umich.edu/.

comparable economic and social frameworks to enable meaningful comparisons.[3]

We selected Canada, Germany, and the United Kingdom for comparison to the United States based on the availability of data from each and the size of their economies. Data on income and wealth from the three countries have been harmonized with those of the United States by researchers at the LIS Cross-National Data Center in Luxembourg.[4] Additional data that enable comparisons between survival[5] of older populations in different countries have been harmonized for the United Kingdom and the United States by researchers at the Program on Global Aging, Health, and Policy at the University of Southern California Dornsife Center for Economic and Social Research.[6] With respect to the size of selected countries' economies, 2020 total and per capita gross domestic

[3]We recognize that other countries have different cultures, histories, and legal systems than the United States. These disparities are not necessarily reflected in a country's data on income, wealth, and longevity. Additionally, the laws, regulations, policies, and customs of other countries may not have the same effects if applied in the United States.

[4]The Luxembourg Wealth Study database harmonizes data from income and wealth surveys conducted in other countries with the Survey of Consumer Finances (SCF) conducted in the United States. SCF is a nationally representative survey of U.S. households produced by the Board of Governors of the Federal Reserve System. A different group of households is interviewed every 3 years about their debt, assets, and income, among other topics. For simplicity, in the report we refer to LWS as providing data for the United Kingdom. Wealth and Assets Survey data used in LWS actually cover populations on the island of Great Britain, which does not include Northern Ireland. Additionally, the Wealth and Assets Survey excludes addresses north of the Caledonia Canal, the Scottish Islands, and the Isles of Scilly. See appendix II for information on income and wealth surveys in Canada, Germany, and the United Kingdom.

[5]We have 10 years of reliable data to analyze due to the limitations of the Harmonized ELSA data, as opposed to 22 years of reliable data in the RAND HRS. As a result, we cannot analyze longevity to the extent we did in the prior report, GAO, *Retirement Security: Income and Wealth Disparities Continue Through Old Age*, GAO-19-587 (Washington, D.C.: August 9, 2019). Because we have fewer years of data to analyze and compare, we use 10-year survival rates as a proxy for longevity in this analysis. See appendix IV for more information.

[6]Specifically, researchers maintain the Gateway to Global Aging Data, a set of protocols that can be used to harmonize income and wealth surveys conducted in other countries with the Health and Retirement Study (HRS) conducted in the United States. HRS is a nationally representative, longitudinal survey produced by the University of Michigan with support from the National Institute on Aging and the Social Security Administration. HRS follows the same set of Americans from their fifties through the remainder of their lives, and asks questions about income and wealth.

products for each were above the average for the 38 OECD member countries.

To examine how trends in income, wealth, and survival among older households in the United States compare with those in selected countries, we conducted two analyses.[7] To compare distributions of income and wealth over time, we used Luxembourg Wealth Study (LWS) data to conduct cross-sectional analysis of successive cohorts of households age 55 and over in the United States and selected countries from 1998 through 2019.[8] To examine the association between household income and wealth with survival, we used the Gateway to Global Aging Data protocols to harmonize HRS with the English Longitudinal Study of Ageing (ELSA).[9] We then conducted longitudinal analysis of households age 50 and over from 2002 through 2012. For both analyses, we sorted samples of older households into quintiles by income or wealth.

We restricted the number of countries included in our analysis and the types of comparisons we make based on two limitations. One limitation is that countries administer national income and wealth surveys on varying schedules. As a result, income and wealth data are not consistently aligned by year between the countries in our analysis. Additionally, wealth data are available for fewer countries in fewer years relative to income data. As a result, we focused our review on comparisons of general trends in older populations. We do not, for example, draw conclusions about or make comparisons between specific levels of income or wealth for older populations in the United States and selected countries. Despite these limitations, the data we reviewed provide useful insights about

[7]Throughout the report, we use the term older households to refer to the populations in our analyses. These variously included households age 50 and older, or age 55 and older, consistent with our prior review, see GAO-19-587. Specifically, for our cross-sectional analysis, we defined older households as those in which the household head or any spouses or partners were age 55 or older. For our longitudinal analysis, we use data for households age 50 and over based on the design of the survey data on older households in selected countries.

[8]We converted estimates to 2017 U.S. Dollar purchasing power parities—the most recent available at the time of our analysis—to adjust for inflation and differences in currency values. Although income and wealth data in LWS for Germany and the United Kingdom are longitudinal—meaning these countries generally surveyed the same households over time— we limit our analysis to an examination of cross-sections of older populations. This is because data in LWS for Canada and the United States are cross-sectional, meaning each wave of surveys conducted in these countries may include different households.

[9]For simplicity, in this report we refer to ELSA, which is conducted in England, as providing data for the United Kingdom.

general disparities in distributions of income and wealth between the United States and selected countries, and their association with survival in the United States and the United Kingdom. For each of the datasets used in our study, we reviewed documentation, interviewed and corresponded with officials responsible for the data, and tested for outliers and missing data or variables. We determined that these data are sufficiently reliable for the purposes of this report.

To describe factors that contribute to any cross-national differences in income and wealth inequality among older households, we interviewed government officials, academic researchers, and research organizations in Canada, Germany, and the United Kingdom to discuss the factors they identified as associated with distributions of income and wealth among older households. We also coordinated our review with national audit offices in selected countries. We interviewed U.S. Census Bureau officials about products they issue similar to those used in selected countries to explore associations between income and other sources of deprivation, such as poor health and lack of educational attainment. Additionally, the stakeholders we interviewed to inform our country selections provided considerations for assessing the actions other countries have taken to address trends similar to those in the United States, and the outcomes of these actions.[10] We also reviewed data used to answer our first objective to explore associations between the factors identified by interviewees and the income or wealth of older populations in the United States and selected countries.

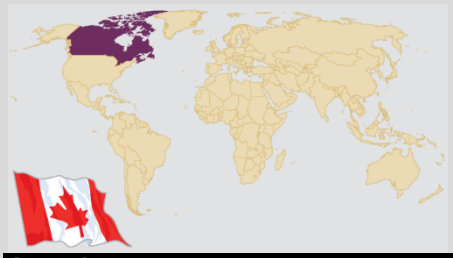
We also searched for literature to provide additional context on the income, wealth, and longevity of older populations, using two methodologies. We conducted a formal search of multiple databases for relevant government reports, scholarly and peer reviewed articles, working papers, and publications by research associations from January 2010 to May 2020. We identified 56 that informed this report. We also reviewed 138 studies authored or recommended by interviewees, or identified in the course of our fieldwork.

[10]A legal, regulatory, or policy feature leading to certain outcomes in one or more of the countries we studied, which may have significantly different cultures, histories, and legal systems than the United States, does not necessarily indicate that similar measures would lead to comparable outcomes in the United States. We did not conduct an independent legal analysis to verify all the information we gathered about selected countries' laws, regulations, or policies. Instead, we relied on appropriate secondary sources and interviews to support our work.

Appendix II: Information on Selected Countries

To compile the information in this appendix, we interviewed government officials and researchers in Canada, Germany, and the United Kingdom. We also reviewed government documents and relevant literature for each country. We selected countries for review based on the availability of income and wealth data from each and the size of their economies, as measured by per capita gross domestic product. We did not conduct an independent legal analysis to verify the information provided about the laws, regulations, or policies of the countries selected for this study.[1] Rather, we relied on appropriate secondary sources and interviews to support our work. We submitted key report excerpts to government officials in each country, as appropriate, for their review and verification, and we incorporated their technical corrections as necessary.

[1]A legal, regulatory, or policy feature leading to certain outcomes in one or more of the countries we studied, which may have significantly different cultures, histories, and legal systems than the United States, does not necessarily indicate that similar measures would lead to comparable outcomes in the United States.



At a glance

Population: 38 million (2020)

Gross Domestic Product (GDP): $1.77 trillion (2020)

GDP per capita in U.S. dollars (USD): $52,051 (2021)

Public pension spending (as percentage of GDP in 2018): 4.9

Net pension replacement rates (as percentage of average individual earnings in 2020): 46.4

Net pension wealth (as multiple of average individual earnings in 2020): 8.7 for men, 9.0 for women

Tax on personal income (as percentage of GDP in 2020): 12.5

Life expectancy at birth: 81.7 years (2020)

Estimated present value of benefits expected from public retirement programs and defined benefit retirement plans, based on the amount of taxes indiviuals pay for these benefits.[a]

Income and wealth data sources

The Survey of Financial Security provides a comprehensive picture of the net worth of Canadian families. It is administered by Statistics Canada and aims to collect information from a sample of Canadian families on their financial and non-financial assets, their financial behaviors and attitudes, as well as their debts such as mortgages, vehicles, credit cards, and student loans.

Currency: Canadian Dollar
Collection Mode: Personal interview
Structure of Data: Cross-sectional
Frequency: Every 3 years
Most Recent Survey: 2019
Most Recent Survey in LWS: 2016
Sample Size of Most Recent Survey in LWS: 12,429 households, including 28,402 individuals

Canada

Sources of retirement income

National pension:

- The Canada Pension Plan provides a monthly, taxable benefit that replaces part of your income when you retire, funded by contributions and investment returns. The earnings-related Canada Pension Plan targets a replacement rate of 33.3 percent of average lifetime earnings, up to a maximum earnings limit each year. Employees in the province of Quebec have their own Quebec Pension Plan, broadly similar to and coordinated with the Canada Pension Plan. To qualify, recipients must
  - be at least 60 years old, and
  - have made at least one valid contribution to the Canada Pension Plan

- The Old Age Security (OAS) program provides monthly benefits that are independent of an individual's earnings history, funded by general tax revenues.
  - The OAS pension is available to seniors age 65 and older who meet the legal status and residence requirements. Seniors who have resided in Canada for at least 40 years after age 18 receive a full basic OAS pension. Those who do not qualify for a full pension receive a partial pension if they have resided in Canada for at least 10 years after age 18. The amount of their benefit is calculated at the rate of 1/40th of a full pension for each complete year of residence in Canada.
  - The Guaranteed Income Supplement provides additional monthly support to low-income OAS pensioners.
  - The Allowance and the Allowance for the Survivor are available to certain qualifying individuals age 60 to 64.

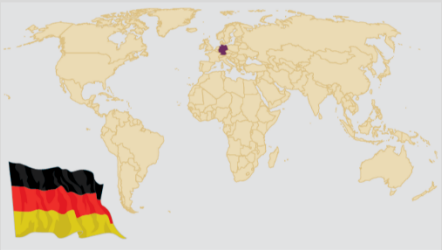
Employer-sponsored pensions: Registered Pension Plans established by employers or unions to provide pensions for employees. In general, the plans can be defined benefit (DB), defined contribution (DC), or a combination of DB and DC plans.

Individual savings: Individuals can use tax-assisted arrangements that foster personal savings including Registered Retirement Savings Plans and Tax Free Savings Accounts—a general purpose savings plan that provides for qualified withdrawals free of federal income tax.

Income and wealth data sources (cont.)

Coverage: The Survey of Financial Security covers about 98 percent of the population in the 10 provinces (the territories were not included). The excluded populations are as follows: those living on Indian reserves, official representatives of foreign countries living in Canada and their families, members of religious and other communal colonies, members of the Canadian Forces living in military bases, people living in residences for senior citizens, and people living full time in institutions. Information was not gathered from persons temporarily living away from their families (for example, students at university) because it would be gathered from their families if selected. In this way, double counting of such individuals was avoided.

Source: GAO analysis of program documentation and other relevant documents; and interviews with government officials; State Department (base map); Art Explosion (flag). | GAO-22-103950



At a glance

Population: 83.2 million (2020)

GDP: $4.88 trillion (2021)

GDP per capita in USD: $50,804 (2021)

Public pension spending (as percentage of GDP in 2017): 10.2

Net pension replacement rates (as percentage of average individual earnings in 2020): 52.9

Net pension wealth (as multiple of average individual earnings): 10.6 for men, 11.7 for women (2020)

Tax on personal income (as percentage of GDP in 2020): 10.4

Life expectancy at birth: 81.0 years (2018)

Income and wealth data sources

The German Socio-Economic Panel is administered by the German Institute for Economic Research and aims to collect representative micro-data on persons, households and families to measure stability and change in living conditions by following a microeconomic approach enriched with sociology and political science variables. Information included in this survey includes income, household composition, education, expenses, assets, debt and wealth.

Currency: Euro
Collection Mode: Face-to-face with computer-assisted personal interviewing and/or paper-and-pencil interviewing
Structure of Data: Longitudinal
Frequency: Annual survey, with wealth module asked every 5 years beginning in 2002
Most Recent Survey: 2020
Most Recent Survey in LWS: 2017
Sample Size of Most Recent Survey in LWS: 87,580 households including 228,655 individuals

Germany

Sources of retirement income

National pension: An earnings-related pension, requiring at least 5 years of contributions. As of 2021, the contribution rate was 18.6 percent of covered earnings. Employer and employee each pay half of the contribution rate. Pensions are adjusted yearly, primarily based on the development of wages.

Employer-sponsored pensions: Pension reforms implemented in January 2018 aim at increasing coverage by making it less onerous for employers to sponsor DC plans. The reforms introduced a new type of plan without the guaranteed minimum benefit that was previously required for DC plans that made it difficult for smaller employers especially to offer pensions to their workers. The new plans may be established solely on the basis of collective bargaining agreements.

Individual savings: Private retirement savings include products such as Riester pensions, first introduced in 2002. Riester pensions benefit from tax incentives on contributions but also from additional direct public subsidies for low-income households and households with children. The self-employed are generally not eligible for Riester pensions but can benefit from the Rürup pensions, another instrument for private retirement savings.

Income and wealth data sources (cont.)

Coverage: The survey covers all private (non-group, non-institutional) households in Germany.

Source: GAO analysis of program documentation and other relevant documents; and interviews with government officials; State Department (base map); Art Explosion (flag). | GAO-22-103950

At a glance

Population: 67.1 million (2020)

GDP: $3.47 trillion (2021)

GDP per capita in USD: $47,334 (2021)

Public pension spending (as percentage of GDP in 2017): 5.6

Net pension replacement rates (as percentage of average individual earnings in 2020): 58.1

Net pension wealth (as multiple of average individual earnings): 10.6 for men, 11.8 for women (2020)

Tax on personal income (as percentage of GDP in 2020): 9.5

Life expectancy at birth: 80.4 (2020)

Income and wealth data sources

The Wealth and Assets Survey is administered by the Office for National Statistics and aims to provide representative data for households and indivudals in Great Britain covering (1) the level, distribution nature and type of assets (including savings) and debts of all types; (2) attitudes towards savings, debt, and planning for retirement; and (3) change in the aforementioned over time.

Currency: Pound Sterling
Collection Mode: Survey
Structure of Data: Longitudinal
Frequency: Every 2 years, financial year-based periodicity (April to March)
Most Recent Survey: April 2018 to March 2020
Most Recent Survey in LWS: 2017
Sample Size of Most Recent Survey in LWS: 18,028 households, including 40,485 individuals

Coverage: All private households in Great Britain with the exception of people in communal establishments such as retirement homes, prisons, barracks, halls of residence and hotels, as well as homeless people.

United Kingdom

Sources of retirement income

National pension: A flat-rate single-tier national pension was introduced in April 2016. This pension plan replaces the previous two-tier system and provides a regular payment of about £185.15 per week or £9,628 per year, unless the pension is deferred, in which case it increases by about 5.8 percent per year.

Employer-sponsored pension: The Pensions Act 2008 put in place a framework for workplace pension reform designed to increase private pension saving in the UK. As a result, from October 2012, all eligible employees have to be automatically enrolled into a qualifying workplace pension plan with the option for employees to opt-out. Although employees are able to opt out of their employer's pension plan, if they are still eligible, they will be automatically re-enrolled after a 3-year period. The qualified plans can be either DB, DC, or hybrid plans. The National Employment Savings Trust, managed as an independent entity, was established by the government to help employers meet their obligation to automatically enroll eligible workers in a retirement plan and thus functions as the default qualified workplace plan.

Individual savings: Savings arranged by the individual. The United Kingdom has Individual Savings Accounts that allow an individual to save up to a designated amount per year tax-free. Workers can take money out of their Individual Savings Accounts at any time, but rules or charges associated with withdrawals are dependent on the terms of the ISA.

United Kingdom (cont.)

Income and wealth data sources (cont.)

The English Longitudinal Study of Ageing (ELSA) collects data from people aged 50 and over to understand all aspects of aging in England. ELSA collects information on people's physical and mental health, wellbeing, finances and attitudes around ageing and how these change over time. Data from ELSA participants informs policy across all aspects of ageing including health and social care, retirement and pensions policy, and social and civic participation.

The original sample was drawn from households that had previously responded to the Health Survey for England (HSE) between 1998 and 2001. These years were chosen because they were recent and could provide a sufficiently large sample size. ELSA used the core samples for these years, all of which were nationally representative. A pilot study was conducted in 2001 before main fieldwork began in March 2002. The same group of respondents have been interviewed every 2 years, with each administration of the study known as "waves," to measure changes in their health, economic, and social circumstances. Younger age groups are replaced or refreshed to retain the panel. The sample has been refreshed using HSE participants in waves 3, 4, 6, 7 and 9. When a refreshment sample is drawn, households from HSE are selected for ELSA if at least one HSE interview was conducted with an age-eligible respondent who agreed to be re-contacted. Each refreshment sample added then becomes part of the cohort issued again at subsequent waves.

Source: GAO analysis of program documentation and other relevant documents; and interviews with government officials and researchers; State Department (base map); Art Explosion (flag). | GAO-22-103950

Appendix III: Information about Data from the Luxembourg Wealth Study Database

The LIS Cross-National Data Center in Luxembourg makes the Luxembourg Wealth Study database (LWS) available for public use while maintaining the privacy of microdata from participating countries' National Income and Wealth Surveys.[1] To do this, LIS makes data available by remote execution. This means users can generate statistics from LWS, such as estimates of average and median household income and wealth by quintile and the confidence intervals around them.[2] However, users cannot access the underlying microdata in LWS, for example to resolve discrepancies in the statistics they query from LWS.

Because we could not access selected countries' microdata in LWS, we could not fully resolve disparities in results for high-income older households (the 20 percent of households with the highest incomes, or quintile 5) from those we reported in 2019.[3] Specifically, incomes we reported in 2019 for high-income households exceed incomes for the same group of households in this report by about $34,000 to $56,000, or by about 8 percent to 21 percent. A data expert and research associate at LIS determined that part of the difference occurred because our 2019 estimates include withdrawals from retirement plans and accounts, such as 401(k) plans and Individual Retirement Accounts. To create a unified measurement scheme across countries, LIS does not treat these withdrawals as income. The remaining disparities are likely the result of other variations in the way we defined household income for our 2019 report and the way LWS defines it. We conclude these disparities may understate, but do not change, the findings from our comparison of

[1]Microdata are the smallest unit of analysis in a survey, and can refer to a single individual or household. In some cases, microdata could be used to identify particular individuals.

[2]These are the intervals that would contain the actual population value for 95 or 99 percent of the samples that could have been drawn from countries' surveys, since each could have provided different estimates.

[3]GAO-19-587.

income distributions for older households in the United States and selected countries.

Also because we accessed LWS remotely, we used two different methods for calculating confidence intervals, which express the variability inherent in survey estimates. Specifically, we report confidence intervals at either 95 percent or 99 percent levels depending on the availability of replicate weight files for survey-years in LWS (see table 3). LWS data for Germany and the United States use multiple imputed values in estimates (such as for income and wealth), while surveys in the United Kingdom and Canada use a single imputation in estimates. In addition, we found potential errors in the estimated confidence intervals for some income and wealth estimates for the United States that were generated using a version of the code that utilizes replicate weight files and multiple imputed values. As a result, we estimated confidence intervals at the 99 percent level using single imputation and not using any associated replicate weight file.

Table 3: Luxembourg Wealth Study Database Estimates Have 95 or 99 Percent Confidence Intervals

	Quintiles	Income/wealth	Years	Confidence intervals
United States	1	Income	All	95 percent
		Wealth	1998-2010, 2016, 2019	95
			2013	99
	2-4	Both	All	95
	5	Both	All	99
Canada	All	Both	1999-2012	99
	All	Both	2016	95
Germany	All	Both	All	99
United Kingdom	All	Both	All	99

Source: GAO analysis of data from the Luxembourg Wealth Study database. | GAO-22-103950

Note: We ranked older households—meaning those where the survey respondent, their partner or spouse, or both reported being 55 or older—by income and wealth, then sorted them into quintiles.

Lastly, because we use two different methods to calculate confidence intervals, we were not able to calculate confidence intervals for average-to-median ratios in figure 5, which depicts concentrations of income and wealth. Table 4 presents average and median estimates for income separately, along with their accompanying confidence intervals.

Table 4: Confidence Intervals for Average and Median Household Income, as Shown in Figure 5

			Average income/ median income	Confidence interval	Lower bound	Upper bound
United States	Third Quintile (Middle-Income)	1998	37,023	95	36,262	37,785
			36,847		35,129	38,565
		2001	41,273	95	40,310	42,236
			41,220		39,156	43,284
		2004	46,786	95	46,037	47,534
			45,378		43,527	47,230
		2007	44,594	95	43,753	45,435
			44,043		41,769	46,317
		2010	47,102	95	46,438	47,765
			46,076		44,803	47,350
		2013	45,101	95	44,521	45,681
			44,895		43,362	46,429
		2016	51,315	95	50,646	51,983
			50,870		49,123	52,617
		2019	51,308	95	50,704	51,913
			50,727		48,768	52,685
	Fifth Quintile (High-Income)	1998	224,250	99	197,093	251,407
			128,560		113,122	143,997
		2001	260,565	99	226,113	295,016
			150,518		137,727	163,310
		2004	262,510	99	237,675	287,345
			162,958		148,560	177,356
		2007	285,129	99	258,036	312,222
			155,755		138,205	173,304
		2010	267,679	99	244,011	291,347
			158,458		148,890	168,025
		2013	273,901	99	251,843	295,959
			161,923		149,417	174,429
		2016	341,100	99	306,534	375,666
			185,243		172,020	198,465
		2019	308,308	99	285,441	331,176
			186,052		174,033	198,072
Canada	Third Quintile (Middle-Income)	1999	33,408	99	33,054	33,762
			32,985		32,322	33,648
		2005	37,545	99	36,867	38,223
			37,524		36,358	38,690

			Average income/ median income	Confidence interval	Lower bound	Upper bound
		2012	40,903	99	40,438	41,367
			40,550		39,736	41,363
		2016	44,304	95	43,906	44,703
			44,125		43,366	44,884
	Fifth Quintile (High-Income)	1999	111,291	99	104,623	117,959
			91,771		87,949	95,594
		2005	116,622	99	108,728	124,516
			93,984		87,476	100,491
		2012	140,277	99	132,177	148,377
			110,405		105,211	115,598
		2016	165,899	95	157,948	173581
			122,402		117,153	127,651
Germany	Third Quintile (Middle-Income)	2002	34,563	99	34,220	34,906
			34,372		33,792	34,951
		2007	33,743	99	33,400	34,085
			33,424		32,784	34,064
		2012	34,588	99	34,248	34,928
			34,321		33,697	34,946
		2017	38,377	99	38,014	38,740
			37,912		37,406	38,419
	Fifth Quintile (High-Income)	2002	109,065	99	103,294	114,837
			85,896		81,738	90,054
		2007	109,392	99	103,724	115,059
			89,394		86,191	92,597
		2012	113,565	99	107,716	119,414
			93,316		89,792	96,841
		2017	121,934	99	116,764	127,103
			101,979		98,342	105,617
United Kingdom	Third Quintile (Middle-Income)	2007	25,593	99	25,428	25,757
			25,169		24,899	25,438
		2009	27,633	99	27,432	27,835
			27,277		26,883	27,671
		2011	35,133	99	34,888	35,378
			34,989		34,477	35,501
		2013	31,362	99	31,147	31,577
			31,092		30,686	31,498
		2015	33,846	99	33,598	34,094
			33,583		33,095	34,071

			Average income/ median income	Confidence interval	Lower bound	Upper bound
		2017	35,032	99	34,780	35,283
			34,920		34,484	35,357
	Fifth Quintile (High-Income)	2007	117,316	99	112,254	122,379
			83,958		81,552	86,363
		2009	115,232	99	109,357	121,107
			86,491		83,781	89,202
		2011	122,160	99	116,711	127,610
			98,849		95,879	101,818
		2013	115,223	99	106,755	123,690
			88,544		85,505	91,583
		2015	119,158	99	113,556	124,760
			94,613		91,002	98224
		2017	117,959	99	110,774	125,144
			94,901		91,936	97,866

Source: GAO analysis of data from the Luxembourg Wealth Study database. | GAO-22-103950

Notes: Average and median income household include household income derived from work and investments, cash and non-cash transfers of a private nature—such as scholarships for college— and cash benefits from public retirement systems and other programs of assistance. It also includes payments from private retirement plans that recur at least once a year, such as monthly payments from a defined benefit plan, or annual programmed withdrawals from a defined contribution plan to satisfy minimum distribution requirements. It does not include one-time withdrawals from defined contribution plans, such as lump sum payments from 401(k) plans in the United States. They also do not include non-cash income, such as homeowners who derive benefits from living in their home, or by beneficiaries of public programs who receive assistance in the form of health care, housing, child care, or education benefits.

To establish low-, middle- and high-income older households for each country, we broke households where the survey respondent, their partner or spouse, or both reported being 55 or older into quintiles based on income. We calculated median income, meaning the income of the “typical” household, for each quintile. For this analysis, we consider the 20 percent of households with the lowest incomes, or first quintile, to be low-income. We consider the 20 percent of households with incomes in the middle of the distribution, or third quintile, to be middle-income households. And we consider the 20 percent of households with the highest incomes, or fifth quintile, to be high-income.

We converted estimates to 2017 U.S. Dollar purchasing power parities—the most recent available at the time of our analysis—to adjust for inflation and differences in currency values.

Similarly, table 5 provides mean and median wealth estimates separately, along with the upper and lower bounds of their confidence intervals.

Table 5: Confidence Intervals for Average and Median Household Wealth, as Shown in Figure 5

		Year	Average wealth/ median wealth	Confidence interval	Lower bound	Upper bound
United States	Third Quintile (Middle-Wealth)	1998	205,061	95	199,021	211,101
			208,577		195,393	221,761
		2001	241,227	95	233,006	249,449
			244,089		224,722	263,456
		2004	265,618	95	257,290	273,947
			250,587		237,080	264,094
		2007	270,490	95	262,855	278,125
			263,199		247,898	278,501
		2010	218,800	95	214,243	223,357
			216,002		202,446	229,559
		2013	195,607	95	190,026	201,189
			194,689		183,501	205,876
		2016	215,909	95	211,666	220,152
			210,751		196,887	224,614
		2019	225,116	95	220,373	229,860
			224,836		212,615	237,058
	Fifth Quintile (High-Wealth)	1998	2,541,925	99	2,230,391	2,853,459
			1,071,111		917,306	1,224,917
		2001	3,480,715	99	3,069,474	3,891,956
			1,480,271		1,267,408	1,693,134
		2004	3,517,454	99	3,141,075	3,893,833
			1,557,513		1,388,552	1,726,474
		2007	4,091,616	99	3,660,616	4,522,615
			1,552,650		1,278,355	1,826,946
		2010	3,655,445	99	3,337,914	3,972,975
			1,761,480		1,536,934	1,986,027
		2013	3,568,323	99	3,216,145	3,920,502
			1,529,898		1,374,045	1,685,750
		2016	4,591,234	99	4,183,426	4,999,041
			2,023,012		1,785,677	2,260,347
		2019	4,483,298	99	4.076,444	4,890,153
			1,846,260		1,651,587	2.040,932
Canada	Third Quintile (Middle-Wealth)	1999	174,948	99	172,047	177,850
			174,852		169,213	180,491
		2005	205,995	99	200,436	211,553
			206,695		197,837	215,554

		Year	Average wealth/ median wealth	Confidence interval	Lower bound	Upper bound
		2012	264,280	99	259,369	269,191
			260,471		251,952	268,990
		2016	300,177	95	296,397	303,958
			295,816		287,488	304,143
	Fifth Quintile (High-Wealth)	1999	933,688	99	871,737	995,639
			671,129		635,698	706,560
		2005	1,201,972	99	1,032,444	1,371,500
			810,667		704,508	916,827
		2012	1,554,061	99	1,443,755	1,664,367
			1,069,636		991,855	1,147,417
		2016	1,905,559	95	1,806,879	2,004,239
			1,295,706		1,228,436	1,362,975
Germany	Third Quintile (Middle-Wealth)	2002	117,895	99	112,008	123,782
			117,448		108,631	126,265
		2007	109,704	99	104,884	114,525
			100,016		90,088	109,943
		2012	118,663	99	113,765	123,562
			118,539		110,953	126,125
		2017	149,750	99	144,615	154,884
			150,358		143,073	157,642
	Fifth Quintile (High-Wealth)	2002	1,033,952	99	882,380	1,185,524
			656,969		616,856	697,081
		2007	1,019,808	99	876,929	1,162,686
			655,174		608,763	701,586
		2012	862,830	99	778,847	946,814
			589,231		559,173	619,288
		2017	989,582	99	891,877	1,087,286
			684,149		650,836	717,461
United Kingdom	Third Quintile (Middle-Wealth)	2007	337,676	99	335,054	340,299
			336,887		331,301	342,474
		2009	316,850	99	314,555	319,145
			315,860		311,900	319,820
		2011	316,396	99	314,169	318,623
			314,636		310,027	319,245
		2013	322,884	99	320,275	325,493
			321,408		316,863	325,954
		2015	344,878	99	341,687	348,068
			341,124		335,632	346,616

		Year	Average wealth/ median wealth	Confidence interval	Lower bound	Upper bound
		2017	364,425	99	360,999	367,851
			361,798		355,034	368,562
	Fifth Quintile (High-Wealth)	2007	1,343,675	99	1,268,917	1,418,432
			931,485		901,444	961,526
		2009	1,297,330	99	1,104,409	1,490,250
			871,955		843,904	900,006
		2011	1,390,868	99	1,275,348	1,506,387
			925,374		893,178	957,570
		2013	1,704,846	99	1,478,703	1,930,988
			1,009,196		975,437	1,042,954
		2015	1,979,824	99	1,487,744	2,471,904
			1,136,928		1,093,105	1,180,751
		2017	1,765,568	99	1,647,984	1,883,152
			1,221,204		1,179,429	1,262,979

Source: GAO analysis of data from the Luxembourg Wealth Study database. | GAO-22-103950

Notes: We define household wealth as net worth, which includes financial and non-financial assets—such as homes, cars, or family-owned businesses—minus the value of the total liabilities. This measurement of wealth does not include the present value of future benefits to be paid from public retirement programs or defined benefit workplace retirement plans. For example, wealth estimates for the United States do not include the present value of future Social Security benefits, or lifetime income expected from employer-sponsored defined benefit plans or individual annuities. In contrast, our measurement of household wealth does include the value of assets held in defined contribution workplace retirement plans, such as 401(k) plans in the United States, and individual retirement accounts.

To establish low-, middle- and high-income older households for each country, we broke households where the survey respondent, their partner or spouse, or both reported being 55 or older into quintiles based on income. We calculated median wealth, meaning the wealth of the “typical” household, for each quintile. For this analysis, we consider the 20 percent of households with the least wealth, or first quintile, to be low-wealth. We consider the 20 percent of households in the middle of the distribution, or third quintile, to be middle-wealth households. And we consider the 20 percent of households with the most wealth, or fifth quintile, to be high-wealth.

We converted estimates to 2017 U.S. Dollar purchasing power parities—the most recent available at the time of our analysis—to adjust for inflation and differences in currency values.

Appendix IV: Survival Analysis of Older Adults in the United States and United Kingdom

This technical appendix describes the data, methodology, limitations, and results related to the analysis of the relationship between income and wealth and survival among older adults in the United States and United Kingdom as described in this report. We undertook this analysis to better understand the relationship between income and wealth and survival to older ages, in the United States compared to that of other countries.

Data

We aimed for this analysis to be similar to the survival analysis conducted for the United States using data on older Americans from the Health and Retirement Study (HRS) in GAO*, Retirement Security: Income and Wealth Disparities Continue Through Old Age,* GAO-19-587 (Washington, D.C.: August 9, 2019). We focused on conducting a similar analysis in the United Kingdom given the availability of harmonized data from the English Longitudinal Study of Ageing (ELSA) with the HRS, which allows for cross-country comparisons between the two countries. We were unable to do a similar analysis in other countries beyond the United Kingdom, including Canada and Germany, due to data availability issues. In order to compare the results between the United Kingdom and the United States, we also conduct the analysis for the United States during the same time period.

English Longitudinal Study of Ageing. We downloaded the Harmonized ELSA data from the UK Data Service via the Gateway to Global Aging Data, which is a free public resource designed to facilitate cross-national and longitudinal studies on aging using the family of health and retirement studies around the world. ELSA is a panel survey of people age 50 and over and their partners, living in private households in the United Kingdom and specifically England. ELSA data are longitudinal and follow the same individuals over time. The survey gathers information about demographics, income, assets, health, cognition, family structure and connections, health care use and costs, housing, job status and history, expectations, and insurance. The population of interest for our analysis are individuals in the United Kingdom age 50 and over in the first

wave of the survey, which was conducted in 2002-2003. This initial sample included 11,050 respondents age 50 and over on March 1, 2002. There have been eight waves of interviews in the study, from 2002-2003 to 2016-2017. However, we only use data through wave 6 of the survey in 2012-2013 because data on one of the key variables to measure survival, date of death, are not reliable in waves 7 and 8.

Health and Retirement Study. We also used data from the HRS, which is a longitudinal household survey conducted by the Institute for Social Research at the University of Michigan. With the goal of making the data more accessible to researchers, the RAND Center for the Study of Aging, with funding and support from the National Institute on Aging (NIA) and the Social Security Administration (SSA), created the RAND HRS data products. Similar to ELSA, HRS is a national panel survey of individuals over age 50 and their spouses. The data are also longitudinal and follow the same individuals over time. The HRS provides panel data that enable research and analysis in support of policies on retirement, health insurance, saving, and economic well-being. The survey elicits information about demographics, income, assets, health, cognition, family structure and connections, health care utilization and costs, housing, job status and history, expectations, and insurance. The population of interest for our analysis are individuals in the United States over age 50 in the sixth wave of the survey, which began in 2002. Similar to the ELSA data analysis, we measure mortality from 2002 (wave 6) through 2012 (wave 11) to facilitate comparison with our analysis of older United Kingdom adults, although reliable mortality data are available in the HRS through 2014 (wave 12).

For simplicity, we say that our analysis period was from 2002-2012, even though some individuals were observed from 2003-2013. We used the following harmonized variables from the Harmonized ELSA and RAND HRS in various parts of our analysis:

- To account for the fact that older individuals are more likely to die sooner, we include data on the age of the respondent when the survey began.
- To account for disparities in survival by sex/gender, we include data on the gender of the respondent.
- To measure respondents' race and ethnicity, we identify respondents as either White or non-White. The RAND HRS identifies respondents as either White/Caucasian, Black/African-American, or Other and also

identifies respondents as either Hispanic or non-Hispanic; ELSA identifies respondents as either White or non-White.

- To measure respondents' education level, we sort them into four groups: those with less than a high school education; those who graduated high school or received their GED; those with some college education; and those with a college degree and above.
- To measure baseline health status at the beginning of the survey period, we sort respondents into five groups based on their self-reported health status in 2002, including Excellent, Very good, Good, Fair, and Poor. We also include alternative measures of health in our analysis to see how sensitive our results are to our choice of health measure, including activities of daily living, which measure the ability to live independently, as well as high blood pressure and smoking behavior at the beginning of the study period.
- Given our interest in analyzing the relationship between income and survival, one of our main variables of interest is household income in the beginning of the study in 2002, which includes the income of the respondent and their spouse. Income includes individual and spouse earnings, family capital income, income from private and public pensions, government transfers, and other regular payments. We used this variable for income because it is the income variable harmonized between the ELSA and RAND surveys, and because we did not have access to administrative income or earnings data from the United Kingdom, as we did for our previous report, GAO-19-587 from the United States.
- Another variable of interest is household wealth at the beginning of the study, as we are also interested in analyzing the relationship between wealth and survival. Wealth includes the net value of primary residence, net value of business, net value of non-housing financial wealth, net value of secondary home residence and other property, and the total value of other physical assets. The wealth measure does not include the value of vehicles as a result of the harmonization between the surveys. We used this variable for wealth because it is the wealth variable harmonized between the ELSA and RAND surveys. Using wealth at the beginning of the survey is similar to our approach in the previous report, GAO-19-587.

We adjust all dollar-denominated variables in both the ELSA and HRS for inflation and express them in 2019 US dollars.

Overall, due to data limitations, our analysis in this report differed from that in GAO-19-587 in three key ways:

- We have 10 years of reliable data to analyze due to the limitations of the Harmonized ELSA data, as opposed to 22 years of reliable data in the RAND HRS. As a result, we cannot analyze longevity to the extent we did in the prior report, since we have fewer years of data to analyze and compare, and we analyze survival.
- We do not have access to mid-career earnings data (or any administrative earnings from the lifetime) in the Harmonized ELSA data, as we did for the RAND HRS because we did not have access to administrative income data from the United Kingdom. Mid-career earnings was the basis for the income variable in the prior report. As a result, our main income variable of interest for the analysis in this report is income at the beginning of the survey in 2002. We have done some sensitivity analyses to ensure that the associations with respect to survival we saw using the mid-career earnings variable in the RAND HRS were consistent with the household income variable at the beginning of the survey.
- We do not restrict the analysis of the ELSA to one birth cohort, as we did in our survival analysis in the previous report, because the ELSA does not follow similar cohorts as the HRS does. As a result, we account for age at the beginning of the survey in our analyses.

Methodology

Our goal was to determine how income, wealth, and other demographic and health-related factors are associated with survival to older ages of individuals in the United Kingdom over age 50 in the ELSA panel to compare with results of older individuals in the United States over age 50 in the HRS. For the purposes of our analysis, we use survival to older ages during the 10-year study period as a proxy for longevity.

In statistics, incomplete measurement of longevity or survival is generally known as censored data. We experience censored data in our analysis because we only observe survival through 2012. Survival analysis methods are required to avoid making inaccurate conclusions about actual survival from censored data, when survival can only be measured up to a certain time before death. This is also known as a partial survival analysis, as we cannot observe full survival due to the nature of the surveys.

In our survival analysis, the dependent variable is a function of the time in months to death and whether death was observed during the 10-year survey period. For our univariate analyses, we used the Kaplan-Meier

method to estimate survival probabilities as a function of time and to obtain univariate statistics on survival for different economic and demographic groups within 10-year age groups (with the exception of the over 90 age group which can go beyond 10 years). We measured the proportion of ELSA and HRS participants still alive at the end of the 10-year survey period, meaning that we observed survival of individuals from the beginning of the survey period in 2002 through 2012, by income quintiles, wealth quintiles, race (White and non-White), gender (male and female), and educational attainment (less than high school, high school graduate or GED, some college, college graduate or higher). We estimated these survival probabilities by the economic and demographic variables described above within 10-year age groups, including people 50-59, 60-69, 70-79, 80-89, and over 90 when the surveys began in 2002.

Due to technical limitations associated with accounting for the survey design of the ELSA and the HRS data, we were not able to calculate confidence intervals with the survival probabilities via the Kaplan-Meier method, consistent with the limitation described in prior work (GAO-19-587). As a result, as a part of our univariate analyses, we estimated Cox proportional hazard models to test whether the survival rates obtained from the Kaplan-Meier method described above were statistically significantly different from each other within the economic and demographic groups described above for each age group. These Cox proportional hazard models account for the survey designs of both the ELSA and HRS data and produce hazard ratios, which measure the risk of dying at a certain period for one group compared to others, like the economic and demographic groupings described above.

Hazard ratios that are statistically significant and greater than 1.00 indicate that individuals with those characteristics are more likely to die during the survey period compared to a reference group. Hazard ratios that are statistically significant and less than 1.00 indicate that individuals with those characteristics are less likely to die in the study period compared to a reference group. Hazard ratios are compared within groups (i.e., between the high-income and high-wealth groups and the lower-income and lower-wealth groups) for each country. For example, we estimated survival rates for individuals in high-income and low-income households using the Kaplan-Meier method and tested if these survival rates were significantly different from one another using a Cox proportional hazard model, which produced hazard ratios that allowed us to compare the likelihood of each of the four lower-income groups (1st, 2nd, 3rd, and 4th income quintiles) dying in the 10-year study period

compared to the high-income group (5th quintile) for the United Kingdom and United States separately.

We focus on presenting survival probabilities in the report because this metric of survival probability is easier to understand than hazard ratios. A limitation of univariate analysis is that we cannot analyze the association between survival and multiple explanatory variables all together. As a result, we also estimated multivariate Cox proportional hazard models (multivariate regressions) to analyze the relationship between income and survival and wealth and survival during the 10-year period for which we have data, while controlling for various related demographic variables for each country, including age at the beginning of the 10-year period, gender, race, education, and self-reported health status at the beginning of the survey in various specifications (see Results section below).

Unlike the other variables in the multivariate regressions, age is not included as a categorical explanatory variable and is instead included as age in years at the beginning of the survey as a discrete variable (e.g., 50, 51, 52, and so on). In the multivariate regression results, there is one hazard ratio associated with the age variable that can be interpreted as the increase in risk of death for every unit of the variable (i.e., for every additional year of age). We take this approach with respect to the age variable in the multivariate analyses because it allows us to include more information on the effect of age on survival, as we are able to estimate the chance of survival as age increases by one year, as opposed to our approach in the univariate analyses in which we examined survival rates by 10-year age groups. Overall, our multivariate regressions allow us to examine the association between income and survival and wealth and survival including a richer set of data than our univariate analyses. This approach allows us to efficiently examine the association between income and wealth and survival while accounting for other factors related to surviving to older ages, including age at the beginning of the 10-year period.

Limitations

Our results have limitations and should be interpreted with caution. Importantly, results from the Cox proportional hazard model regressions present correlations, not causal estimates. We report on associations and make no determination of the potential causality of income or wealth or any other demographic variable on survival.

Our results demonstrate that some characteristics are associated with greater chance of surviving to older ages, conditional on having survived to at least age 50, a prerequisite of the surveys. Our results do not suggest that all individuals with those characteristics will live longer than individuals with different characteristics.

Given that our analysis covers 2002 through 2012, we use 10-year survival probabilities for partial longevity information. We do not observe survival over the lifetime, and some individuals in our analysis are substantially younger than other individuals given that the surveys are inclusive of all ages over 50. Thus, the period during which we observe mortality is dependent on age, and those who are younger may exhibit more disparities in survival by economic and demographic characteristics compared to those of older ages when disparities in mortality across these characteristics may tend to mitigate. As a result, we account for age at the beginning of the study period throughout our analyses. In our univariate analyses, we estimate survival rates by 10-year age groups. An additional limitation related to this approach is that the sample size of the age group age 90 and older is relatively smaller than the other groups, particularly in the United Kingdom. Moreover, the ELSA is not particularly well-suited to the study of race because the number of non-White participants is small, according to an ELSA administrator.

The income and wealth groupings are based on what the individual's' household income and wealth was at the beginning of the study period in 2002, but taking a snapshot of an individual's income and wealth may not be representative of what their income and wealth are like over their lifetime. This may be a bigger issue for relatively younger individuals in our data, who are more likely to be pre-retirement when the survey starts and may move to different income groups later in their lives, after our study period. In the previous report, GAO-19-587, we used an average of mid-career household earnings data to measure an individual's place in the income distribution, which allowed us to incorporate more than just a year snapshot of income, but we did not have access to similar data in the United Kingdom. As a part of our sensitivity analyses for this report, we compared the associations with respect to the relationship between income and survival for the group who started the survey in their fifties in the United States using both measures of income from the HRS: the mid-career earnings measure and the household income measure at the beginning of the survey in 2002. Overall, we found that the associations between income and survival we saw using the lifetime earnings variable were consistent with the household income variable at the beginning of the survey (both starting in 2002), suggesting that income at the

beginning of the survey is a reasonable variable to use to group individuals by income for this analysis. The wealth variable we used for this report is similar to what we used in the previous report, GAO-19-587. Overall, we assume that individuals are in the same income and wealth groups during the 10-year period of our analysis.

There may be omitted variables that are not included in our models. While some studies control for health status in analyses related to longevity, others do not given the close relationship between health and mortality. As a result, we conducted our survival regressions both including and excluding measures of health as a part of our sensitivity analyses. However, health status is based on the self-reported health beginning of the survey period, and this variable can also change throughout the 10-year study period, which is not something we account for in our analyses.

Given that this analysis is based on survey data, our analysis assumed actual survival during the observation period did not have a systematic relationship with whether HRS and ELSA respondents dropped out of the survey (except that we know they would eventually die, also known as non-informative censoring).

The ELSA data includes individuals from England, but not Wales, Scotland, or Northern Ireland, which are also part of the United Kingdom. Similar studies of Scotland and Northern Ireland have yet to collect enough years of data to be suitable to this type of analysis, according to ELSA administrators. We refer to the ELSA data analysis as an analysis of the United Kingdom for consistency throughout the report, as the United Kingdom is one of our selected case study countries. A limitation of this approach is that Scotland and Northern Ireland have lower life expectancies and greater premature mortality than England, according to an ELSA administrator.

Results

With respect to our univariate analyses of income and survival in the United Kingdom, we found that higher household income was associated with survival to older ages, but we observed different patterns in the two oldest age groups, from 2002 through 2012 (see table 6). We previously presented the estimated survival rates (see table 1), and we include the hazard ratios that determine the statistical significance of the disparities between the high-income (5th quintile) and lower-income groups below.

Table 6: Estimated Hazard Ratios and Survival Rates Over 10-Year Period by Household Income for U.K. Adults by Age Groups in 2002

	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate
Age at survey start	50-59	50-59	60-69	60-69	70-79	70-79	80-89	80-89	90+	90+
Explanatory variables										
1st (lowest)	3.76***	86%	2.31***	76%	1.65***	48%	1.19	23%	0.75	13%
95 percent confidence intervals	(2.49, 5.68)	—	(1.64, 3.27)	—	(1.27, 2.14)	—	(0.87, 1.63)	—	(0.35, 1.60)	—
2nd	2.86***	89%	2.09***	78%	1.45***	53%	1.42**	18%	0.90	12%
95 percent confidence intervals	(1.83, 4.48)	—	(1.51, 2.89)	—	(1.13, 1.86)	—	(1.04, 1.95)	—	(0.41, 1.99)	—
3rd	2.77***	90%	2.05***	78%	1.44***	53%	1.12	26%	0.45*	34%
95 percent confidence intervals	(1.83, 4.19)	—	(1.51, 2.78)	—	(1.12, 1.83)	—	(0.81, 1.55)	—	(0.19, 1.06)	—
4th	2.19***	91%	1.24	86%	1.20	59%	1.29	22%	1.33	23%
95 percent confidence intervals	(1.54, 3.11)	—	(0.92, 1.68)	—	(0.92, 1.58)	—	(0.90, 1.85)	—	(0.41, 4.30)	—
5th (highest)	omitted category	96%	omitted category	89%	omitted category	64%	omitted category	29%	omitted category	0%
Number of observations	—	3,696	—	3,080	—	2,373	—	1,089	—	111

Source: GAO analysis of Harmonized ELSA data. | GAO-22-103950

Note:

*** p<0.01,

** p<0.05,

* p< 0.10.

Parentheses contain 95 percent confidence intervals. Statistical significance of disparities in survival rates is measured between the 5th (highest) income group and each of the lower four income groups. ELSA includes individuals in England and does not include individuals in Wales, Scotland, or Northern Ireland.

With respect to our univariate analyses of income and survival in the United States, we found that higher household income was associated with survival to older age, but patterns differed for the two oldest age groups, from 2002 through 2012 (see table 7). We previously presented the estimated survival rates (see table 1), and we include the hazard ratios that determine the statistical significance of the disparities between the high-income (5th quintile) and lower-income groups below.

Table 7: Estimated Hazard Ratios and Survival Rates Over 10-Year Period by Household Income for U.S. Adults by Age Groups in 2002

	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate
Age at survey start	50-59	50-59	60-69	60-69	70-79	70-79	80-89	80-89	90+	90+
Explanatory variables										
1st (lowest)	3.76***	80%	2.98***	69%	2.00***	48%	1.35**	26%	0.87	11%
95 percent confidence intervals	(2.61, 5.43)	—	(2.44, 3.64)	—	(1.60, 2.52)	—	(1.08, 1.70)	—	(0.53, 1.42)	—
2nd	2.08**	88%	2.29***	75%	1.65***	53%	1.36***	23%	0.90	11%
95 percent confidence intervals	(1.16, 3.70)	—	(1.84, 2.86)	—	(1.39, 1.97)	—	(1.10, 1.68)	—	(0.52, 1.56)	—
3rd	2.15***	88%	1.77***	80%	1.29***	61%	1.15	28%	1.02	4%
95 percent confidence intervals	(1.36, 3.41)	—	(1.43, 2.19)	—	(1.08, 1.54)	—	(0.93, 1.43)	—	(0.57, 1.84)	—
4th	1.50**	91%	1.34**	85%	1.09	66%	1.12	33%	0.75	15%
95 percent confidence intervals	(1.01, 2.22)	—	(1.04, 1.71)	—	(0.94, 1.28)	—	(0.85, 1.47)	—	(0.43, 1.31)	—
5th (highest)	omitted category	94%	omitted category	88%	omitted category	68%	omitted category	32%	omitted category	0%
Number of observations	—	2,580	—	6,893	—	4,475	—	2,252	—	365

Source: GAO analysis of RAND HRS data. | GAO-22-103950

Note:

*** p<0.01,

** p<0.05,

* p< 0.10.

Parentheses contain 95 percent confidence intervals. Statistical significance of disparities in survival rates is measured between the 5th (highest) income group and each of the lower four income groups.

With respect to our univariate analyses of wealth and survival in the United Kingdom, we found that higher household wealth was associated with survival to older ages, though patterns differed for the oldest age group (see table 8). We previously presented the estimated survival rates (see table 2), and we include the hazard ratios that determine the statistical significance of the disparities between the high-income (5th quintile) and lower-income groups below.

Table 8: Estimated Hazard Ratios and Survival Rates Over 10-Year Period by Household Wealth for U.K. Adults by Age Groups in 2002

	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate
Age at survey start	50-59	50-59	60-69	60-69	70-79	70-79	80-89	80-89	90+	90+
Explanatory variables										
1st (lowest)	4.28***	81%	3.59***	68%	1.87***	43%	1.56***	19%	0.54	13%
95 percent confidence intervals	(2.97, 6.18)	—	(2.65, 4.87)	—	(1.51, 2.31)	—	(1.22, 2.00)	—	(0.23, 1.27)	—
2nd	2.12***	90%	2.46***	77%	1.61***	49%	1.55***	19%	0.56	21%
95 percent confidence intervals	(1.42, 3.17)	—	(1.82, 3.33)	—	(1.31, 1.97)	—	(1.21, 1.97)	—	(0.24, 1.29)	—
3rd	1.39	93%	1.62***	84%	1.16	58%	1.29*	23%	0.78	11%
95 percent confidence intervals	(0.92, 2.10)	—	(1.19, 2.19)	—	(0.95, 1.44)	—	(1.00, 1.66)	—	(0.29, 2.08)	—
4th	0.80	96%	1.48**	85%	1.10	59%	1.24	25%	0.47	21%
95 percent confidence intervals	(0.50, 1.27)	—	(1.09, 1.99)	—	(0.89, 1.37)	—	(0.93, 1.64)	—	(0.19, 1.17)	—
5th (highest)	omitted category	95%	omitted category	90%	omitted category	63%	omitted category	32%	omitted category	0%
Number of observations	—	3,696	—	3,080	—	2,373	—	1,089	—	111

Source: GAO analysis of Harmonized ELSA data. | GAO-22-103950

Note:

*** p<0.01,

** p<0.05,

* p< 0.10. Parentheses contain 95 percent confidence intervals. Statistical significance of disparities in survival rates is measured between the 5th (highest) wealth group and each of the lower four wealth groups. ELSA includes individuals in England and does not include individuals in Wales, Scotland, or Northern Ireland.

With respect to our univariate analyses of wealth and survival in the United States, we found that higher household wealth was associated with survival to older ages, although patterns differed for the oldest age group, from 2002 through 2012 (see table 9). We previously presented the estimated survival rates (see table 2), and we include the hazard ratios that determine the statistical significance of the disparities between the high-income (5th quintile) and lower-income groups below.

Table 9: Estimated Hazard Ratios and Survival Rates Over 10-Year Period by Household Wealth for U.S. Adults by Age Groups in 2002

	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate
Age at survey start	50-59	50-59	60-69	60-69	70-79	70-79	80-89	80-89	90+	90+
Explanatory variables										
1st (lowest)	4.06***	80%	3.30***	66%	2.18***	44%	1.64***	21%	1.05	5%
95 percent confidence intervals	(2.33, 7.09)	—	(2.61, 4.18)	—	(1.80, 2.64)	—	(1.37, 1.95)	—	(0.69, 1.60)	—
2nd	2.07**	90%	1.93***	79%	1.69***	53%	1.43***	26%	0.92	6%
95 percent confidence intervals	(1.07, 4.03)	—	(1.52, 2.44)	—	(1.40, 2.05)	—	(1.18, 1.72)	—	(0.59, 1.44)	—
3rd	1.94***	90%	1.64***	81%	1.43***	59%	1.43***	25%	1.07	6%
95 percent confidence intervals	(1.22, 3.08)	—	(1.28, 2.09)	—	(1.19, 1.72)	—	(1.25, 1.63)	—	(0.65, 1.78)	—
4th	1.04	95%	1.27**	85%	1.26**	62%	1.29***	26%	1.05	3%
95 percent confidence intervals	(0.52, 2.06)	—	(1.00, 1.62)	—	(1.03, 1.53)	—	(1.09, 1.53)	—	(0.63, 1.75)	—
5th (highest)	omitted category	95%	omitted category	88%	omitted category	68%	omitted category	37%	omitted category	3%
Number of observations	—	2,580	—	6,893	—	4,475	—	2,252	—	365

Source: GAO analysis of RAND HRS data. | GAO-22-103950

Note:

*** p<0.01,

** p<0.05,

* p< 0.10.

Parentheses contain 95 percent confidence intervals. Statistical significance of disparities in survival rates is measured between the 5th (highest) wealth group and each of the lower four wealth groups.

With respect to our univariate analyses of gender and survival in the United Kingdom, we found women were generally more likely to survive during the 10-year period compared to men (see table 10). We found similar results in the United States (see table 11).

Table 10: Estimated Hazard Ratios and Survival Rates Over 10-Year Period by Gender for U.K. Adults by Age Groups in 2002

	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate
Age at survey start	50-59	50-59	60-69	60-69	70-79	70-79	80-89	80-89	90+	90+
Explanatory variables										
Female	0.62***	94%	0.56***	87%	0.72***	59%	0.74***	27%	0.68*	9%
95 percent confidence intervals	(0.48, 0.80)	—	(0.47, 0.68)	—	(0.64, 0.82)	—	(0.64, 0.85)	—	(0.45, 1.02)	—
Male	omitted category	91%	omitted category	78%	omitted category	49%	omitted category	16%	omitted category	0%
Number of observations	—	3,696	—	3,080	—	2,373	—	1,089	—	111

Source: GAO analysis of Harmonized ELSA data. | GAO-22-103950

Note:

*** p<0.01,

** p<0.05,

* p< 0.10.

Parentheses contain 95 percent confidence intervals. Statistical significance of differences in survival rates is measured between females and males. ELSA includes individuals in England and does not include individuals in Wales, Scotland, or Northern Ireland.

Table 11: Estimated Hazard Ratios and Survival Rates Over 10-Year Period by Gender for U.S. Adults by Age Groups in 2002

	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate
Age at survey start	50-59	50-59	60-69	60-69	70-79	70-79	80-89	80-89	90+	90+
Explanatory variables										
Female	0.74**	92%	0.67***	84%	0.77***	62%	0.77***	30%	0.73***	6%
95 percent confidence intervals	(0.58, 0.96)	—	(0.61, 0.75)	—	(0.71, 0.84)	—	(0.69, 0.86)	—	(0.59, 0.90)	—
Male	omitted category	89%	omitted category	77%	omitted category	53%	omitted category	21%	omitted category	3%
Number of observations	—	2,580	—	6,893	—	4,475	—	2,252	—	365

Source: GAO analysis of RAND HRS. | GAO-22-103950

Note:

*** p<0.01,

** p<0.05,

* p< 0.10.

Parentheses contain 95 percent confidence intervals. Statistical significance of differences in survival rates is measured between females and males.

With respect to our univariate analyses of race and survival, we did not find statistically significant disparities in survival between Whites and non-Whites in any age group in the United Kingdom (see table 12). We could not estimate the hazard ratio for the age group age 90 and older in the United Kingdom because all of the respondents who responded to the race question in that age group were White, and thus there were no non-White respondents to compare survival during the 10-year period. The estimated survival rate for the White group for the age 90 and older group was 6 percent. On the other hand, in the United States, we found that Whites were more likely to survive during the 10-year period than non-Whites, but patterns differed in the two oldest age groups (see table 13).

Table 12: Estimated Hazard Ratios and Survival Rates Over 10-Year Period by Race for U.K. Adults by Age Groups in 2002

	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate
Age at survey start	50-59	50-59	60-69	60-69	70-79	70-79	80-89	80-89
Explanatory variables								
Non-White	0.76	95%	0.95	85%	1.33	45%	0.53	23%
95 percent confidence intervals	(0.31, 1.88)	—	(0.49, 1.83)	—	(0.91, 1.93)	—	(0.20, 1.43)	—
White	omitted category	92%	omitted category	83%	omitted category	55%	omitted category	46%
Number of observations	—	3,696	—	3,080	—	2,372	—	1,089

Source: GAO analysis of Harmonized ELSA data. | GAO-22-103950

Note:

*** p<0.01,

** p<0.05,

* p< 0.10.

Parentheses contain 95 percent confidence intervals. Statistical significance of differences in survival rates is measured between non-Whites and Whites. ELSA includes individuals in England and does not include individuals in Wales, Scotland, or Northern Ireland. We could not estimate the hazard ratio for the age group age 90 and older in the United Kingdom because all of the respondents in that age group were White. The estimated survival rate for the White group for the age 90 and older group was 6 percent.

Table 13: Estimated Hazard Ratios and Survival Rates Over 10-Year Period by Race for U.S. Adults by Age Groups in 2002

	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate
Age at survey start	50-59	50-59	60-69	60-69	70-79	70-79	80-89	80-89	90+	90+
Explanatory variables										
Non-White	1.50**	87%	1.20**	78%	1.24***	52%	1.08	25%	0.74*	4%
95 percent confidence intervals	(1.03, 2.18)	—	(1.00, 1.42)	—	(1.06, 1.44)	—	(0.88, 1.33)	—	(0.53, 1.04)	—
White	omitted category	91%	omitted category	81%	omitted category	59%	omitted category	27%	omitted category	7%
Number of observations	—	2,579	—	6,893	—	4,473	—	2,252	—	365

Source: GAO analysis of RAND HRS. | GAO-22-103950

Note:

*** p<0.01,

** p<0.05,

* p< 0.10.

Parentheses contain 95 percent confidence intervals. Statistical significance of differences in survival rates is measured between non-Whites and Whites.

With respect to our univariate analyses of education and survival, we found that those with college or above were generally more likely to survive than those without a high school degree in the United Kingdom, but patterns differed for the oldest age groups (see table 14). We did not include estimates of survival rates by education level for the age group 90 and older because the estimated survival rates by education group were not reliable for this age group. Out of the 105 respondents in the oldest age group with education data, 87 percent reported having less than a high school education, leaving few observations in the remaining education groups. Given the relatively small size of the this age group in the United Kingdom data, this made it difficult to reasonably compare survival rates between different levels of educational attainment within the age group age 90 and older.

There are many more educational levels in the United Kingdom compared to the United States, and these levels have undergone various name changes over time, making the harmonization more challenging for the oldest respondents. This data reliability issue, in combination with the relatively small sample size of this age group in the United Kingdom, yielded unreliable estimates for the oldest age group.

In the United States, we found that those with a college education or above were more likely to survive during the 10-year period than those with a high school degree or less in all but the oldest age group (see table 15).

Table 14: Estimated Hazard Ratios and Survival Rates Over 10-Year Period by Education for U.K. Adults by Age Groups in 2002

	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate
Age at survey start	50-59	50-59	60-69	60-69	70-79	70-79	80-89	80-89
Explanatory variables								
Less than high school	2.24***	89%	1.86***	78%	1.33**	50%	1.25	21%
95 percent confidence intervals	(1.47, 3.42)		(1.32, 2.61)		(1.02, 1.75)		(0.92, 1.68)	
High school graduate	0.98	95%	0.95	88%	0.78	67%	0.76	39%
95 percent confidence intervals	(0.60, 1.61)	—	(0.63, 1.43)	—	(0.54, 1.13)	—	(0.50, 1.17)	—
Some college	1.48	93%	0.98	88%	1.04	59%	0.87	28%
95 percent confidence intervals	(0.93, 2.35)	—	(0.65, 1.49)	—	(0.75, 1.45)	—	(0.61, 1.24)	—
College or more	omitted category	95%	omitted category	87%	omitted category	59%	omitted category	24%
Number of observations	—	3,415	—	2,822	—	2,127	—	989

Source: GAO analysis of Harmonized ELSA data. | GAO-22-103950

Note:

*** p<0.01,

** p<0.05,

* p< 0.10.

Parentheses contain 95 percent confidence intervals. Statistical significance of differences in survival rates is measured between college or more and each of the other education levels. ELSA includes individuals in England and does not include individuals in Wales, Scotland, or Northern Ireland. We did not include estimates of survival rates by education level for the age group 90 and older because of data reliability issues.

Table 15: Estimated Hazard Ratios and Survival Rates Over 10-Year Period by Education for U.S. Adults by Age Groups in 2002

	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate	Hazard Ratio	Survival Rate
Age at survey start	50-59	50-59	60-69	60-69	70-79	70-79	80-89	80-89	90+	90+
Explanatory variables										
Less than high school	2.28***	86%	2.33***	71%	1.76***	47%	1.41***	21%	0.74	6%
95 percent confidence intervals	(1.46, 3.56)	—	(1.94, 2.79)	—	(1.51, 2.06)	—	(1.18, 1.69)	—	(0.52, 1.06)	—
High school graduate	1.82***	89%	1.38***	82%	1.21***	60%	1.33***	26%	0.60**	9%
95 percent confidence intervals	(1.17, 2.82)	—	(1.13, 1.68)	—	(1.06, 1.38)	—	(1.07, 1.64)	—	(0.39, 0.92)	—
Some college	1.35	92%	1.32**	83%	1.07	64%	1.08	31%	0.70	3%
95 percent confidence intervals	(0.89, 2.04)	—	(1.03, 1.69)	—	(0.90, 1.28)	—	(0.88, 1.33)	—	(0.44, 1.11)	—
College or more	omitted category	94%	omitted category	87%	omitted category	66%	omitted category	36%	omitted category	0%
Number of observations	—	2,577	—	6,892	—	4,474	—	2,252	—	365

Source: GAO analysis of RAND HRS. | GAO-22-103950

Note:

*** p<0.01,

** p<0.05,

* p<0.10.

Parentheses contain 95 percent confidence intervals. Statistical significance of differences in survival rates is measured between college or more and each of the other education levels.

Our multivariate results on the association between income and survival in the United Kingdom (columns 1-3) and United States (columns 4-6) for individuals 50 and older from 2002 through 2012 are in table 16 below.

- In table 16, column 1 shows the results for the United Kingdom using the Cox proportional hazard model that includes the income groups and the age at the beginning of the study in 2002. The hazard ratios suggest that individuals in the lower-income groups (1st through 4th quintiles) are more likely to die during the 10-year study period compared to the top income group (5th quintile), after controlling for age at the beginning of the study in 2002. Moreover, the hazard ratio

associated with age is 1.10, meaning that for every year older an individual is upon entry into the survey in 2002, the risk of death increases 10 percent. These results are generally similar to the analysis of the same variables in the United States as shown in table 16, column 4.

- In table 16, column 2 shows the results for the United Kingdom using the Cox proportional hazard model that includes the income groups, age at the beginning of the study period in 2002, and gender, race, and education. Again, the hazard ratios suggest that individuals in the lower-income groups (1st through 4th quintiles) are more likely to die during the 10-year study period compared to the top income group (5th quintile), after controlling for age at the beginning of the study in 2002 and the other demographic variables. We also found that women were more likely than men to survive during the 10-year study period, and those with less than high school education were more likely to die during the study period than individuals with a college degree or higher. These results are similar to the analysis of the same variables in the United States as shown in table 16, column 5. However, those with a high school degree were less likely to die than those with a college degree or higher in the United Kingdom, whereas those with a high school degree were more likely to die than those with a college degree during the study period in the United States.
- In table 16, column 3 shows the results for the United Kingdom using the Cox proportional hazard model that includes the income groups, age at the beginning of the study period in 2002, and gender, race, education, and self-reported health status at the beginning of the study period in 2002. The results are generally consistent with column 2, although adding the health status variables diminishes some of the education results. The health status results indicate that those in less than excellent health in 2002 are significantly more likely to die during the study than those in excellent health. These results for the United Kingdom are similar to the United States in column 6.

Table 16: Estimated Hazard Ratios by Household Income, Demographic Characteristics, and Health Status through 2012 for U.S. and U.K. Adults Age 50 and Older in 2002

	(1)	(2)	(3)	(4)	(5)	(6)
Country	**U.K.**	**U.K.**	**U.K.**	**U.S.**	**U.S.**	**U.S.**
Survey start	**2002**	**2002**	**2002**	**2002**	**2002**	**2002**
Age at survey start	**50 and older**	**50 and older**	**50 and older**	**50 and older**	**50 and older**	**50 and older**
Explanatory variables						
Income [omitted category = 5th (highest) quintile]						
1st (lowest)	1.63***	1.66***	1.55***	2.02***	2.06***	1.59***
95 percent confidence intervals	(1.39, 1.92)	(1.38, 1.99)	(1.29, 1.87)	(1.78, 2.30)	(1.81, 2.34)	(1.41, 1.80)
2nd	1.68***	1.62***	1.42***	1.77***	1.75***	1.48***
95 percent confidence intervals	(1.44, 1.95)	(1.36, 1.92)	(1.19, 1.70)	(1.57, 2.00)	(1.56, 1.97)	(1.31, 1.67)
3rd	1.53***	1.49***	1.28***	1.48***	1.43***	1.26***
95 percent confidence intervals	(1.31,1.79)	(1.26, 1.76)	(1.07, 1.53)	(1.33, 1.65)	(1.27, 1.60)	(1.12, 1.42)
4th	1.37***	1.33***	1.28***	1.25***	1.22***	1.15***
95 percent confidence intervals	(1.17, 1.61)	(1.13, 1.57)	(1.08, 1.50)	(1.13, 1.38)	(1.11, 1.35)	(1.04, 1.28)
Age at interview	1.10***	1.10***	1.10***	1.09***	1.09***	1.09***
95 percent confidence intervals	(1.10,1.11)	(1.10, 1.11)	(1.10, 1.11)	(1.09, 1.10)	(1.09, 1.10)	(1.09, 1.10)
Gender [omitted category = male]						
Female	—	0.65***	0.64***	—	0.65***	0.66***
95 percent confidence intervals	—	(0.60, 0.71)	(0.59, 0.70)	—	(0.61, 0.69)	(0.61, 0.70)
Race/ethnicity [omitted category = White]						
Non-White	—	0.90	0.81	—	1.00	0.92*
95 percent confidence intervals	—	(0.62, 1.29)	(0.57, 1.16)	—	(0.91, 1.10)	(0.83, 1.02)
Education [omitted category = college or more]						
Less than high school	—	1.30***	1.11	—	1.34***	1.07
95 percent confidence intervals	—	(1.10, 1.54)	(0.94, 1.32)	—	(1.21, 1.48)	(0.97, 1.19)
GED	—	—	—	—	1.22*	1.00
95 percent confidence intervals	—	—	—	—	(0.99, 1.49)	(0.83, 1.21)
High school graduate	—	0.80**	0.77**	—	1.18***	1.09
95 percent confidence intervals	—	(0.65, 0.98)	(0.62, 0.95)	—	(1.06, 1.32)	(0.98, 1.22)

	(1)	(2)	(3)	(4)	(5)	(6)
Country	**U.K.**	**U.K.**	**U.K.**	**U.S.**	**U.S.**	**U.S.**
Survey start	**2002**	**2002**	**2002**	**2002**	**2002**	**2002**
Age at survey start	**50 and older**	**50 and older**	**50 and older**	**50 and older**	**50 and older**	**50 and older**
Explanatory variables						
Some college	—	1.03	0.97	—	1.08	1.01
95 percent confidence intervals	—	(0.85, 1.25)	(0.80, 1.18)	—	(0.97, 1.20)	(0.91, 1.11)
Self-reported health status at time of interview [omitted category = excellent]						
Very good	—	—	1.29***	—	—	1.23***
95 percent confidence intervals	—	—	(1.07, 1.56)	—	—	(1.07, 1.41)
Good	—	—	1.71***	—	—	1.74***
95 percent confidence intervals	—	—	(1.43, 2.05)	—	—	(1.52, 1.98)
Fair	—	—	2.58***	—	—	2.59***
95 percent confidence intervals	—	—	(2.15, 3.11)	—	—	(2.25, 2.97)
Poor	—	—	3.53***	—	—	4.72***
95 percent confidence intervals	—	—	(2.85, 4.39)	—	—	(4.07, 5.47)
N	10,349	9,455	9,324	16,565	16,558	16,549

Source: GAO analysis of RAND HRS and Harmonized ELSA data. | GAO-22-103950

Note:

*** p<0.01,

** p<0.05, ,

* p<0.10.

Parentheses contain 95% confidence intervals. ELSA includes individuals in England and does not include individuals in Wales, Scotland, or Northern Ireland.

Our multivariate results on the association between wealth and survival in the United Kingdom (columns 1-3) and United States (columns 4-6) for individuals 50 and older from 2002 through 2012 are in table 17 below.

- In table 17, column 1 shows the results for the United Kingdom using the Cox proportional hazard model that includes the wealth groups and the age at the beginning of the study in 2002. The hazard ratios suggest that individuals in the lower wealth groups (1st through 4th quintiles) are more likely to die during the 10-year study period compared to the top wealth group (5th quintile), after controlling for age at the beginning of the study in 2002. These results are similar to the analysis of the same variables in the United States as shown in table 17, column 4.

- In table 17, column 2 shows the results for the United Kingdom using the Cox proportional hazard model that includes the wealth groups, age at the beginning of the study period in 2002, and gender, race, and education. Again, the hazard ratios suggest that individuals in the lower wealth groups (1st through 4th quintiles) are more likely to die during the 10-year study period compared to the top wealth group (5th quintile), after controlling for age at the beginning of the study in 2002 and the other demographic variables. We also found that women were more likely than men to survive during the 10-year study period, and those with less than a high school degree were more likely to die during the study period than individuals with a college degree or higher. These results are similar to the analysis of the same variables in the United States as shown in table 17, column 5. However, those with a high school degree were less likely to die than those with a college degree or higher in the United Kingdom, whereas those with a high school degree were more likely to die than those with a college degree during the study period in the United States.
- In table 17, column 3 shows the results for the United Kingdom using the Cox proportional hazard model that includes the wealth groups, age at the beginning of the study period in 2002, and gender, race, education, and self-reported health status at the beginning of the study period in 2002. When we accounted for self-reported health status at the beginning of the survey in 2002 in addition to the other demographic variables, we found that disparities in survival between the 3rd (middle), 4th, and 5th (top) wealth quintiles in the U.K. were not statistically significant, as was the result for the group with less than a high school education. These results suggest that initial self-reported health status is a critical channel through which wealth affects survival, as wealth and initial self-reported health status are positively correlated. The disparities in survival between the top wealth group and the lower wealth groups remained statistically significantly when also controlling for health status in the United States, as shown in column 6, although the education results were no longer significant.

Table 17: Estimated Hazard Ratios by Household Wealth, Demographic Characteristics, and Health Status through 2012 for U.S. and U.K. Adults Age 50 and Older in 2002

	(1)	(2)	(3)	(4)	(5)	(6)
Country	**U.K.**	**U.K.**	**U.K.**	**U.S.**	**U.S.**	**U.S.**
Survey start	**2002**	**2002**	**2002**	**2002**	**2002**	**2002**
Age at survey start	**50 and older**	**50 and older**	**50 and older**	**50 and older**	**50 and older**	**50 and older**
Explanatory variables						
Household wealth quintile [omitted category = 5th quintile]						
1st (lowest)	1.99***	1.94***	1.62***	2.19***	2.16***	1.77***
95 percent confidence intervals	(1.73, 2.28)	(1.67, 2.25)	(1.39, 1.89)	(1.97, 2.43)	(1.93, 2.42)	(1.56, 2.00)
2nd	1.71***	1.63***	1.37***	1.66***	1.62***	1.43***
95 percent confidence intervals	(1.49, 1.96)	(1.41, 1.89)	(1.18, 1.60)	(1.51, 1.83)	(1.46, 1.80)	(1.27, 1.60)
3rd	1.27***	1.22***	1.11	1.49***	1.45***	1.38***
95 percent confidence intervals	(1.12, 1.45)	(1.06, 1.41)	(0.96, 1.28)	(1.35, 1.63)	(1.33, 1.60)	(1.25, 1.52)
4th	1.16**	1.17**	1.12	1.27***	1.24***	1.19***
95 percent confidence intervals	(1.01, 1.34)	(1.01, 1.36)	(0.96, 1.31)	(1.15, 1.40)	(1.11, 1.37)	(1.06, 1.33)
Age at interview	1.11***	1.10***	1.10***	1.10***	1.10***	1.10***
95 percent confidence intervals	(1.10, 1.11)	(1.10, 1.11)	(1.10, 1.11)	(1.10,1.10)	(1.10, 1.10)	(1.09, 1.10)
Gender [omitted category = male]						
Female	—	0.65***	0.65***	—	0.67***	0.67***
95 percent confidence intervals	—	(0.60, 0.70)	(0.59, 0.70)	—	(0.63, 0.71)	(0.62, 0.71)
Race/ethnicity [omitted category = White]						
Non-White	—	0.88	0.83	—	0.93	0.87***
95 percent confidence intervals	—	(0.61, 1.25)	(0.58, 1.16)	—	(0.85, 1.03)	(0.79, 0.96)
Education [omitted category = college or more]						
Less than high school	—	1.23**	1.08	—	1.30***	1.03
95 percent confidence intervals	—	(1.05, 1.45)	(0.92, 1.28)	—	(1.17, 1.46)	(0.92, 1.16)
GED	—	—	—	—	1.16	0.95
95 percent confidence intervals	—	—	—	—	(0.95, 1.43)	(0.78, 1.16)
High school graduate	—	0.81**	0.78**	—	1.19***	1.08
95 percent confidence intervals	—	(0.67, 1.00)	(0.64, 0.96)	—	(1.07, 1.33)	(0.97, 1.21)
Some college	—	1.03	0.98	—	1.08	1.00
95 percent confidence intervals	—	(0.85, 1.25)	(0.80, 1.19)	—	(0.98, 1.20)	(0.90, 1.11)
Self-reported health status at time of interview [omitted category = excellent]						
Very good	—	—	1.27**	—	—	1.24***
95 percent confidence intervals	—	—	(1.05, 1.53)	—	—	(1.08, 1.43)
Good	—	—	1.68***	—	—	1.75***
95 percent confidence intervals	—	—	(1.40, 2.02)	—	—	(1.53, 1.99)

	(1)	(2)	(3)	(4)	(5)	(6)
Country	**U.K.**	**U.K.**	**U.K.**	**U.S.**	**U.S.**	**U.S.**
Survey start	**2002**	**2002**	**2002**	**2002**	**2002**	**2002**
Age at survey start	**50 and older**	**50 and older**	**50 and older**	**50 and older**	**50 and older**	**50 and older**
Explanatory variables						
Fair	—	—	2.45***	—	—	2.58***
95 percent confidence intervals	—	—	(2.03, 2.96)	—	—	(2.25, 2.95)
Poor	—	—	3.26***	—	—	4.70***
95 percent confidence intervals	—	—	(2.61, 4.07)	—	—	(4.06, 5.45)
N	10,349	9,455	9,324	16,565	16,558	16,549

Source: GAO analysis of RAND HRS and Harmonized ELSA data. | GAO-22-103950

Note:

*** p<0.01,

** p<0.05,

* p<0.10.

Parentheses contain 95 percent confidence intervals. ELSA includes individuals in England and does not include individuals in Wales, Scotland, or Northern Ireland.

Appendix V: GAO Contact and Staff Acknowledgments

GAO Contact

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Staff Acknowledgments

In addition to the contact named above, Michael Collins (Assistant Director), Tom Moscovitch (Analyst-in-Charge), Nina Daoud, Andrew Edkins, Sarah Gilliland, Kathleen McQueeney, and John Villecco made key contributions. Also contributing were Andrew Bellis, Jason Bromberg, Charlotte Cable, Alicia Cackley, Peter Choi, Justin Dunleavy, Maria Gadel, Jennifer Gregory, Lijia Guo, Charles Jeszeck, Courtney LaFountain, Kirsten Lauber, Ted Leslie, Robert Letzler, Sheila McCoy, Ty Mitchell, Catherine Morrissey, Lauren Mosteller, Benjamin Netto DeYoung, Mimi Nguyen, Jessica Orr, Rhiannon Patterson, Sonya Phillips, Marylynn Sergent, Daniel Setlow, Joe Silvestri, Amelia Stastney, Curtia Taylor, Anjali Tekchandani, Jeff Tessin, Frank Todisco, Kate Van Gelder, Peter Verchinski, Adam Wendel, Kelly Whitt Troutman, and Christopher Zbrozek.

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