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Cost of Climate Change to an American Born in 2024

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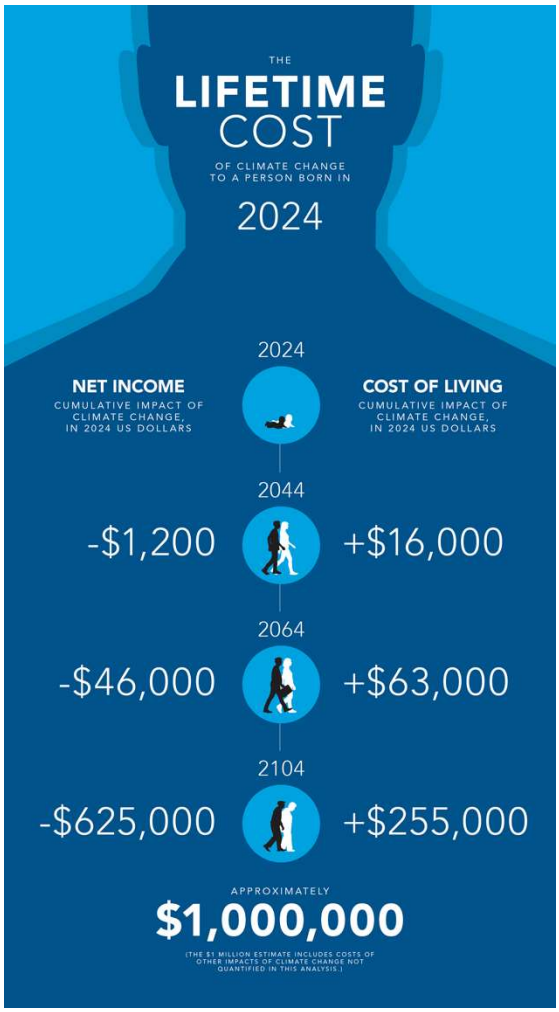
The Bottom Line



The cost of climate change to a baby born in 2024 in America could be around $500,000[1] over their lifetime.[2] When more uncertain factors are included, the costs could reach about $1 million. For many Americans, this financial loss will require difficult decisions about how to pay for food, housing, and other daily expenses, which climate change will increase by approximately 9 percent[3] over their lifetime.[4] At the same time, climate change is expected to decrease an individual's net income[5] by roughly 10 percent over their lifetime, leaving that person with less disposable income to cover the higher cost of living. Despite the large uncertainties associated with estimating the impacts of future climate change on personal finances, one thing is clear: climate change will have a significant impact on Americans' standard of living.

While the impacts of climate change in 2024 are relatively small, increases in the severity and frequency of heat waves, droughts, and floods in the years ahead are expected to lead to much more pronounced financial impacts. For example, when an American is 40 years old, climate change could lower their annual net income by approximately $3,900 and increase their annual expenses by $4,300.

By the time this person reaches the age of 80, climate change will have reduced their retirement income by an estimated 16 percent, leaving them with fewer resources to enjoy

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[1] All dollar figures in this study were converted to constant 2024 dollars using the Bureau of Economic Analysis GDP Deflator data and Congressional Budget Office estimates for 2024. These adjustments were made so that all dollars are comparable and maintain the same purchasing power over time. All cost, price, and dollar estimates in this study can be compared for any present or forecasted period without additional conversion.

[2] Because this study assessed only some components of net income and cost of living, the costs of climate change presented in this study represent underestimates. The actual, comprehensive costs of climate change will be larger.

[3] This study analyzed costs under two climate change scenarios; detailed results for both scenarios are provided in the Appendix. The estimates in this summary and article are based on the high climate change scenario, which assumes only minimal global efforts to reduce greenhouse gas emissions.

[4] The 9% increase in average cost is for a single adult. The report presents average (vs. median) results.

[5] Net income is defined as the amount of employment and retirement investment income after taxes are taken out.

their golden years. The financial strain of climate change may even push them into poverty if they are not able to save enough to maintain their standard of living.

Climate change will not affect everyone equally. If a child born in 2024 ends up working in a particularly climate-sensitive career such as outdoor construction or agriculture, their earnings could be lowered more than average. Employees in highly exposed industries could experience income losses that are almost three times greater than those of the average US employee.[6] If they live in a place that is particularly vulnerable to storms or droughts, the impact on their cost of living could be much higher than average. Furthermore, if they are a person of color or from an otherwise disadvantaged part of society, the financial impacts due to climate change will tend to be greater than average.

This report, produced by ICF for Consumer Reports, explores these financial impacts in detail, along with the implications of these impacts for choices that consumers make.

[6] This is based on estimated income losses for different employment sectors in the United States from two studies:
(1) Deryugina, T., and Solomon, M.H. (2014). "Does the Environment Still Matter? Daily Temperature and Income in the United States." National Bureau of Economic Research Working Paper No. 20750, tables 3 & A1, retrieved from: https://www.nber.org/papers/w20750; and (2) Behrer, A. P. et al (2021). "Heat Has Larger Impacts on Labor in Poorer Areas." Environmental Research Communications, page 11, retrieved from: https://doi.org/10.1088/2515-7620/abffa3

Introduction

A child born in 2024 is entering a world in which climate change is a pressing reality. Climate change is already leading to widespread, significant, and escalating impacts from rising temperatures, more frequent and severe extreme weather events, and higher sea levels. These impacts will continue to intensify in the coming decades as this individual grows up and enters adulthood.

Climate change will increasingly affect individual consumers' income and expenses over the course of this century and beyond.[7] But we can reduce that impact if we choose. Although some degree of future climate change is unavoidable (due to historical greenhouse gas emissions and time lags in the climate system), individuals have power to influence the magnitude and pace of that change by reducing greenhouse gas emissions. Decisions made today by individuals, businesses, and governments will affect the lifetime financial situation of every American child born in 2024.

This report illustrates the lifetime costs of climate change to the personal finances of a person born in America in 2024. The estimates presented in this report may help individual consumers understand the costs of climate change and plan their household finances and spending habits over the coming decades accordingly. It can also help them bolster their own climate resilience as well as inform their personal choices about activities that contribute to climate change, such as what type of car they drive, the efficiency of the appliances they buy, and the food they eat.

About the Analysis

Consumer Reports commissioned ICF, one of the world's leading climate change consultancies, to conduct this analysis of the costs of climate change to an American born in 2024. ICF analyzed impacts to net income and to a "market basket" of goods and services over a person's lifetime, using two climate change scenarios to capture a range of plausible costs. ICF used published studies on the costs of climate change to develop estimates of its impacts on net income and the cost of living. Data are available for impacts on only some components of net income and the cost of living, so ICF considers its findings to be underestimates.

Because American consumers are geographically, economically, and socially diverse, ICF also developed four "personas" to explore the financial impacts of climate change on different populations.

[7] The extent of future climate change is uncertain because it will be affected by changes in greenhouse gas emissions that in turn are determined largely by society's energy choices and behavior. This report explores costs associated with climate change under two different state-of-the-art scenarios of climate change over the course of this century: SSP1-2.6 (the "low" emissions scenario) and SSP3-7.0 (the "high" emissions scenario). The estimates in this article focus on the high scenario.

Net Income[8]

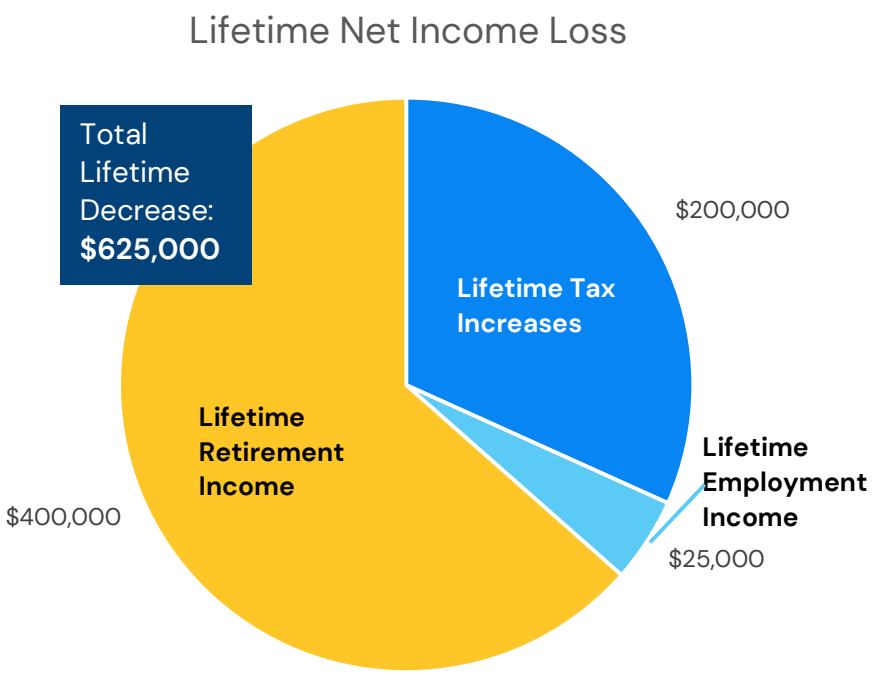

Figure 1. Lifetime net income losses due to climate change

Net income is a key component of an individual's personal finances, although it is not immediately relevant for someone born in 2024 who will mostly be supported by their parents until the age of 20.[9] However, in 2044, as the generation of individuals born in 2024 turns 20, they will start to enter the workforce and receive their own income. At this point, climate change will have only marginal impacts on an individual's income, but the impacts will grow over time. By the time they are 40 their cumulative net income will likely have decreased by approximately 2.2 percent ($46,000) due to climate change. By the time they are 80, their cumulative net income may have decreased by 9 percent ($625,000) due to climate change.

These losses in net income over their lifetime are due to three factors, the largest of which is retirement income losses (a $400,000 average decrease over 80 years), followed by tax increases ($200,000), and then employment income losses ($25,000) (Figure 1).

Retirement Income

Retirees typically rely on a combination of pensions, annuities, investments, and Social Security to cover their living expenses after retirement. Climate change is expected to decrease retirement income by impacting the value of corporate stocks held in retirement portfolios through higher costs to companies (e.g., higher cooling costs), declines in corporate productivity (e.g., decreased labor productivity due to more required work breaks during heat waves), damages to physical assets and supply chains (e.g., flood damages to raw materials), reduced resource availability (e.g., increased lumber costs due

[8] This analysis did not consider changes in consumer preferences, cultural shifts, tax policy, supply chain shortages, tariffs, interest rates, financing, and other unknown economic pressures that will affect net income in the future.

[9] Net income is shown as $0 before 2044 for both scenarios, and climate change impacts on net income are assumed to be irrelevant to an individual until they turn 20, because for the purpose of this analysis we assume that the person does not enter the workforce and earn a wage, pay taxes, or invest in retirement savings until they turn 20 (in 2044). This represents a small source of underestimation in the analysis because, in reality, not everyone will be supported in the same way and many individuals *will* have to support themselves before the age of 20.

to increased wildfire damage), and new costs associated with transitioning to low-carbon solutions (e.g., replacing internal combustion engines with electric motors). Pension plans are generally sensitive to climate change, too, so even workers who don't make their own investments and rely on pension plans can expect to feel the financial impacts of climate change on net income.

In 2104, when the individual turns 80, their change in annual retirement income is projected to decrease by approximately $26,000.[10] And, as noted above, they will experience an estimated $400,000 average cumulative decrease in retirement investment income under a high climate change scenario.

Although our analysis focuses on the impact to the average consumer, it is important to note that the impact of climate change on retirement investment earnings will vary by income level. Higher-income individuals will experience higher investment losses, simply because they are investing larger amounts of money, but the burden of investment losses will be greatest for low-income individuals. Ultimately, retirement investment losses for consumers with relatively little retirement investment savings to begin with could cause some retirees to run out of their savings faster than expected and leave them with no source of income for their golden years except Social Security checks.

Our analysis for calculating retirement investment losses is subject to significant uncertainty. Investor behavior, portfolio diversification, federal retirement reform, as well as unexpected life events, property damage, healthcare costs, and other factors that can be exacerbated by climate change will impact a person's ability to invest their employment income and manage risk.

Uncertainty

Due to limited data, this analysis did not quantify the effects of all climate change impacts on net income and cost of living. The numbers presented in this report are thus an underestimate of the total financial impact of climate change.

Furthermore, the analysis team had to make several assumptions to address gaps in available data. These assumptions lead to uncertainty in the estimates. The analysis team captured some of the uncertainty associated with future GHG emissions by considering both high and low climate change scenarios, though the report focuses on the high scenario to underscore the magnitude of the costs if little climate action is taken. This report presents results with only two significant digits to reflect the large uncertainty, though in many cases the analysts' confidence is only at the level of a single significant digit or even just an order of magnitude. Nonetheless, as the first summary of consumer-level impacts of climate change, the analysis team believes the information in this report provides useful estimates.

Taxes

After decreased retirement income, the next most important effect on net income is higher personal taxes. When a person born this year turns 40, they are projected to pay $2,000

[10] Based on the average age of retirement in the United States, workers will retire at 61 years of age. For our analysis, this means that, for an individual born in 2024, the person stops earning a wage at age 62, in 2086. This analysis assumes that the individual does not invest and receive retirement investment earnings until their average annual wage exceeds $40,000.

more in personal taxes due to climate change. Over their lifetime, they are projected to pay $200,000 more in taxes. This represents a 17 percent increase in lifetime taxes paid compared with a hypothetical world without climate change.

The projected tax increase from climate change is due to at least two factors: a decrease in government revenue and an increase in government expenses. Government revenue is expected to be lower due to climate change than in a hypothetical future without climate change because of reductions in the amount of personal and corporate taxes paid to governments.

In addition, climate change is expected to increase government expenses in a variety of ways, including increasing physical damage to government infrastructure, increasing public healthcare expenses, increasing the need for more subsidized insurance programs, and accelerating instability that threatens global security.[11] By decreasing tax revenues and increasing government expenses, climate change effectively increases the demand for government services while simultaneously decreasing the government's ability to fund those services. Ultimately, these higher governmental costs and lower governmental revenues may be passed along to taxpayers.[12]

The Impact of Reducing Emissions

The estimates presented in this article focus on a hypothetical high-emissions scenario that assumes little additional action to reduce climate change. But we can determine which scenario unfolds in the real world.

Under the low emissions scenario considered in this analysis, the impacts on personal finance are lower—in some cases much lower— than presented here.

For example, lifetime retirement income could increase by 1% under the low scenario (compared with a 16% decrease under the high scenario), and lifetime tax increases could range from 0.4% ($5,200) under the low scenario to 15% ($200,000) under the high scenario.

Overall net income would increase by 0.2% ($11,000) under the low scenario, whereas under the high scenario it would fall by 10% (a loss of $625,000).

Employment Income

The third factor affecting net income is the impact that climate change is expected to have on employment income. As temperatures rise and the frequency and severity of extreme weather events increases, labor hours will be lost due to increasing climate-related health

[11] OMB. "Federal Budget Exposure to Climate Risk 2023," April 2022, page 277, retrieved from: https://www.whitehouse.gov/wp-content/uploads/2022/04/ap_21_climate_risk_fy2023.pdf.

[12] Our analysis assumes, under both the low and high climate scenarios, that individual income tax, sales tax, and corporate income tax would increase to negate any government debt from climate change impacts to government expenses and tax revenues. The actual impacts on personal taxes for the consumer, however, could vary significantly. For example, all impacts of climate change on government expenses and revenues might end up being transferred to the federal debt and would not result in higher taxes for the consumer. We chose to assume that taxes would increase to negate any government debt from climate change impacts in our analysis to illustrate the total breadth of the potential climate impacts on consumer taxes. Our results for personal tax increases from climate change impacts do not include the expected increase in corporate income tax from climate impacts. The cumulative analysis of taxes and fees calculates the sum of annual changes from age 20 to age 80.

hazards in the workplace, particularly in professions that require outdoor work, such as agriculture and construction. Lost labor hours will drive a loss in wages.[13] When an individual born in 2024 turns 40 (in 2064), they are projected to lose an average of $500 in annual wages due to climate change. Over their working lifetime, a person born in 2024 is projected to lose a cumulative average total of $25,000 in wages due to climate change. And these are likely to be underestimates since the numbers presented here do not fully account for the many ways in which climate change may affect companies and the salaries and wages they pay, even in sectors such as manufacturing or IT.

Net Income Summary

The severity of climate change will determine the extent to which net income is affected. Under a high emissions scenario, an individual will begin to experience significant losses in net income from 2044 onward. However, under a low emissions scenario, an individual may actually experience small gains in net income. The extent of how climate change impacts an individual's net income depends on the world's ability to reduce greenhouse gas emissions in the near term.

It is important to note that our estimates of how climate change will impact net income are likely significant underestimates. Because not every projected impact of climate change has been quantified in the scientific literature, this analysis only captures part of the impact on net income. For example, our estimates for increases in personal taxes do not account for all the impacts of climate change on government revenues and expenditures such as increased spending for the Department of Defense,[14] impacts to ecosystem services and biodiversity,[15] risks to federal lending for housing and mortgages,[16] damages to federal buildings and facilities,[17] and more. The methodology section in the appendix of this report further explains the potential underestimates for our three sub-categories of net income: personal taxes, retirement income, and wage income.

[13] Wage losses assume a starting working age of 20 and retirement at age 61. No wage losses are accounted for before age 20 or after age 61.
[14] OMB. "Federal Budget Exposure to Climate Risk 2023," April 2022, page 289, retrieved from: https://www.whitehouse.gov/wp-content/uploads/2022/04/ap_21_climate_risk_fy2023.pdf.
[15] Moore, Frances C., Arianna Stokes, Marc N. Conte, and Xiaoli Dong. "Noah's Ark in a Warming World: Climate Change, Biodiversity Loss, and Public Adaptation Costs in the United States." *Journal of the Association of Environmental and Resource Economists* 9, no. 5 (September 2022), page 1002, retrieved from: https://doi.org/10.1086/716662.
[16] OMB. "Federal Budget Exposure to Climate Risk 2023," April 2022, page 284, retrieved from: https://www.whitehouse.gov/wp-content/uploads/2022/04/ap_21_climate_risk_fy2023.pdf.
[17] OMB. "Federal Budget Exposure to Climate Risk 2023," April 2022, page 283, retrieved from: https://www.whitehouse.gov/wp-content/uploads/2022/04/ap_21_climate_risk_fy2023.pdf.

Cost of Living[18] (Expenses)

The second component of an individual's personal finances is their cost of living (i.e., net expenses). Climate change will increase many costs[19] over the lifetime of an individual born in 2024,[20] driven by growing costs for food, housing, vehicle-related expenses, healthcare, travel and entertainment, utilities, and other goods and services (Figure 2). Higher costs will decrease purchasing power and can come at the expense of saving or other discretionary spending.

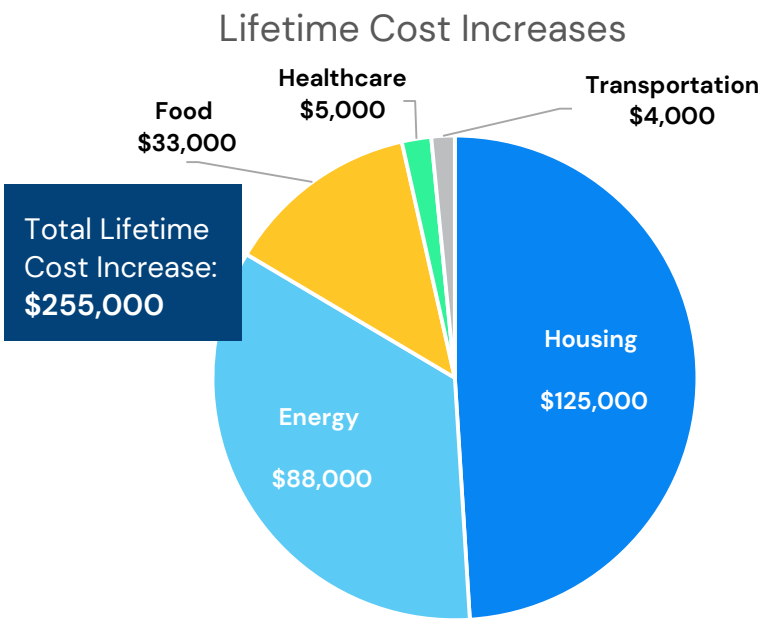

Figure 2. Additional cost of living expenses associated with climate change.

The ways in which climate change affects an individual's expenses vary over the course of a lifetime. Until adulthood, most expenses for an individual born in 2024 will be borne by their parents. However, the rising costs imposed by climate change will increase individuals' annual spending by approximately 11 percent in 2064, or around 20 percent for households with two adults and children.[21] In many cases, these higher costs will lead to expenses exceeding income and will ultimately require that households make tough choices to reduce spending.

Housing

In 2044, an individual born in 2024 will turn 20 and begin to take care of their own expenses as they enter the workforce and begin to earn an individual income. Housing expenses are the largest proportion of an individual's or household's expenses and will remain so over the course of a person's lifetime. Flooding and weather-related damage to housing will increase the operating and

[18] In this study, cost of living encompasses food, housing, energy, healthcare, and vehicle crash costs. This analysis held consumption of these cost-of-living components constant over time; the estimates do not reflect changes in consumption patterns at different ages. This analysis also only estimated expenses for which data are available. If data were readily available for other items that could increase personal expenses—such as higher supply chain costs due to increased weather-related disruptions, higher cost of water in increasingly arid regions (e.g., the Southwest), higher raw materials costs due to weather and climate impacts on their production, and others—the estimated costs of climate change would likely be significantly higher than those in this analysis. The overall increase in cost of living due to climate change presented here is thus an underestimate.

[19] This analysis assumes that all changes in costs incurred by climate change will be passed onto the consumer.

[20] This analysis assumes a constant market basis, so cost impacts do not reflect changes in consumption patterns at different ages.

[21] The US Census Bureau's American Community Survey (ACS) household spending tables used to construct these estimates do not distinguish the number of children in the household and represent an average spending for households with children.

maintenance expenses and insurance costs of housing by close to $900 per year by 2044, and housing will likely represent a proportionally big expense for this individual.

Food

Food is another major expense with limited substitutes. Climate change is expected to disrupt agriculture, reduce access to food, and lead to higher food prices. By 2064, when an individual born in 2024 turns 40, their annual estimated spending on food will be $4,900. By 2104, when this individual reaches the age of 80, their annual food costs may rise to about $5,400—an 18 percent increase relative to food prices in the year they were born.

Transportation

Transportation represents an important expense for consumers. Extreme weather events, such as heavy rainfall, are correlated with a higher likelihood of hazardous road conditions and motor vehicle accidents. As climate change increases the frequency and severity of extreme weather events, drivers around the country will face the risk of more crashes and the costs that come with them. In 2064 when an individual born in 2024 reaches the age of 40, the per-capita average annual cost of vehicle crashes will be roughly $60.[22] By the time they reach age 80, that cost will have doubled to $120. The cost increase will be borne by consumers either through direct payment of crash recovery or through higher insurance premiums.[23]

While not included in the total cost estimates of this report, air travel will also become more expensive. By as early as 2034, extreme weather will increase the cost of delayed flights by an estimated $80 per passenger.[24]

The increase in transportation costs caused by climate change over the lifetime of an individual born in 2024 may limit their ability to travel. Depending on how affluent a person is, they may need to decrease yearly travel to save money for other important expenses. This could curtail their ability to visit family members, pursue job opportunities that are farther away, and travel for pleasure. Individuals will also have to consider the fuel costs associated with travel, which are described below.

[22] Crashes will result in average property damage costs of $6,400 per crash in 2024 and up to $27,120 in possible injury costs per occupant based on National Safety Council estimates. The $60 figure represent per-capita annual costs based upon National Highway Traffic Safety Administration crash statistics. Fatalities and valuation of statistical life are not accounted for in these annual per-capita costs.

[23] These estimates ignore the cost of fuel and vehicle purchase prices, which could potentially change over time due to incentives that make electric vehicles more attractive.

[24] Does not include travel disruptions due to flooding.

Energy

Energy costs will be affected by climate change, leading to higher costs for household heating and cooling as well as transportation. Increases in extreme temperatures will require individuals to consume more energy to maintain comfortable temperatures at home. Additionally, as the frequency of natural disasters increases due to climate change, gasoline prices will become more volatile and increase overall. When an individual born in 2024 turns 80, costs for electricity, gas, and gasoline will be an estimated 60 percent higher than they were in the year of their birth.[25] This could result in total spending on energy reaching up to $6,100 per year in 2104. As the costs of heating and cooling homes increase, an individual may be financially pinched elsewhere and/or unable to stay in their current residence if it becomes too expensive to maintain a comfortable temperature.

Uncertainty: the Cost of Living

The analysis team used a variety of sources to estimate increases in cost due to climate change and apply them to estimates of household spending from the US Census Bureau's American Community Survey (ACS). These estimates are built on data and assumptions from climate studies that did not always line up with the periods analyzed or the specific set of household goods.

In many cases, the team had to extrapolate and interpolate data to align with the periods used in this analysis or apply proxies in place of growth rates or unit conversions for specific household expenditures. Therefore, the cost-of-living estimates in this study are uncertain and should be considered rough estimates of future costs due to climate change, excluding inflation.

Health and Healthcare

Finally, personal health and healthcare expenses are likely to be affected by climate change. As temperatures rise and extreme weather events increase in frequency and severity, people will face higher risks of heat-related illness as well as injuries or illnesses caused by floods and storms. Individuals also face increasing health risks from some infectious diseases whose incidence may increase under climate change. These risks can lead to higher costs. The incidence of respiratory illnesses is projected to increase by 15 percent by the time an individual born in 2024 reaches the age of 80. Total lifetime expenditures for the average American on healthcare could increase by as much as $5,000 over the individual's lifetime.[26] Climate change can also affect physical and mental health indirectly, e.g., by reducing opportunities for outdoor recreation.

[25] Energy costs in this analysis use increases in electricity prices as a proxy for increased cost of household utilities and increases in gasoline and EV prices as a proxy for increased transportation energy costs. These estimates do not account for demand dynamics, where higher temperatures may lead to an increase in cooling demand and a decrease in heating demand. Similarly, potential increases in fuel taxes were not accounted for in this analysis. Therefore, the estimates presented are likely underestimates.

[26] These estimates cover only the increases costs associated with respiratory and heat-related illness and therefore are a conservative estimate of the impacts of climate change on healthcare. They do not include infectious disease, or injures from increases in storms, flooding, or vehicle crashes.

Impacts by Region and Socioeconomic Status

While climate change will increase the cost of living for all individuals, the specific impacts on different elements of personal finances depend on household composition and socioeconomic status. The costs of climate change will be more significant for single adult households with children, as a single income will have to cover the increasing costs of climate change for themselves and dependents. This will have implications for:

- The amount of disposable income for these households after covering core expenses such as housing, food, energy, and transportation.
- The need to consume less-expensive substitutes and/or reduce consumption to save money.
- The savings rate, the ability to save, or the amount of debt that an individual or household incurs.

The financial stresses imposed by climate change will also vary based on region and socioeconomic status. The narratives below explore the lives of four distinct personas developed to illustrate regional and socioeconomic heterogeneity.

ICF developed the personas in collaboration with Consumer Reports. They were designed to capture a broad spectrum of demographic characteristics, providing a representation of diverse consumer groups within the United States. The four personas, each distinct in its attributes, embody variations in income levels, diversity, gender identity, geographical location, marital status, occupation, and race.

The impacts of climate change are not distributed equally. Different regions experience different climate hazards and specific populations have different vulnerabilities to these hazards. To help illustrate this regional and socioeconomic diversity in how climate change will affect future costs, the analysis team created four personas.

Ann is a cisgender Asian female who works as a construction worker in Tampa, Florida.

Bianca is a queer woman of Hispanic heritage who works as an IT professional in Reno, Nevada.

Chris is a cisgender Caucasian male who works as a farm equipment operator for a large farming operation in Vinton, Iowa.

Derek is a cisgender African American man who works as a nurse in Boston.

Ann

Ann is a single cisgender Asian female without children who works as a construction worker in Tampa, Florida. Her way of life will be more significantly affected by climate change than the average American.

Climate change will cause Ann's housing costs to rise over the course of her lifetime, as increasingly frequent and severe hurricanes and tropical storms[27] in Florida cause property damage and raise her insurance premiums.[28] By age 40, Ann may see annual housing costs account for as much as 60–70 percent of her annual expenses.[29]

Because Ann lives in a region vulnerable to storms and high temperatures, heat waves and other extreme weather conditions may curtail the number of days that she is able to work.[30] However, there will be times in her working life when someone with her construction skillset is in high demand: the projected increase in the number and severity of tropical storms hitting western Florida will lead to an uptick in home repair needs. Though her earnings from construction work may increase during those periods, she will also likely have higher repair expenses for her own home.

Furthermore, as a woman and a person of color, Ann may experience disproportionate impacts of climate change relative to her white male counterparts.[31] As part of these marginalized groups, Ann may face additional barriers to accessing information and resources for disaster preparedness in her community. Given the intersection of different parts of her identity with climate change, Ann may benefit from seeking out resources that support women of color in dealing with the impacts of climate change.

Ann's personal taxes will also rise over the course of her lifetime as increased damage from hurricanes increases government expenses—such as for payouts from the National Flood Insurance Program and disaster response efforts[32]—while simultaneously decreasing government revenue from property tax.[33] When she turns 80, her annual net income loss

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[27] Angela Colbert. "A Force of Nature: Hurricanes in a Changing Climate." NASA, June 2022, retrieved from: https://climate.nasa.gov/news/3184/a-force-of-nature-hurricanes-in-a-changing-climate.

[28] More than 3 million residents in the Tampa Bay area live in low-lying neighborhoods and/or in coastal areas that are highly susceptible to storm surges and flooding (https://www.insurancejournal.com/news/southeast/2015/09/15/381499.htm)

[29] Housing estimates exclude changes to property tax, interest rates, and insurance regulations or requirements. If insurance rates continue to grow to this extent, some regulatory or market actions will likely occur to stabilize the growth in housing costs.

[30] US EPA. "Multi-Model Framework for Quantitative Sectoral Impacts Analysis: A Technical Report for the Fourth National Climate Assessment," May 2017, page 54, retrieved from: https://www.epa.gov/sites/default/files/2021-03/documents/ciraii_technicalreportfornca4_final_with_updates_11062018.pdf.

[31] United States Strategy to Respond to the Effects of Climate Change on Women 2023, https://www.state.gov/reports/united-states-strategy-to-respond-to-the-effects-of-climate-change-on-women-2023/

[32] OMB. "Federal Budget Exposure to Climate Risk 2023," April 2022, page 277, retrieved from: https://www.whitehouse.gov/wp-content/uploads/2022/04/ap_21_climate_risk_fy2023.pdf.

[33] Linda Shi and Andrew M. Varuzzo. "Surging Seas, Rising Fiscal Stress: Exploring Municipal Fiscal Vulnerability to Climate Change." *Cities* 100 (May 1, 2020): 102658, retrieved from https://doi.org/10.1016/j.cities.2020.102658.

may be as much as $5,670.[34] Relative to her low income, this loss is significant and will squeeze her finances.

Climate change will increase the physical stress of an already demanding job. Her healthcare expenses will tend to correspondingly increase, particularly when her financial condition requires her to work on construction sites through heat waves, leading to episodes of dehydration, heat exhaustion, and even heat stroke. These higher healthcare costs will be difficult to meet, since as a construction worker she is either without health insurance or the sole payer for her insurance across most of her working life.

Given that Ann is someone who tends to live paycheck to paycheck, the increased cost of living and increasing loss of income across her lifetime will eliminate most of her disposable income and may even force her to give up home ownership. These increased expenses will also affect her ability to save for retirement, potentially forcing her to live mainly off of Social Security once she retires.

Bianca

Bianca is a queer woman of Hispanic heritage who works as an IT professional in Reno, Nevada. Reno is expected to become hotter and drier over the course of Bianca's lifetime.[35] The increasing severity and duration of droughts will cause Bianca's food expenses to increase by reducing local as well as national agricultural yield and productivity. Rising temperatures and increasing drought will also lead to a dwindling snowpack over Bianca's lifetime and, while she was raised to love skiing, winter snowpack will become less and less reliable as she gets older, forcing her to spend more times on other hobbies. Bianca is married and lives with her partner and two children.

Climate change is expected to increase the size of wildland fires and the duration of the wildfire season across the American West, including in Reno.[36] The fires will lead to extended periods of poor air quality in and around Reno. Wildfire smoke contains particulate matter, carbon monoxide, nitrogen oxides, and volatile organic compounds that can significantly reduce air quality, both locally and in areas downwind of fires. Smoke exposure will likely increase health problems for Bianca, such as respiratory and cardiovascular hospitalizations; emergency department visits; asthma, bronchitis, chest pain, chronic obstructive pulmonary disease, and respiratory infections; and medical visits for lung illnesses.[37] While the average American will likely experience increases in healthcare costs due to climate change, Bianca's actual costs will be higher than average because she lives in an area that will be particularly prone to smoke exposure. In 2064, when Bianca is 40, her household cost of healthcare may be around $7,000 per year.

As an IT professional, Bianca is fortunate that her work takes place indoors and thus she is more protected from the increased risk of poor outdoor air quality and extreme heat.

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[34] This value represents losses under a high greenhouse gas emissions scenario.
[35] NOAA. "Climate Change Impacts," August 13, 2021, retrieved from: https://www.noaa.gov/education/resource-collections/climate/climate-change-impacts.
[36] OMB. "Federal Budget Exposure to Climate Risk 2023," April 2022, page 286, retrieved from: https://www.whitehouse.gov/wp-content/uploads/2022/04/ap_21_climate_risk_fy2023.pdf.
[37] CDC. "Wildfires," June 18, 2020. https://www.cdc.gov/climateandhealth/effects/wildfires.htm.

However, these increasing climate hazards will make her less active than she would like to be during the summer months. Furthermore, while Bianca makes a nice salary from her IT job, her expenses will increase over time as wildfire prevalence drives an increase in housing costs associated with property damage.[38]

As a queer woman of color, Bianca is part of multiple marginalized groups, which increases her vulnerability to climate change.[39] Even in her own community, Bianca faces discrimination and has less access to resources to help her cope with environmental challenges such as wildfire, drought, and extreme heat. Furthermore, members of the LGBTQ+ community often face discrimination in relief efforts following environmental disasters, which can further marginalize these communities during periods of emergency. This means that Bianca will have to work harder to access resources for disaster preparedness.[40] The intersection of environmental challenges and LGBTQ+ identity can negatively affect the mental and physical health of individuals like Bianca. Disruptions to Bianca's outdoor activities will also contribute to her increased stress and anxiety levels.[41]

Chris

Chris is a cisgender Caucasian male who works as a farm equipment operator for a large farming operation in Vinton, Iowa. Chris is married and lives with his partner and two children. As a farm equipment operator, Chris spends most of his time working outside. As temperatures rise, working conditions become more dangerous in certain seasons. As the risk of heat-related illness increases, Chris must be more careful about when he works. Sometimes there are days when he can't work. This leads to a loss in wages over time. It also can drive an increase in healthcare costs due to heat-related illness. In 2064, by the time Chris is 40, he will likely experience increased healthcare costs due to heat-related illness amounting to roughly $800 per year. This takes a significant toll on his personal finances.

Rising temperatures also drive a decrease in crop yields over Chris's lifetime.[42] This means that the farms that Chris works for bring in less revenue. Furthermore, declining crop yields drive increases in crop insurance premiums,[43] and climate change leads to a rise in

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[38] Anderegg, William R. L., Timothy Collins, Sara Grineski, Sarah Nicholls, and Christoph Nolte. "Climate Change Greatly Escalates Forest Disturbance Risks to US Property Values." *Environmental Research Letters* 18, no. 9 (August 2023): 094011, page 7, retrieved from https://doi.org/10.1088/1748-9326/ace639.

[39] Premkumar and Atanasova, 2023, "The disproportionate impact of climate crisis on the LGBTQIA2S+ community," Greenpeace. https://www.greenpeace.org/international/story/60078/impact-climate-crisis-lgbtqia2s-pride-month/

[40] "Topic Collection: The LGBTQI+ Community and Disaster Preparedness and Response," https://asprtracie.hhs.gov/technical-resources/160/the-lgbtqi-community-and-disaster-preparedness-and-response/0

[41] Simmonds, K. E., Jenkins, J., White, B., Nicholas, P. K., & Bell, J. (2022). Health impacts of climate change on gender diverse populations: A scoping review. Journal of Nursing Scholarship, 54, 81–91. https://doi.org/10.1111/jnu.12701

[42] Zhao, Chuang et al (2017). "Temperature increase reduces global yields of major crops in four independent estimates" Proceedings of the National Academy of Sciences, Figure 2b, retrieved from: https://www.pnas.org/doi/full/10.1073/pnas.1701762114.

[43] OMB. "Federal Budget Exposure to Climate Risk 2023," April 2022, page 278, retrieved from: https://www.whitehouse.gov/wp-content/uploads/2022/04/ap_21_climate_risk_fy2023.pdf.

petroleum prices over the course of Chris's career.[44] All of these factors make it more expensive for farmers to run their businesses, and Chris experiences a decrease in his wage income as farms attempt to buffer some of these costs. Chris is expected to experience a reduction in wages that is 1.3 times greater than the national average loss in employment income due to climate change.[45]

Depending on where Chris lives in Vinton, he may also incur extra costs due to riverine flooding. Vinton is located along the Cedar River. As temperatures rise, riverine flooding is projected to increase—as is the occurrence of severe storms and excessive rainfall.[46] It is anticipated that the risk of flooding will increase dramatically in this region with frequent flood events. To avoid significant property losses, it is assumed that homeowners will elect to purchase flood insurance rather than assume the full risk and repair costs associated with flooding. Annual losses due to flooding per insured residential properties are estimated to be $3,100 by 2064. Whether Chris is in an insured or uninsured property by the time he turns 40, he will likely face significant housing costs due to the increased risk of flooding.

As climate change hurts the agricultural industry and Chris experiences a decrease in annual wage income, coupled with an increase in his cost of living, climate change will hit him hard since his income is already relatively modest. He will struggle to save for retirement and will need to work hard to make ends meet, potentially by picking up a second job.

As someone who comes from a farming family, Chris will not only feel the impacts of climate change on his finances but will also see these impacts threaten his family heritage. Chris may have to contemplate switching careers to continue to support himself in a changing climate, which would break the legacy of farming and significantly impact Chris and his family's cultural identity.

Derek

Derek is a cisgender African American man who works as a nurse in Boston. Derek is married and lives with his partner and two children. Derek is accustomed to occasional heavy rainfall and flooding in Boston, but these events will become even more frequent and severe across the course of his lifetime.[47] Shifting storm patterns and associated inland flooding will pose greater financial burden to the city. Furthermore, Boston also faces the challenges of rising sea levels and associated damage to coastal properties. While the costs

[44] CDC. "Food Security," June 18, 2020. https://www.cdc.gov/climateandhealth/effects/food_security.htm.
[45] This is based on estimated income losses for different employment sectors in the United States from two studies: (1) Deryugina, T., and Solomon, M.H. (2014). "Does the Environment Still Matter? Daily Temperature and Income in the United States." National Bureau of Economic Research Working Paper No. 20750, tables 3 & A1, retrieved from: https://www.nber.org/papers/w20750; and (2) Behrer, A. P et al (2021). "Heat Has Larger Impacts on Labor in Poorer Areas." Environmental Research Communications, page 11, retrieved from: https://doi.org/10.1088/2515-7620/abffa3
[46] Estimates on projected increases in riverine flooding, particularly those for Iowa, were adopted Swain, D. L., Wing, O. E., Bates, P. D., Done, J. M., Johnson, K. A., & Cameron, D. R. (2020). Increased flood exposure due to climate change and population growth in the United States. *Earth's Future*, 8(11), e2020EF001778.
[47] Angela Colbert. "A Force of Nature: Hurricanes in a Changing Climate." NASA, June 2022, retrieved from: https://climate.nasa.gov/news/3184/a-force-of-nature-hurricanes-in-a-changing-climate.

due to flooding are relatively minimal to Derek, who makes a good salary as a nurse, coastal flooding will translate into higher housing and insurance costs that individual property owners like Derek will need to prepare for.

As a nurse, Derek also plays a role in responding to natural disasters that impact human health. As flooding and extreme weather become more frequent and severe, Derek will likely have more strenuous working hours during emergencies and will face the risk of burnout due to more frequent disasters. This will make it harder for him to stay engaged in other parts of his life and will take a toll on his mental and physical health.

While Derek loves living in Boston, he struggles with the legacy of discrimination in the city's housing system. The practice of redlining has led to significant environmental disparities in Boston, particularly in historically marginalized neighborhoods such as Dorchester, Roxbury, and East Boston.[48,49] These areas, having been marked as high-risk based on racial composition, now experience considerably higher average temperatures compared with more affluent areas—up to 7.5°F higher during the day and 3.6°F higher at night.[50] The lack of greenspace and tree canopies in these neighborhoods exacerbates the heat, leading to a stark difference in living conditions. As an African American and someone who works in the healthcare system, Derek is deeply committed to working to address these environmental disparities but notices that they are becoming more pronounced as the climate continues to change.

Derek's commitment to his community places him in a unique position to understand and advocate for changes that address long-standing racial and ethnic disparities. He devotes much of his free time to helping communities of color address environmental and health inequities that have developed from centuries of discrimination.

The study was conducted by ICF and commissioned by Consumer Reports with support from Breakthrough Energy, an organization whose work includes philanthropic efforts for clean energy.

[48]Suarrez, J. M., Rodriguez, M., Stevenson, E., Walsh , M., & Sukkar , Y. (2024). Climate change worsens racial inequities, but Boston has a plan. Retrieved from https://theemancipator.org/2023/07/27/environmental-racism/climate-change-is-exacerbating-racial-inequities-boston-is-trying-change-that/

[49] City of Boston. (2022). "Heat Resilience Solutions For Boston. Retrieved from: https://www.boston.gov/sites/default/files/file/2022/04/04212022_Boston%20Heat%20Resilience%20Plan_highres-with%20Appendix%20%281%29.pdf

[50] City of Boston. (2022). "Heat Resilience Solutions For Boston. Retrieved from: https://www.boston.gov/sites/default/files/file/2022/04/04212022_Boston%20Heat%20Resilience%20Plan_highres-with%20Appendix%20%281%29.pdf