

A photograph of three business professionals in an office setting. A woman with curly hair is seated at a desk, looking at a laptop. Two other people, a woman with glasses and a man, are leaning over her, looking at the screen. The scene is brightly lit, suggesting a modern office environment. The text 'THE ECONOMIC CASE FOR HEALTH' is overlaid in white, bold, sans-serif font across the middle of the image.

THE ECONOMIC CASE FOR HEALTH

▶ A Rapid Scoping Literature Review

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EXECUTIVE SUMMARY

This study reviewed research on how health affects the economy. Health includes people's health outcomes, the factors that shape health, and the programs and policies that support health. The review examined four areas of economic impact:

1. **Macroeconomics**
2. **Public finance**
3. **Private-sector firm performance**
4. **Individual and household impact**

Thousands of studies were screened, and 61 were included that directly analyzed how health and the economy are connected. The findings help health care, public health and community leaders explain why investing in health can strengthen jobs, productivity and long-term economic success.

WHY THIS MATTERS TO KANSAS NOW

- Health indicators in Kansas have fallen behind the nation. This signals not just a health challenge, but a potential economic headwind for growth, competitiveness and fiscal stability.
- Economic strength depends on health. Health need not be viewed as a cost center, but as an economic strategy that affects families, companies and communities.

Bottom line: Health is a smart investment – one that strengthens families, boosts productivity and fuels long-term economic growth.

KEY POINTS

Health is a Key Ingredient for Economic Success

Most credible research shows that healthier countries, states and communities post stronger gross domestic product (GDP) and attract more investment. When health improves, growth, jobs and competitiveness follow over the long run.

- A 10 percent reduction in mortality or disability burden is linked to about a 10 percent gain in GDP.
- Healthier countries attract more investment and are more competitive.
- Communities that gain life expectancy tend to see higher home values over time.

Healthier Companies Perform Better

Health hits the bottom line, mainly through lost productivity, which often exceeds medical spending. Companies that foster a culture of health see higher productivity and stronger performance. But employee health is shaped by more than the workplace – community conditions, such as safe neighborhoods, food access and strong public health programs, help people be healthy.

- Lost productivity from poor employee health often costs companies 2-4 times more than direct medical spending.
- Depression and chronic conditions drive large losses in workforce participation and on-the-job productivity.
- Companies with a strong "culture of health" have been shown to outperform peers on financial and market measures in some analyses.

Policies That Support Health Can Spark Economic Gains

Research consistently contradicts the conventional narrative that policies like smoke-free laws or junk-food taxes damage business. At worst, studies show little to no economic downside; in some cases, they point to long-term gains through productivity, public savings and healthier communities.

- A systematic review of smoke-free laws found no negative effect on restaurant revenues or employment and a slight increase across hospitality overall.
- In Australia, a junk-food tax was projected to add about \$300 million in lifetime income gains for the country.
- U.S. simulations of healthy food incentives project billions of dollars in long-term productivity and income gains.

Poor Health Limits Household Prosperity

Better health and environments improve employment stability, earning potential and wealth, while health shocks and environmental contamination drive debt, bankruptcy and lower economic mobility.

- Early-life exposure to air pollution and punitive neighborhood environments reduces economic mobility, particularly for children from low-income communities.
- Access to preventive and restorative services (e.g., dental care) improves transitions from public assistance to work.
- Serious illness drives long-term financial strain; events such as cancer, stroke or heart attack reduce employment and income and increase risk of debt and bankruptcy.

people and communities boost productivity, support families and fuel long-term growth. This evidence can be used to communicate in economic terms that resonate with business leaders, elected officials and the public – translating “health talk” into “economic talk” about jobs, families and fiscal stability.

Strategic Moves for Leaders

- Communicate the economic value of health. Create systems to quantify the economic costs of poor health and economic benefits of health programs and policies. This may resonate with key stakeholders on their terms.
- Plan for the long game. The economic benefits of health improvements may take years to accrue. Plan for quick wins and show how they connect to long-term health and economic gains. This can help fuel momentum and support.
- Address the “wrong pocket” problem. Health benefits often accrue in other sectors. Communicate how various sectors benefit from health infrastructure and seek support and partnerships to maintain the health infrastructure.
- Work with business. Public health is more than a regulatory body. Work with employers to build healthier workplaces and grow the economy.

Bottom line: Treating health as an economic strategy opens new doors for partnership and investment. When leaders frame health as a driver of prosperity – not just an expense – they make a stronger case for action that benefits everyone.

Next Steps: Turning the Economic Case for Health Into Action

Health helps create a strong economy. Healthier

INTRODUCTION

Economic conditions are among the most powerful social determinants of health, influencing nearly every measure of population health and health disparities.^{1,2} However, the relationship between health and the economy is not one-directional. Evidence suggests that healthier populations can drive stronger economic outcomes, through factors such as increased labor force participation,^{3,4} reduced social services costs,⁵ higher productivity⁶ and long-term gains in gross domestic product.⁷

These economic benefits are especially relevant in states like Kansas, where health outcomes have lost ground to the national average and whose policies differ from high-performing states.^{8,9} Kansas was once ranked among the healthiest states in the nation but has experienced the largest long-term drop in

America's Health Rankings, falling from a high of eighth in 1991 to 28th in 2024.^{10,11} This decline not only signals worsening health, but may also carry significant economic consequences that are underexplored and underleveraged in public policy conversations.

Understanding how health influences the economy could help reframe the case for investing in policies and programs that support health, particularly for policymakers motivated by economic growth, workforce development or budgetary efficiency. This study will explore the relationship between indicators of population health (outcomes, health determinants, public health programs and policies) and economic indicators. In doing so, it will also consider how economic arguments may support the case for investment in the public's health.

CONCEPTUAL FRAMEWORK

There is a plethora of research showing a well-established connection between socio-economic factors on health. This includes research showing that socio-economic factors serve as a fundamental cause of disease and disparities with consistent relationships across diseases, generations and societal changes.^{1,2} There is also a strong literature base showing how socio-economic factors have direct and indirect effects on health, through chronic stress and allostatic load, as well as by affecting more proximal risk factors, serving as the "cause of the causes."¹²⁻¹⁴ Economic factors, such as income, wealth and employment, are among the strongest factors with these social determinants of health.^{15,16}

This study asks whether the reverse is true – how do measures of population health impact economic outcomes? Since population health is influenced through multiple determinants as well as through programs and policies, each will be examined in this study. This study also will examine multiple indicators of economic outcomes. This includes macroeconomics, private-sector firm performance, public finance, and individual or household outcomes. The population health and economic domains are described in Figure 1 and the conceptual framework with the focus of this study is shown in Figure 2.

Figure 1. DEFINITION OF POPULATION HEALTH AND ECONOMIC DOMAINS

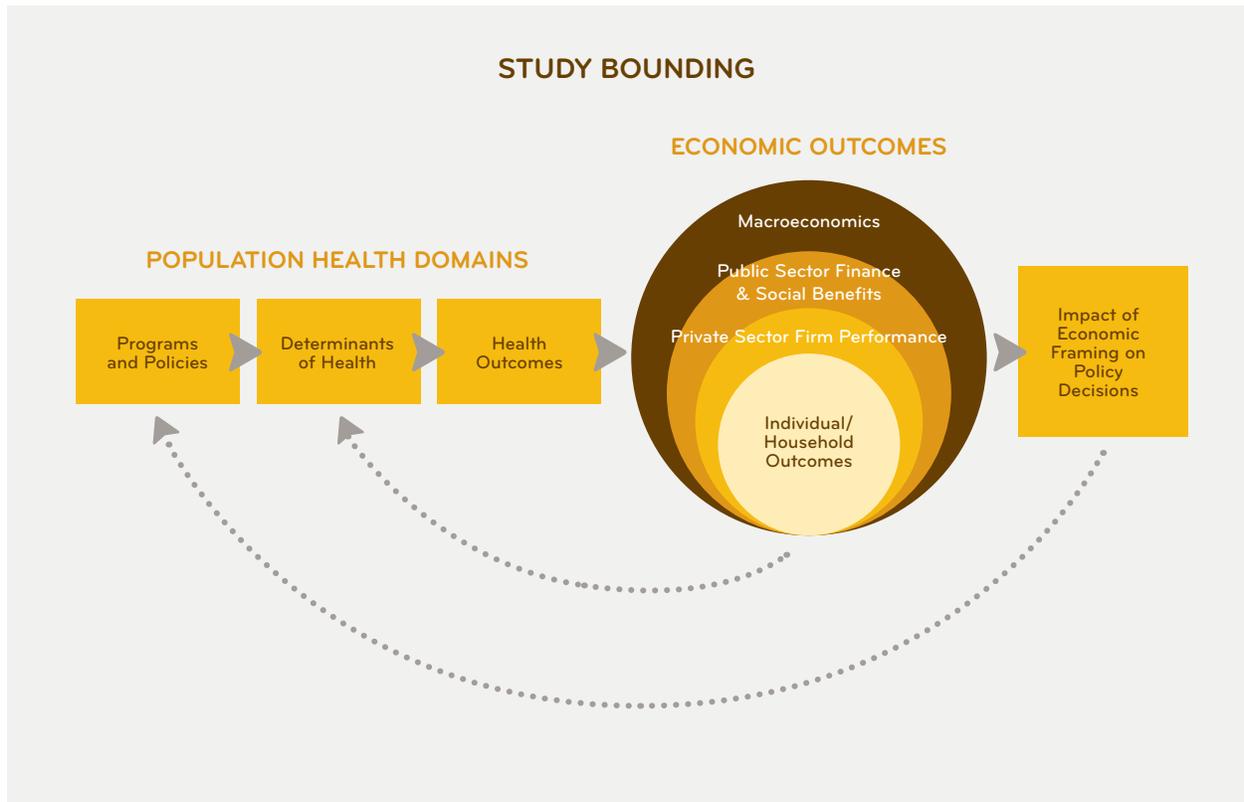
POPULATION HEALTH DOMAINS

1. **Population Health Programs and Policies:** This includes the structural determinants of health — state and local policies, public health and health care funding and programs, culture and other similar factors.
2. **Population Health Determinants:** This includes the proximal factors that cause disease. This may range from behavior, access to care, environmental factors and community-level social determinants of health.
3. **Population Health Outcomes:** This includes physical and mental states across large groups of people, such as employees, neighborhoods, states or countries. Indicators may include mortality rates, life expectancy, disease-specific mortality or morbidity, etc.

ECONOMIC DOMAINS

1. **Individual (Household):** The purpose is to capture how population health affects individuals and households. Indicators include median household income, poverty and wealth.
2. **Private Sector (Firms):** The purpose is to capture how population health affects firm-level effectiveness. Indicators include productivity, absenteeism, profit and turnover.
3. **Public Finance:** The purpose is to capture how population health affects government revenues and expenditures. Indicators include government spending, tax revenues and debt to gross domestic/state/regional product ratio.
4. **Macroeconomics:** The purpose is to capture broad, economy-wide effects of population health. Indicators include gross domestic/state/regional product, labor-force participation and consumer price index.

Figure 2. CONCEPTUAL FRAMEWORK AND STUDY BOUNDING



METHODS

Researchers at the Kansas Health Institute conducted a rapid scoping literature review using a systematic search strategy. Google Scholar was selected as the primary database, as PubMed and Web of Science yielded fewer relevant results. Because of Google Scholar's search limitations, researchers ran four separate searches, one for each economic domain. To avoid overrepresentation of pandemic-related studies, COVID-19 articles were excluded, as their findings may not reflect typical economic conditions. For each search, the first 250 results were screened, for a total of 1,000 articles.

The articles that were sought addressed both a population health and an economic domain; focused on the U.S., other high-income countries or cross-national analyses that included high-income countries; were

written in English; and were published after 2010.¹ Backward and forward reference chaining identified an additional 1,152 and 1,393 articles, respectively. In total, 3,545 articles were screened. In total, 61 articles were included: 11 in the individuals/household domain, 13 in public finance, 21 in private-sector firms and 16 in macroeconomics.

Each article was reviewed by a research team member assigned to one of the four economic domains. Reviewers summarized the study's aims, methods, findings and limitations. The project lead then reviewed all materials to ensure accuracy and consistency. Within each domain, the project lead identified overarching themes that grouped studies with similar topics or methods and developed a narrative synthesis summarizing the key findings.

RESULTS

Each economic domain is summarized here to synthesize the findings across the themes.

MACROECONOMICS

Sixteen articles were included in the macroeconomic domain after removing articles focused on low- or middle-income countries, commentaries, or dissertations and theses. This included nine multi-country studies, three U.S.-specific studies, and four literature reviews.

Multi-Country Studies

Across the included international studies, better population health is consistently linked to stronger economic outcomes. Several papers show that longer life expectancy and

higher adult survival rates are associated with higher productivity and national income.¹⁷⁻¹⁹ The benefits are especially strong when mortality among working-age adults is reduced, suggesting that improvements in adult health drive much of the economic return.²⁰

Other work shows that reducing overall mortality and disease burden leads to substantial long-term gains in national income. For example, a 10-percent reduction in mortality or disability burden was linked with close to a 10-percent increase in long-run GDP per person.²¹ Similarly, revisiting older data, Bloom and colleagues found that once initial conditions were accounted for, health improvements significantly raised income levels, although they said causation could not be implied.²²

^a The publication year criterion (post-2010) was relaxed for articles identified through reference chaining. Articles were excluded when thematic saturation was reached and additional sources were unlikely to provide new insights.

Health also affects international investment and competitiveness. Countries with smaller gender gaps in health tended to rank higher on measures of national competitiveness.²³ At the same time, higher burdens of communicable disease discouraged foreign direct investment, reducing both capital inflows and growth potential.²⁴

Environmental conditions show the reverse effect. In countries with high carbon emissions, greater levels of CO₂ were linked to higher infant mortality, while economic growth was associated with lower infant mortality. This suggests that pollution can undermine the health improvements that are typically associated with stronger economic outcomes.²⁵

Taken together, these studies suggest a consistent pattern: (1) improvements in life expectancy and adult survival raise productivity and income, (2) lowering mortality and disease burden delivers sizable long-term economic gains, (3) communicable diseases and gender gaps in health create drag on competitiveness and investment, and (4) environmental risks like CO₂ emissions threaten health gains that fuel economic growth. Differences across studies largely reflect the time periods examined, the specific health measures used and the methods applied.

U.S. Studies

Evidence from U.S. studies also points to a connection between population health and economic outcomes, though the pathways and magnitudes differ somewhat from the global evidence.

At the community level, improvements in life expectancy were linked to higher housing values. In U.S. metropolitan areas from 1990 to 2010, a one-year increase in life expectancy predicted about a 5-percent rise in home values five years later, suggesting that healthier populations make places more attractive to live and can expand the tax base.²⁶

At the county and state level, the picture is more mixed. One analysis found that increases in life expectancy were associated with higher earnings

per capita, with a 1-percent increase in life expectancy linked to about a 1-percent increase in income. However, results varied by model, and instrumental variable estimates using tobacco taxes were inconclusive, leaving uncertainty about the causal strength of the relationship.²⁷

A historical study of large health shocks in the mid-20th century shows how cause-specific mortality changes can have complex economic impacts. Reductions in influenza/pneumonia and maternal mortality were tied to substantial long-run gains in state income, while declines in tuberculosis mortality were unexpectedly associated with lower income. When separating child versus adult mortality, reductions in child mortality were associated with higher per capita income, while reductions in adult mortality were associated with lower income due to population growth.²⁸

Literature Reviews

Research consistently shows that better population health supports stronger economies. Healthier people can work more years, be more productive on the job, and can save and invest more.^{29,30}

Recent reviews of international studies find that most credible evidence points to positive effects of better health on national income, though the size of the effect depends on the measure of health used (mortality vs. illness, adult vs. child survival) and the country's stage of development.³¹ Some studies suggest that a 10-percent drop in mortality or disease burden is linked to about a 10-percent gain in long-term economic growth.

Work that connects individual and national outcomes helps explain how this happens. Early-life health improvements — such as reducing malaria or anemia — are tied to more schooling and higher adult earnings. Adult health matters too, mainly by increasing the time people can work and how effectively they do it.³²

The reviews also note timing matters: in poorer countries, rapid declines in mortality can briefly strain resources, while in richer countries, health gains usually boost growth. Noncommunicable diseases, such as heart disease and diabetes,

are highlighted as major threats to productivity in high-income settings.³⁰

Despite differences in approach, the reviews point to the same conclusion: improving population health, especially for working-age adults, supports stronger and more sustainable economic performance.^{29,31}

KEY POINTS

- Health and economic growth are linked, but not uniformly. Many cross-country studies show that longer life expectancy and reduced mortality align with higher productivity and income, though the effect depends on age group, health measure and time-period studied.
- Working-age health is especially important. Mortality declines among adults have the strongest links to productivity and income, while child and non-adult mortality improvements contribute through schooling and future workforce gains.
- Context matters. U.S. studies reveal mixed or complex effects – life expectancy gains sometimes correspond with higher earnings or property values, but results vary by method, location and cause of death. Historical analyses also show that reductions in some diseases (e.g., tuberculosis) had unexpected economic effects.
- Other factors shape the health–economy relationship. Smaller gender gaps in health and lower burdens of communicable disease are linked with greater competitiveness and investment, while environmental risks such as CO₂ emissions may undermine gains that otherwise support growth.
- Reviews converge but emphasize caution. Reviews conclude that health improvements usually support long-term growth, particularly in higher-income settings. Still, they highlight variation across studies, challenges separating cause from effect, and the need to account for stage of development and disease profile.

Figure 3. EVIDENCE TABLE – MACROECONOMICS

| CITATION | AIM/PURPOSE | METHODS | FINDINGS | LIMITATIONS |
|--|--|---|--|---|
| MULTI COUNTRY STUDIES | | | | |
| Bloom DE, Canning D, Kotschy R, Prettner K, Schünemann J. Health and economic growth: reconciling the micro and macro evidence. CESifo Working Paper No. 9806. CESifo; 2022. | Reconcile micro- vs macro-based returns to population health and quantify the direct productivity effect of health. | Macro production-function aligned to a generalized Mincer wage equation; panel of 133 countries, 1965–2015 (5-year); health = adult survival (15–60); controls for capital, education, technology diffusion, institutions, demographics; OLS and system GMM with extensive robustness checks. | A 10-percentage-point rise in adult survival is associated with a ~10.6% increase in labor productivity (95% CI ≈3.4–17.9%), consistent with micro calibrations (=6.7–13.4%). Treated as the direct effect after accounting for indirect channels. | Mortality-based proxies may miss morbidity; macro IV/GMM validity and data quality matter; indirect channels excluded so total effects may be larger; ecological inference limits; working paper (not peer-reviewed). |
| Ay İC. Air pollution, health and economic growth: a panel data analysis for countries with the highest CO ₂ emission. Acad Elegance (Akademik Hassasiyetler). 2021;8(15):269–288. | Model how air pollution, economic growth, and population health interact across top CO ₂ -emitting countries and estimate short- vs long-run effects. | Panel of 41 countries, 1970–2018. Health: infant mortality; Economy: GDP per capita; Pollution: national fossil-fuel CO ₂ emissions. Panel ARDL with PMG/MG/DFE, unit-root and cross-section dependence tests, Westerlund cointegration; Hausman test favored PMG. | Long run: +1% CO ₂ → +0.181% infant mortality; and +1% GDP per capita → -0.179% infant mortality. Short run: no significant effects. Interpretation: growth improves health while pollution worsens it; effects are of similar magnitude. | Observational macro panel (no causal claims); health → economy pathway not directly estimated; CO ₂ is a narrow pollution proxy; uses infant mortality only (morbidity not captured); results rely on cointegration rather than external instruments; limited to top CO ₂ emitters. |

| CITATION | AIM/PURPOSE | METHODS | FINDINGS | LIMITATIONS |
|---|--|---|---|--|
| <p>Rocco L, Fumagalli E, Mirelman AJ, Suhrcke M. Mortality, morbidity and economic growth. PLOS One. 2021;16(5):e0251424. doi:10.1371/journal.pone.0251424</p> | <p>Reassess long-run GDP per-capita growth effects of mortality and morbidity (DALYs) with bounded/IV estimates.</p> | <p>Cross-country panel of 135 countries, 1990–2014; IV using 1966 Plasmodium falciparum exposure; partial-identification bounds (Oster; Conley) and Lewbel instruments; rich controls.</p> | <p>10% reduction in mortality → ≥9.6 percentage-point gain in GDP-per-capita growth over ~25 years (upper bounds ~13 pp), 10% reduction in DALYs → ≥10.6 pp. Effects robust across IV/bounding; heterogeneous by income level and demographic transition.</p> | <p>Causal claims hinge on IV assumptions; ecological design; health proxies may have measurement error and miss some productivity channels; bounds yield ranges, not point estimates.</p> |
| <p>Monterubbianesi PD, Grandes M, Dabús C. New evidence of the health status and economic growth relationship. Panoeconomicus. 2017;64(4):439–459.</p> | <p>Compare growth accounting vs Barro-style growth regressions to estimate health's long-run income effect.</p> | <p>Panel of 91 countries, 1960–2005 (5-year). (1) Growth-accounting with FE and IV (lagged changes for health/education); (2) Barro regressions with PCSE; robustness with infant mortality.</p> | <p>+1 year of life expectancy → +2.6% (growth-accounting IV-FE) and +8.3% (Barro PCSE-FE) higher long-run income. With infant mortality, a 1% decrease → +0.1% (growth-accounting) and +1.8% (Barro) higher income.</p> | <p>Ecological macro-panel; IV relies on lagged-change validity; mortality proxies under capture morbidity; estimates reflect long-run averages with cross-country data quality variation.</p> |
| <p>Aghion P, Howitt P, Murtin F. The relationship between health and growth: when Lucas meets Nelson-Lucas meets Nelson-Phelps. NBER Working Paper No. 15813. National Bureau of Economic Research; 2010.</p> | <p>Test whether both initial levels and growth of life expectancy raise GDP per-capita growth.</p> | <p>Cross-country growth regressions, 1960–2000; OLS and IV combining life-expectancy growth; IV set from Lorentzen-McMillan-Wacziarg (malaria ecology; climate/geography). OECD sub-analysis by age (LE at 0/40/60/80) with FE and SYS-GMM.</p> | <p>Including both terms, higher initial LE and faster LE growth are positively associated with GDP growth; convergence can mask this if only growth of LE is used. In OECD, mortality reductions below age 40 are those linked to productivity growth.</p> | <p>Macro ecological design; IV validity (exclusion of climate/geography) not guaranteed; some instrument-strength concerns; LE proxies mortality more than morbidity; working paper (not peer-reviewed).</p> |

| CITATION | AIM/PURPOSE | METHODS | FINDINGS | LIMITATIONS |
|--|---|---|---|--|
| <p>Bloom DE, Canning D, Fink G. Disease and development revisited. NBER Working Paper No. 15137. National Bureau of Economic Research; 2009.</p> | <p>Revisit Acemoglu & Johnson (2007) to test whether health improvements raise income once initial conditions/slow adjustment are considered.</p> | <p>Reanalysis of A&J data for 47 countries, 1940–2000; add initial life expectancy and income; conditional-convergence/error-correction models; use A&J's predicted mortality change as instrument; OLS, IV, NLS.</p> | <p>Negative A&J result reflects omitted initial conditions and instantaneous adjustment assumption. Allowing for convergence and conditioning on initial health/income, health improvements are positively and significantly associated with income growth; exogenous health gains from the epidemiological transition increased income levels.</p> | <p>Macro aggregate design; identification hinges on instrument assumptions; results sensitive to lag structure and collinearity between initial health and health gains; not definitive causal proof; working paper.</p> |
| <p>Gavurova B, Ivankova V, Rigelsky M, Kmecova I. How do gender inequalities in health relate to the competitiveness of developed countries? J Competitiveness. 2020;12(3):99-118.</p> | <p>Evaluate how life expectancy/self-rated health — and their gender gaps — relate to national competitiveness.</p> | <p>Panel of 36 OECD countries, 2010–2018. Outcome: Global Competitiveness Index. Health indicators at various ages and self-reports by sex; FE/RE regressions with robustness checks.</p> | <p>Better population health \uparrow higher competitiveness; smaller gender gaps in health generally aligned with higher competitiveness.</p> | <p>Observational; OECD-only; mortality and self-reports (measurement error); GCI rescaling; model choices (outliers/heteroscedasticity) may affect estimates.</p> |
| <p>Herzer D, Nagel K, Dewenter R. The effects of adult and non-adult mortality on long-run economic development. HSU Economics Working Paper No. 177. Helmut Schmidt University; 2017.</p> | <p>Test whether adult vs non-adult mortality have different long-run effects on income per person.</p> | <p>Heterogeneous dynamic panel of 20 countries, 1800–2010; CS-ARDL/ECM linking GDP per capita to life expectancy at 21 (adult) and mortality up to 21 (non-adult).</p> | <p>Adult mortality matters; non-adult does not (long run): +1 year in LE at 21 \rightarrow ~7.4% higher long-run GDP per capita; middle-adult mortality reductions drive gains; adjustment gradual (half \approx 4 yrs, ~97% \approx 20 yrs).</p> | <p>Macro observational; relies on cointegration/weak exogeneity rather than external IVs; mortality over morbidity; sample limited to countries with long historical data.</p> |

| CITATION | AIM/PURPOSE | METHODS | FINDINGS | LIMITATIONS |
|--|---|---|---|--|
| <p>Ghosh S, Renna F. The relationship between communicable diseases and FDI flows: an empirical investigation. <i>World Econ.</i> 2015;38(10):1574-1593.</p> | <p>Test whether communicable disease burden defers foreign direct investment (FDI).</p> | <p>114 countries; outcomes: FDI per capita and FDI/GDP (avg. 2008-2010); health: YLL to communicable diseases, age-standardized mortality; OLS then 2SLS instrumenting health with distance from the equator; controls for income, openness, geography, infrastructure, institutions.</p> | <p>Communicable disease burden reduces FDI once endogeneity is addressed. 1 pp ↑ in YLLC → -3.7% FDI per capita and -0.09 pp FDI/GDP; +10 deaths/100k → -0.04% FDI per capita and -0.10 pp FDI/GDP; results robust to institutional controls.</p> | <p>Instrument validity/strength limits (just-identified; weak-IV risk); observational cross-country design; short 2008-2010 window; communicable proxies may miss broader morbidity.</p> |
| U.S. STUDIES | | | | |
| <p>Nau C, Bishai D. Green pastures: do U.S. real estate prices respond to population health? <i>Health Place.</i> 2018;49:59-67. doi:10.1016/j.healthplace.2017.11.008</p> | <p>Test whether improvements in community health predict later increases in real estate prices.</p> | <p>Panel of 371 U.S. MSAs (1990-2010). Outcome: FHFA Home Price Index. Health: IHME life expectancy, FE with year dummies; 1-5 year lags (best = 5-year); broad socio-economic controls; random-slope models for spatial heterogeneity.</p> | <p>Higher life expectancy predicted higher housing prices: +1 year (5-year lag) ≈ +8 HPI points (~5% price increase at 2010 mean). Robust across lags/controls; strongest on East/West coasts. Implication: investing in health can raise property values and tax base.</p> | <p>Observational – no causality; potential dynamic-panel bias; MSA-level masks within-metro variation and excludes rural areas; HPI includes appraisals; life expectancy may not capture morbidity; residual confounding possible.</p> |
| <p>Bowser D. The effect of life expectancy on economic growth in the United States. Paper presented at: Population Association of America Annual Meeting; April 2010.</p> | <p>Estimate how changes in life expectancy affect state/county earnings per capita.</p> | <p>State (51) and merged-county (2,826) panels, 1970-2000; OLS long-differences and DID; 2SLS using tobacco tax as instrument for life expectancy; controls for education, age structure, race; year effects; clustered SEs.</p> | <p>Mixed: decade-panel OLS mostly null/negative; long-difference models show positive associations – county-level 1% ↑ life expectancy ≈ 1% ↑ in net earnings per capita; state results similar. IV estimates null (weak instrument), suggesting limited causal leverage.</p> | <p>Weak instrument (F<10) undermines 2SLS; results sensitive to specification; ecological design risks confounding; mortality proxies may miss morbidity/productivity channels; limited generalizability (U.S., 1970-2000).</p> |

| CITATION | AIM/PURPOSE | METHODS | FINDINGS | LIMITATIONS |
|---|--|---|--|--|
| <p>Hansen CW. Causes of mortality and development: evidence from large health shocks in 20th century America. <i>Economics Working Paper No. 2012-29</i>. Aarhus University; 2012. doi:10.2139/ssrn.2181403</p> | <p>Estimate how cause-specific health improvements (flu/pneumonia, tuberculosis, maternal mortality) affected state income per capita.</p> | <p>Differences-in-differences using pre-1937 state mortality interacted with post-1950 indicator; panel of 48 U.S. states (1940–1980); state/time FE; channel analyses (population, capital/worker, schooling, fertility); 2SLS for child vs adult mortality.</p> | <p>1-SD decline in flu/pneumonia mortality → ~13% long-run ↑ in income; 1-SD decline in maternal mortality → ~8% ↑ (fragile); 1-SD decline in TB mortality → ~9% in income. 2SLS; 1-SD drop in child (adult) mortality → +27% (-24%) income effect; mechanisms include lower fertility, higher capital per worker, and more secondary schooling.</p> | <p>Ecological/state-level analysis; identification relies on timing of medical breakthroughs and pre-shock variation; maternal result weakens with regional controls; reduced-form limits interpretation; mid-century U.S. context may not generalize.</p> |
| LITERATURE REVIEWS | | | | |
| <p>Ajayi OF, Akinbobola TO. Health status and economic growth. In: <i>Encyclopedia of the UN SDGs: Decent Work and Economic Growth</i>. Springer; 2020. doi:10.1007/978-3-319-71058-7_87-1</p> | <p>Synthesize how population health influences economic growth and outline transmission mechanisms.</p> | <p>Narrative encyclopedia chapter drawing on prior theory and empirical studies (no new data).</p> | <p>Argues that better health (life expectancy/adult survival) raises GDP via higher labor productivity and supply; greater human capital, increased savings/investment, and longer working lives; descriptive co-movement of global life expectancy and GDP.</p> | <p>Conceptual overview; no identification strategy or effect sizes; descriptive associations subject to confounding and reverse causality. Health status and economic growth</p> |

| CITATION | AIM/PURPOSE | METHODS | FINDINGS | LIMITATIONS |
|--|---|--|--|--|
| <p>Fumagalli E, Pinna Pintor M, Suhrcke M. The impact of health on economic growth: a narrative literature review. Health Policy. 2024;143:105039. doi:10.1016/j.healthpol.2024.105039</p> | <p>Synthesize causal evidence on health's impact on GDP per-capita growth and explain heterogeneity.</p> | <p>Narrative review of post-2000 macro studies tackling endogeneity (FE, IV, natural experiments). Final sample: 19 studies; AI-assisted screening (ASReview).</p> | <p>Most credible studies find positive effects of better health on growth, but magnitudes vary by development stage, health measure (mortality vs morbidity; working-age vs early-age), and model specification; e.g., 10% reductions in mortality/DALYs often add ≈10 p.p. to 25-year growth.</p> | <p>Narrative synthesis (no new estimates); relies on macro cross-country evidence with IV/LATE/generalizability concerns; mortality proxies can miss morbidity/productivity; measurement error and heterogeneity persist.</p> |
| <p>Bleakley H. Health, human capital, and development. Annu Rev Econ. 2010;2:283-310. doi:10.1146/annurev.economics.102308.124436</p> | <p>Summarize how disease/health improvements affect human capital and income, linking micro to macro.</p> | <p>Narrative review of micro (early-life health shocks, deworming, malaria eradication, anemia) and macro evidence; simple human-capital model.</p> | <p>Early-life health gains lead to higher adult earnings/skills; deworming and malaria eradication linked to large long-run income increases; adult health raises income mainly via more healthy time at work; direct productivity effects are key.</p> | <p>Review (no new data); context-specific historical estimates; translating micro to national income is uncertain; cross-country associations risk confounding.</p> |
| <p>Bloom DE, Kuhn M, Prettner K. Health and economic growth. IZA Discussion Paper No. 11939. Institute of Labor Economics (IZA); 2018.</p> | <p>Synthesize theory and evidence on how population health affects economic growth across development stages.</p> | <p>Narrative review of macro theory (neoclassical, OLG, endogenous/R&D) and empirics (cross-country panels, IV/GMM, disease-specific studies).</p> | <p>Better population health generally boosts income/productivity, especially post-demographic transition (via human capital, savings, demographic dividend). In pre-transition settings, mortality decline can temporarily dilute capital and depress GDP per capita. NCD and CVD burdens imply sizable output losses in richer countries.</p> | <p>Review (no new causal estimates); macro identification is difficult (reverse causality, instrument validity); effects vary by health measure, age group, and development stage; mortality proxies can miss morbidity/productivity channels.</p> |

PRIVATE-SECTOR FIRM PERFORMANCE

Twenty-one articles were included in the private-sector firm performance domain after removing articles focused on low- or middle-income countries, commentaries, or dissertations and theses. This included 10 related to the impact on productivity (including absenteeism and presenteeism), seven on the impact of a company culture of health on firm performance, and four on the impact of public health policies on firm performance.

Impact of Health on Productivity

Across workplace and population-based studies, poor health is consistently associated with lower productivity. Mental health conditions, especially depression and psychological distress, are among the strongest predictors of absenteeism, presenteeism and impaired work functioning.³³⁻³⁵ When combined with chronic diseases such as cardiovascular disease, the effects are even greater, leading to sharp reductions in workforce participation and higher risks of prolonged absence.³⁴

Chronic physical conditions, including diabetes, arthritis, obesity and cardiovascular disease, also reduce productivity, though typically to a lesser extent than mental health problems.³⁶⁻³⁸ The risks increase with multimorbidity: workers with multiple conditions are far more likely to experience lost productive time, with clear dose-response patterns.^{38,39}

Employer costs associated with these productivity losses are substantial. Estimates from U.S. and Australian settings suggest that productivity-related costs — particularly presenteeism — often exceed direct medical costs, with depression, hypertension and arthritis among the most costly conditions for employers.^{36,40}

Workplace and behavioral factors also play a role. Higher job stress, low engagement, smoking and unhealthy weight are associated with greater absenteeism and lower self-rated performance, while supportive environments and healthy behaviors mitigate some of these risks.^{36,37,41}

Taken together, these studies suggest a consistent pattern: (1) mental health problems have the strongest and most costly effects on productivity, (2) chronic diseases also contribute, with risk compounding as conditions accumulate, (3) productivity-related costs often exceed medical costs, and (4) workplace conditions and health behaviors can either worsen or buffer these impacts. Differences across studies largely reflect the measures of productivity used, reliance on self-reported health, and the populations examined.

Impact of Culture of Health on Firm Performance

A growing set of studies explores whether companies that invest in employee health and foster a “culture of health” experience business advantages. Several analyses report that stronger culture-of-health scores are associated with lower health care cost trends, reduced absenteeism and higher productivity.⁴² One multi-employer study found that productivity-related costs were more than four times higher than direct medical costs, suggesting that integrated health and productivity strategies are financially relevant to employers.⁴³

Stock market analyses also suggest that companies recognized for workforce health and wellness programs may outperform the market. Simulated portfolios of award-winning firms (e.g., Koop and CHAA recipients) consistently outperformed the S&P 500 over various timeframes.^{44,45} A real-world investment fund tracking companies with strong health and safety practices also achieved modestly higher returns compared to the benchmark.⁴⁶ More recent analyses indicate that firms with strong internal culture-of-health scores achieved better stock performance, while external reputational measures were less predictive.⁴²

However, not all evidence is uniformly positive. A reassessment using risk-adjusted asset-pricing models found that award-winning firms did not universally outperform once portfolio risk and volatility were accounted for, suggesting that earlier findings may have overstated the financial “alpha” of health-promoting firms.⁴⁷

Taken together, these studies suggest a pattern: (1) stronger cultures of health are linked with lower health cost growth and improved productivity, (2) firms recognized for health investments often – but not always – outperform financial benchmarks, and (3) some excess returns may reflect portfolio composition and risk rather than health programs alone. Differences across studies reflect measurement choices, short time horizons and potential selection bias among firms already predisposed to invest in employee health.

Economic Impact of Public Health Policy

Evidence from tobacco control shows that population health policies need not harm local economies. A systematic review of smoking bans in bars and restaurants found no substantial negative impact on business performance. On average, restaurant sales and employment were unaffected, bar sales fell modestly, and broader hospitality sector sales slightly increased, suggesting that bans may even shift spending within the sector.⁴⁸

Nutrition-focused fiscal policies also demonstrate potential productivity and economic gains. An Australian microsimulation estimated that a 10% tax on unhealthy foods could avert more than 2,000 premature deaths by 2030, yielding over 8,600 additional working years and more than \$300 million in lifetime income gains. Productivity benefits were nearly twice as large as health care savings, indicating added economic value beyond direct health expenditures.⁴⁹

Similar findings emerge in U.S. models of healthy food incentives. A Medicare/Medicaid simulation found that subsidizing fruits and vegetables – or a broader set of healthy foods – would prevent millions of cardiovascular events and hundreds of thousands of deaths, while generating tens of billions in health care

savings and proving highly cost-effective from both health system and societal perspectives.⁵⁰ For SNAP participants, simulations of incentives combined with restrictions on sugar-sweetened beverages projected even greater benefits, with nearly one million cardiovascular events prevented and more than \$40 billion in health care savings over a lifetime.⁵¹

Taken together, these studies suggest that well-designed tobacco and nutrition policies can improve health without harming, and in some cases strengthening, economic outcomes. Gains may come from avoided health care costs, additional productive years of life, and broader social benefits. Differences across studies reflect reliance on simulation models, assumptions about consumer response, and the limits of generalizing from specific policy contexts.

KEY POINTS

- **Poor health reduces productivity.** Mental health conditions, especially depression, strongly predict absenteeism and presenteeism, with risks compounded by chronic disease and multimorbidity.
- **Productivity losses are costly.** Productivity-related costs often exceed medical costs, with depression, hypertension and arthritis being most expensive.
- **Culture of health can boost performance.** Firms with stronger health cultures saw lower cost growth, less absenteeism and sometimes stronger stock returns, though not all gains appear causal.
- **Public health policies show economic benefits.** Smoking bans did not harm revenues, while food taxes and subsidies were projected to improve health, add working years and reduce costs.

Figure 4. EVIDENCE TABLE – PRIVATE-SECTOR FIRM PERFORMANCE

| CITATION | AIM/PURPOSE | METHODS | FINDINGS | LIMITATIONS |
|--|---|--|---|---|
| THEME 1: IMPACT OF HEALTH ON PRODUCTIVITY | | | | |
| O'Neil A, Williams ED, Stevenson CE, Oldenburg B, Sanderson K. Co-morbid depression is associated with poor work outcomes in persons with cardiovascular disease: a large, nationally representative survey in the Australian population. BMC Public Health. 2012;12:47. doi:10.1186/1471-2458-12-47 | To examine associations of co-morbid major depressive disorder (MDD) and cardiovascular disease (CVD) with workforce participation, work functioning and absenteeism. | Cross-sectional analysis of the 2007 Australian National Survey of Mental Health and Wellbeing (n=8,841). Compared four groups: MDD only, CVD only, MDD+CVD, and healthy reference group. Outcomes: workforce participation, WHO-DAS work functioning, and absenteeism (days out of role). | Co-morbid MDD+CVD was linked to the lowest workforce participation (adj OR=0.4), greatest odds of impaired work functioning (adj OR=8.1), and highest absenteeism (adj OR=3.0). MDD alone also reduced participation and functioning, while CVD alone mainly reduced participation. Effects on functioning were synergistic: MDD+CVD together worse than additive. | Cross-sectional design precludes causal inference; CVD self-reported, potential recall bias; small subsample with co-morbidity produced wide CIs; non-response bias may have underrepresented younger men; generalizability limited to Australian adults. |
| Besen E, Pransky G. Assessing the relationship between chronic health conditions and productivity loss trajectories. J Occup Environ Med. 2014;56(12):1249-1257. | To examine how chronic health conditions predict membership in longitudinal trajectories of productivity loss from ages 25-44. | Used 12 waves of National Longitudinal Survey of Youth (NLSY79) data (ages 25-44), linked with age-40 health module (n=5,583). Latent class growth analysis identified five productivity-loss trajectories. Multinomial logistic regression estimated relative risks of trajectory membership by chronic conditions. | Chronic conditions such as diabetes, cancer, depression, emotional problems, arthritis, asthma, back/leg problems, eye and sleep problems significantly increased risk of belonging to high-risk or early/late-onset productivity loss trajectories. More chronic conditions raised risk: high-risk group averaged 3.3 conditions vs <1 in no-risk. Mental health problems (depression, emotional disorders) were particularly strong predictors. | Cannot infer causation; health conditions measured only once (at age 40); productivity loss measured via broad items combining absenteeism/presenteeism; relatively young cohort (<44 yrs) misses later-career impacts; some conditions self-reported; within-trajectory condition subsamples were small, limiting subgroup analyses. |

| CITATION | AIM/PURPOSE | METHODS | FINDINGS | LIMITATIONS |
|--|--|---|--|--|
| <p>Keramat SA, Comans T, Pearce A, Basri R, Hashmi R, Dissanayaka NN. Psychological distress and productivity loss: a longitudinal analysis of Australian working adults. <i>Eur J Health Econ.</i> 2025. doi:10.1007/s10198-025-01764-9</p> | <p>To investigate the longitudinal relationship between psychological distress and productivity loss (sickness absence, presenteeism, underemployment) in Australia.</p> | <p>Eight waves of the HILDA Survey (2007–2021), unbalanced panel (70,973 person-year observations from 18,729 adults). Used fixed-effects Poisson regression for sickness absence and fixed-effects logistic regression for presenteeism/underemployment; robustness checks with random-effects and alternative models.</p> | <p>Moderate distress increased sickness absence (IRR=1.08), presenteeism (OR=4.75), and days worked while unwell (IRR=1.85). High distress effects were stronger (absence IRR=1.13; presenteeism OR=19.24; days unwell IRR=3.69). Estimated annual costs: AUD \$60.66–\$99.26 for presenteeism per worker. Underemployment effects mixed: not significant in fixed-effects, but positive in random-effects models. Overall, psychological distress imposed substantial costs on Australian workplaces.</p> | <p>Psychological distress self-reported; underemployment estimates sensitive to model choice; presenteeism measurement partly subjective; limited to Australian context; cannot fully rule out unobserved confounding despite fixed-effects; cost estimates assume consistent presenteeism patterns.</p> |
| <p>Merrill RM, Aldana SG, Pope JE, Anderson DR, Coberley CR, Grossmeier JJ, Whitmer RW. Self-rated job performance and absenteeism according to employee engagement, health behaviors, and physical health. <i>J Occup Environ Med.</i> 2013;55(1):10-18. doi:10.1097/JOM.0b013e31827b73af</p> | <p>To examine how engagement, health behaviors, and physical health jointly influence job performance and absenteeism.</p> | <p>Cross-sectional survey of 20,114 employees at three U.S. companies (2008–2010) using the Healthways Well-Being Assessment. Regression models assessed associations with self-rated performance and absence.</p> | <p>Higher engagement, healthier behaviors, and better physical health were each associated with higher performance and lower absenteeism. Depression, obesity, and chronic diseases predicted worse outcomes.</p> | <p>Cross-sectional; self-reported outcomes; three large companies (limited external validity); cannot infer causality; possible healthy-worker bias.</p> |

| CITATION | AIM/PURPOSE | METHODS | FINDINGS | LIMITATIONS |
|--|--|--|---|--|
| <p>Goetzel RZ, Long SR, Ozminkowski RJ, Hawkins K, Wang S, Lynch W. Health, absence, disability, and presenteeism cost estimates of certain physical and mental health conditions affecting U.S. employers. <i>J Occup Environ Med.</i> 2004;46(4):398-412. doi:10.1097/O1.jom.0000121151.40413.bd</p> | <p>To estimate the full cost burden (medical + productivity) of common physical and mental health conditions for U.S. employers.</p> | <p>Medstat MarketScan claims (374,799 employees, 1997-1999) combined with multiple productivity surveys (e.g., HPQ/WPAI). Condition-specific absenteeism, disability and presenteeism costs calculated per employee.</p> | <p>Highest annual per-employee total costs: hypertension (\$392), heart disease (\$368), depression/mental illness (\$348), arthritis (\$327). Presenteeism often exceeded medical costs (18-60% of total). Mental health conditions carried especially high productivity-related costs — supporting investment in targeted population health/disease management.</p> | <p>Mixed data sources; some self-reported elements; older cohort (late 1990s); lack of standardized productivity metric; may understate current costs/roles.</p> |
| <p>Zhang W, Bansback N, Anis AH. Measuring and valuing productivity loss due to poor health: a critical review. <i>Soc Sci Med.</i> 2011;72(2):185-192. doi:10.1016/j.socscimed.2010.10.021</p> | <p>To critically review methods for measuring/valuing productivity loss due to illness.</p> | <p>Methodological review of human capital vs friction cost approaches and absenteeism/presenteeism instruments; implications for economic evaluations.</p> | <p>Wages often understate true productivity (team production, time-sensitive output). Presenteeism measures vary widely; recommend generic instruments, inclusion of unpaid work, and multipliers to adjust wages to productivity.</p> | <p>Review (no new data); primarily methodological; recommendations may be challenging to implement consistently.</p> |

| CITATION | AIM/PURPOSE | METHODS | FINDINGS | LIMITATIONS |
|--|--|---|---|---|
| <p>Nawata K. Evaluation of physical and mental health conditions related to employees' absenteeism. Front Public Health. 2024;11:1326334.</p> | <p>To identify physical/mental health factors linked to long-term absenteeism in a Japanese corporation.</p> | <p>15,574 quarterly observations from 2,319 employees (2021–2022). Annual medical exam data + Brief Job Stress Questionnaire + work records. Logistic regression with time fixed effects.</p> | <p>High blood pressure, diabetes (HbA1c/antihyperglycemic use), heart/kidney disease, smoking, weight gain, high-frequency alcohol use, and job stress (workload, fatigue, irritability) increased odds of long-term absenteeism; supportive work factors and good mental/physical health lowered risk — implying substantial employer costs from replacement/training.</p> | <p>Single firm (call-center style roles); observational design; self-reported stress; generally healthy workforce; generalizability limited beyond this employer.</p> |
| <p>Holden L, Scuffham PA, Hilton MF, Ware RS, Vecchio N, Whiteford HA. Which health conditions impact on productivity in working Australians? J Occup Environ Med. 2011;53(3):253–262.</p> | <p>To identify health conditions associated with absenteeism and presenteeism among working Australians.</p> | <p>WORC study of ~78,000 workers (58 companies; 2004–2005). WHO-HIPQ used; multivariable regression adjusted for demographics, work factors and comorbidities.</p> | <p>Mental health conditions (psychological distress; drug/alcohol problems) had the greatest negative impacts on absence (RR=1.41–1.60) and presenteeism (RRR=4.32 for distress). Other conditions (injury, obesity, arthritis, cancer) also significant but smaller. Comorbidity compounded risks; presenteeism effects generally stronger.</p> | <p>Cross-sectional; self-reported conditions; low response (24.7%); overrepresentation of women/public sector; may not generalize to all industries.</p> |

| CITATION | AIM/PURPOSE | METHODS | FINDINGS | LIMITATIONS |
|---|--|--|--|---|
| <p>Marzec ML, Scibelli A, Edgington D. Impact of changes in medical condition burden index and stress on absenteeism among employees of a U.S. utility company. <i>Int J Workplace Health Manag.</i> 2015;8(1):15-33.</p> | <p>To investigate how changes in medical condition burden (MCBI) and stress affect absenteeism.</p> | <p>Longitudinal HRA cohort of 3,711 utility employees (2009-2010). Admin records for absence; regression tested incremental and categorical changes in MCBI and stress.</p> | <p>Moving low → high MCBI increased absence (+0.12 days/year); staying low decreased absence (-0.10). Stress shifts tracked absence: low → high (+0.21), high → low (-0.31). MCBI×stress interaction significant — indicating combined burden elevates employer absence costs.</p> | <p>One company; 33% completed both HRAs (participation bias); broad absence definition; small effect sizes; observational — no causality.</p> |
| <p>Wang L, Cocker F, Kilpatrick M, Otahal P, Si L, Palmer AJ, Sanderson K. The associations of multimorbidity with health-related productivity loss in a large and diverse public sector setting. <i>J Occup Environ Med.</i> 2018;60(6):529-537.</p> | <p>To evaluate absenteeism, presenteeism, and lost productive time (LPT) associated with multimorbidity.</p> | <p>Cross-sectional survey of 3,228 Tasmanian state government employees (2013). Twenty chronic conditions + K10 distress; 28-day recall of absence/ presenteeism; sex-stratified negative binomial regression.</p> | <p>Multimorbidity significantly increased absence, presenteeism, and LPT. Women with ≥4 conditions had 2.9x more LPT; men with ≥4 had 4.4x more. Clear dose-response: more conditions → higher productivity loss, implying sizable public-sector economic burden.</p> | <p>Cross-sectional; self-reported health/productivity; 27% response rate; one public-sector jurisdiction; short recall window may misestimate outcomes.</p> |

| CITATION | AIM/PURPOSE | METHODS | FINDINGS | LIMITATIONS |
|--|---|---|---|---|
| THEME 2: IMPACT OF CULTURE OF HEALTH ON FIRM PERFORMANCE | | | | |
| <p>Fabius R, Frazee SG, Thayer D, Kirshenbaum D, Reynolds J. The correlation of a corporate culture of health assessment score and health care cost trend. <i>J Occup Environ Med.</i> 2018;60(6):507-513.</p> | <p>To test whether higher corporate culture of health assessment scores (CHAS) are correlated with lower health care cost trends.</p> | <p>Correlation analysis using 21 sets of annual CHAS and medical/pharmacy cost trend data (2011-2016) from 12 medium-to-large employers (>1 million covered lives). Tools used: Employer Health Opportunity Assessment (EHOA) and Employer Assessment 50 (EA50).</p> | <p>Higher CHAS scores strongly correlated with lower annual health care cost trends ($r = -0.848$, $p < 0.001$). Regression showed each 21-50 point CHAS increase predicted ~1% decrease in annual cost trend. Over 10 years, this equates to ~\$3,999 per covered member in savings. Improved culture of health also linked to reduced absenteeism, higher productivity and superior stock performance.</p> | <p>Small sample size (12 firms, 21 observations); self-selected employers already oriented toward wellness; limited generalizability; correlation cannot prove causation; cost trends also influenced by benefit design, market conditions and other factors.</p> |
| <p>Loeppke R, Taitel M, Richling D, Parry T, Kessler RC, Hymel P, Konicki D. Health and productivity as a business strategy: a multi-employer study. <i>J Occup Environ Med.</i> 2007;49(7):712-721.</p> | <p>To assess the magnitude of health-related productivity loss relative to medical/pharmacy costs and implications for employers.</p> | <p>Integrated medical/pharmacy claims with HPQ self-reported productivity and health data across four large employers; modeled lost productivity alongside business measures.</p> | <p>Health-related productivity costs were >4x medical/pharmacy costs. Conditions driving productivity loss differed from those driving medical costs. Findings support integrated population health & productivity management as a core business strategy.</p> | <p>Four employers (limited generalizability); self-reported productivity; potential industry funding COI; cross-sectional cost estimates.</p> |

| CITATION | AIM/PURPOSE | METHODS | FINDINGS | LIMITATIONS |
|--|---|---|---|---|
| <p>Goetzel RZ, Fabius R, Fabius D, Roemer EC, Thornton N, Kelly RK, Pelletier KR. The stock performance of C. Everett Koop Award winners compared with the S&P 500. <i>J Occup Environ Med.</i> 2016;58(1):9-15.</p> | <p>To assess whether companies investing in employee health/wellness (Koop Award winners) achieve better stock performance than the market.</p> | <p>Retrospective simulation of a portfolio of 26 Koop Award winners (2000–2014) vs S&P 500.</p> | <p>Koop firms' stocks appreciated ~325% vs 105% for S&P 500; \$10k grew to ~\$42.5k vs \$20.5k. Outperformed in 11/14 years – suggesting higher market valuation for exemplary health promotion programs.</p> | <p>Correlation ≠ causation; selection/survivorship bias; small sample; simulation based on past winners.</p> |
| <p>Fabius R, Thayer RD, Konicki DL, Yarborough CM, Peterson KW, Isaac F, Loeppke RR, Eisenberg BS, Dreger M. The link between workforce health and safety and the health of the bottom line: tracking market performance of companies that nurture a culture of health. <i>J Occup Environ Med.</i> 2013;55(9):993-1000.</p> | <p>To test whether companies recognized for excellence in workforce health/safety (CHAA winners) outperform the market financially.</p> | <p>Simulated stock portfolios of Corporate Health Achievement Award (CHAA) winners tracked under four scenarios (1997–2012) vs S&P 500.</p> | <p>CHAA portfolios outperformed the S&P 500 across scenarios (e.g., 1999–2012: +78.7% vs -0.8%; another scenario +140.6% vs +53.9%), implying a competitive advantage from a culture of health.</p> | <p>Limited number of publicly traded awardees; some exclusions (private/acquired firms); simulation; correlation ≠ causation.</p> |
| <p>Fabius R, Thayer RD, Konicki DL, Yarborough CM, Peterson KW, Isaac F, Loeppke RR, Eisenberg BS, Dreger M. The link between workforce health and safety and the health of the bottom line: tracking market performance of companies that nurture a culture of health. <i>J Occup Environ Med.</i> 2013;55(9):993-1000.</p> | <p>To test whether a real-world fund composed of companies with strong culture of health/safety/well-being outperforms the market.</p> | <p>Actual investment fund (HAAF) tracked 2009–2018; compared cumulative total return to S&P 500 TR.</p> | <p>The fund outperformed by ~2%/year; ~264% cumulative ROE vs ~243% for S&P 500 over 10 years – suggesting investor advantage when selecting firms with strong workforce health/safety focus.</p> | <p>Proprietary selection/scoring; association not causal; portfolio composition U.S. large-cap heavy; dividend timing differences vs benchmark.</p> |

| CITATION | AIM/PURPOSE | METHODS | FINDINGS | LIMITATIONS |
|--|---|---|--|---|
| <p>Goetzel RZ, Fabius R, Roemer EC, Thornton N, Kelly RK, Pelletier KR. The stock performance of American companies investing in a culture of health. <i>Am J Health Promot.</i> 2019;33(3):439-447.</p> | <p>To link internal and external culture-of-health (COH-INT/COH-EXT) measures to stock performance.</p> | <p>17 publicly traded firms; COH-INT/EXT surveys in 2013/2015; portfolios rebalanced annually; compared to S&P 500 (Jan. 2013-Aug. 2017).</p> | <p>High COH-INT firms appreciated ~115% vs ~69% for S&P 500; low COH-INT ~+43%. High COH-EXT firms underperformed (~+44%) vs S&P, suggesting internal culture matters more for valuation.</p> | <p>Small sample; short horizon; dichotomized scores; possible survivorship/selection bias; observational (no causal claims).</p> |
| <p>Payne BC, Bredthauer JS. Revisiting the performance of firms recognized for creating a healthy culture. <i>J Occup Environ Med.</i> 2022;64(2):e41-e49.</p> | <p>To reassess award-winner outperformance using risk-adjusted asset-pricing models.</p> | <p>Constructed CHAA/Koop award portfolios; compared to investable benchmarks; applied Fama-French/Carhart factor models; equal- vs value-weighted; dividends included.</p> | <p>After controlling for standard risk factors, award-winning firms did not universally outperform; some excess returns appear to reflect higher portfolio risk/volatility rather than health programs per se — tempering prior “alpha” claims.</p> | <p>Index-construction choices matter; higher risk exposure; results sensitive to risk adjustment and horizon; correlation ≠ causation.</p> |
| THEME 3: ECONOMIC IMPACT OF PUBLIC HEALTH POLICY | | | | |
| <p>Cornelsen L, McGowan Y, Currie-Murphy LM, Normand C. Systematic review and meta-analysis of the economic impact of smoking bans in restaurants and bars. <i>Addiction.</i> 2014;109(5):720-727.</p> | <p>To systematically review and meta-analyze the economic impact of smoking bans in bars and restaurants.</p> | <p>Systematic review of 56 studies (1990s-2012) using regression methods with sales/employment outcomes; 39 studies (129 cases) included in random-effects meta-analysis, stratified by business type, outcome and ban scope.</p> | <p>Smoking bans showed no substantial negative economic impact. Absolute bar sales decreased ~6%, restaurant sales unaffected, and wider hospitality sales rose ~3%. Restaurant employment slightly increased (+0.9%), with no effect on bar employment. At aggregate level, bans were associated with a small but significant increase in hospitality sector share of total retail sales (+0.23 percentage points).</p> | <p>High heterogeneity across studies; majority from the U.S., limiting global generalizability. Some reliance on unpublished studies with unclear funding. Only one industry-linked study, but eight studies lacked funding disclosure. Potential bias from case selection process. Long-term impacts mixed, with most studies showing no effect.</p> |

| CITATION | AIM/PURPOSE | METHODS | FINDINGS | LIMITATIONS |
|--|--|---|---|--|
| <p>Carter HE, Schofield DJ, Shrestha R, Veerman L. The productivity gains associated with a junk food tax and their impact on cost-effectiveness. PLOS One. 2019;14(7):e0220209. doi:10.1371/journal.pone.0220209</p> | <p>To estimate productivity impacts of a 10% tax on unhealthy foods in Australia and assess implications for cost-effectiveness.</p> | <p>Microsimulation combining an obesity-disease model with LifeLossMOD (pre-mature mortality productivity model). Modelled deaths averted and productivity gains from 2003–2030; outcomes: working years gained and present value of lifetime income (PVL).</p> | <p>A junk food tax could avert ~2,053 premature deaths, yielding 8,656 full-time equivalent working years and \$307 million in PVL gains. Productivity benefits were nearly twice the value of health care savings. Largest gains from averting male deaths ages 40–59 (esp. ischemic heart disease). Inclusion of productivity improved cost-effectiveness beyond health care savings alone.</p> | <p>Excluded productivity gains from morbidity and unpaid labor; relied on assumptions about consumption patterns and wage growth; productivity estimates limited to mortality effects (may underestimate total gains). Pfizer Australia partially funded modelling, raising potential COI.</p> |
| <p>Lee Y, Mozaffarian D, Wilde PE, Gaziano TA, Michal R, et al. Cost-effectiveness of financial incentives for improving diet and health through Medicare and Medicaid: a microsimulation study. PLOS Med. 2019;16(3):e1002761. doi:10.1371/journal.pmed.1002761</p> | <p>Estimate health and economic impacts of “healthy food prescriptions” in Medicare/Medicaid.</p> | <p>CVD-PREDICT microsimulation using national data; compared 30% fruit/veg subsidy vs 30% broader healthy-food subsidy to status quo; outcomes: CVD/diabetes, QALYs, costs (health care + lost productivity), ICERs.</p> | <p>Lifetime: F&V incentive prevents 1.93M CVD events, 0.35M deaths, saves \$40B health care; broader incentive prevents 3.28M CVD, 0.62M deaths, 0.12M diabetes, saves \$100B; highly cost-effective from health care and societal perspectives.</p> | <p>Simulation (not trial); assumes sustained diet response and disease risk relations; program design/admin costs and spillovers may vary; U.S. context.</p> |
| <p>Mozaffarian D, Lee Y, Wilde P, Gaziano T, Michal R, et al. Cost-effectiveness of financial incentives and disincentives for improving food purchases and health through SNAP: a microsimulation study. PLOS Med. 2018;15(10):e1002661. doi:10.1371/journal.pmed.1002661</p> | <p>Compare SNAP policy options (incentives, SSB restrictions, combined) on health and costs.</p> | <p>CVD-PREDICT microsimulation for adult SNAP participants; modeled 30% F&V incentive, F&V+SSB restriction, and combined incentive/disincentive (SNAP-plus); health care and program costs; QALYs.</p> | <p>Lifetime: F&V incentive prevents ~304k CVD events, saves \$6.77B health care; adding SSB restriction prevents ~798k events, saves \$3916B; SNAP-plus prevents ~940k events, saves \$41.93B; all scenarios cost-saving societally; SNAP-plus yields largest health and net cost savings.</p> | <p>Simulation; relies on price-elasticities and diet-disease estimates; government affordability depends on subsidy outlays; excludes some non-medical benefits/costs.</p> |

PUBLIC FINANCE AND SOCIETAL BENEFITS

Thirteen studies were included in the public finance and societal benefits domain after excluding those focused on low- or middle-income countries, commentaries and dissertations. Three thematic areas emerged: (1) economic impacts of nutrition programs and policies, (2) economic impacts of cardiometabolic disease, and (3) economic impacts of fetal alcohol spectrum disorder (FASD). Together, these studies quantify how health outcomes, programs and policies affect health care costs, tax burden and total societal costs.

Economic Impacts of Nutrition Programs and Policies

Several studies examined the fiscal benefits of improved dietary quality and nutrition policies. In Australia, Abdullah et al. estimated that meeting the national whole-grain intake target could generate between AUD 37 million and 750 million in annual health care savings from reduced diabetes and cardiovascular disease, growing to nearly AUD 5 billion over 20 years.⁵² Similarly, Baldwin et al. found that greater fruit and vegetable variety among women was associated with fewer health care claims and lower 15-year costs, highlighting the long-term fiscal benefits of dietary diversity. However, this was only found for women within healthy weight ranges.⁵³

U.S. studies using simulations also demonstrate strong returns from nutrition assistance reforms. Choi et al. reported that subsidizing fruit and vegetable purchases for Supplemental Nutrition Assistance Program (SNAP) participants would be cost-saving from a societal perspective – yielding net lifetime savings of \$824 per capita and an incremental cost-effectiveness ratio of \$3,432 per quality-adjusted life years (QALY) gained, with the largest benefits among African American participants.⁵⁴ Li et al. found that combined diet and physical activity promotion programs to prevent type 2 diabetes had a median cost-effectiveness ratio of \$13,761 per QALY, indicating strong value relative to accepted thresholds.⁵⁵

However, not all interventions demonstrated net gains. Magnus et al. reported that a 20 percent discount on fruits, vegetables and water in remote Australian communities resulted in modest health losses and increased costs when modeled in disability-adjusted life years, underscoring the complexity of pricing interventions in small markets.⁵⁶ Taken together, these studies suggest that dietary quality and targeted subsidies can yield significant health and fiscal dividends, while implementation context and complementary measures (e.g., education, access) shape cost-effectiveness.

Economic Impacts of Cardiometabolic Disease and Reduction

Another group of studies assessed the fiscal implications of cardiometabolic diseases (obesity, diabetes, and cardiovascular disease) and the potential returns from reducing their prevalence. Goldman et al. projected that rolling obesity rates back to 1978 levels in the United States would generate \$467 billion in net fiscal savings by 2050, combining higher tax revenues with lower Medicare and Medicaid expenditures.⁵⁷ Similarly, Kotsopoulos and Connolly estimated that obesity imposed a \$22.97 billion annual fiscal burden in Canada, including \$9.4 billion in lost tax revenue and \$7.9 billion in health care costs. A 1-percent reduction in obesity prevalence would yield \$229 million in annual fiscal gains.⁵⁸

At the programmatic level, Khan et al. found that adults with prediabetes who progressed to diabetes had annual medical expenditures \$2,671 higher (~30%) than those who did not. Modeling indicated that employer coverage of a National Diabetes Prevention Program could produce a three-year return on investment of 19-42 percent, depending on participation and completion rates.⁵⁹

Recent analyses using Medical Expenditure Panel Survey data also highlight the fiscal importance of cardiovascular health management. Enyeji et al. found that improving non-dietary cardiovascular health scores among adults with acute coronary syndrome could

save \$4,160 per unit improvement,⁶⁰ while Enyeji et al. reported \$10,100 in savings per unit improvement among stroke patients.⁶¹ Collectively, these findings underscore that cardiometabolic risk reduction produces measurable public and private savings through avoided treatment costs, preserved labor productivity and increased fiscal capacity.

Economic Impacts of Fetal Alcohol Spectrum Disorder

Three studies quantified the fiscal and societal burden of FASD, illustrating the far-reaching costs of preventable developmental conditions. Popova et al. estimated the total economic burden of FASD in Canada at \$1.8 billion annually, driven primarily by productivity losses (41 percent of total costs), followed by correctional system expenses (29 percent) and health care (10 percent).⁶² Additional analyses by Popova et al. found that correctional costs alone exceeded \$350 million per year, with disproportionate impacts among adults.⁶³

Greenmyer et al. reported that evidence-based prevention programs targeting women who have previously given birth to a child with FASD could save society \$1,235,000 per case prevented; a 62-fold cost reduction. And evidence-based prevention programs directed toward women of low socio-economic status who are heavy drinkers and smokers could save society \$939,200 per case prevented.⁶⁴

This suggests that investments in selective prevention yield substantial social returns. These studies collectively show that FASD imposes heavy, recurring costs across health, social service and criminal justice systems – costs that can be substantially mitigated through targeted prevention and early intervention.

KEY POINTS

- **Nutrition programs and dietary improvement yield fiscal dividends.** Increased whole-grain or fruit and vegetable consumption and targeted food subsidies can reduce chronic disease and generate long-term savings in health care and other societal benefits.
- **Cardiometabolic disease prevention offers strong public returns.** Obesity reduction and diabetes prevention programs lower expenditures, increase tax revenues and provide measurable returns on investment.
- **FASD prevention is highly cost-saving.** Reductions in FASD cases can avert more than \$1,000,000 in societal costs per case prevented.
- **Across domains, prevention strengthens public finances.** Investments in nutrition, chronic disease prevention and child health yield broad societal benefits by reducing expenditures, increasing productivity and sustaining government revenue.

Figure 5. EVIDENCE TABLE – PUBLIC FINANCE AND SOCIETAL BENEFITS

| CITATION | AIM/PURPOSE | METHODS | FINDINGS | LIMITATIONS |
|--|--|---|--|--|
| THEME 1: ECONOMIC IMPACTS OF NUTRITION PROGRAMS AND POLICIES | | | | |
| Abdullah MMH, Hughes J, Grafanauer S. Healthcare cost savings associated with increased whole grain consumption among Australian adults. <i>Nutrients</i> . 2021;13:1855. doi:10.3390/nu13061855 | To assess the potential savings in costs of health care and lost productivity associated with a reduction in the incidence of Type 2 Diabetes Mellitus (T2DM) and cardiovascular disease (CVD) through meeting the 48-gram Daily Target Intake for whole grains among the Australian adult population. | A three-step cost-of-illness analysis using simulation was conducted from estimates of proportions of consumers (5%, 15%, 50%, and 100%) who would increase their current intake of whole grains. | Cost savings ranged from 37.5 (5% adoption) to 750.7 million AUD (100% adoption) for T2DM. Cost savings ranged from 35.9 (5% adoption) to 717.4 million AUD (100% adoption) for CVD. In 20 years, these savings could grow to ≈ AUD 2.5 billion for T2DM and AUD 2.4 billion for CVD. Even small increases in whole grain intake could produce large cost savings, especially when replacing refined grains. | There may be limitations to considering single dietary components and that 100% adoption may not be possible due to factors such as gluten among those suffering with coeliac disease or other related conditions. |
| Baldwin JN, Ashton LM, Forder PM, Haslam RL, Hure AJ, Loxton DJ, Patterson AJ, Collins CE. Increasing fruit and vegetable variety over time is associated with lower 15-year healthcare costs: results from the Australian Longitudinal Study on Women's Health. <i>Nutrients</i> . 2021;13:2829. doi:10.3390/nu13082829 | To investigate the association between baseline fruit and vegetable varieties and changes in fruit and vegetable care costs in Australian Longitudinal Study on Women's Health. | Baseline fruit and vegetable variety and change were analyzed as predictors of Medicare claims/costs using multiple regression analysis. | For every 10-point increase in fruit and vegetable variety over time, women made 4.3 fewer claims and incurred \$309.1 less in charges over 15 years overall. However, these associations were only found in women of a healthy weight. | Only women with both diet and health care data were included. They may have been healthier overall. Self-reported food data may be inaccurate. Not all health care services were included, so total costs may be underestimated. |

| CITATION | AIM/PURPOSE | METHODS | FINDINGS | LIMITATIONS |
|--|--|--|---|--|
| <p>Choi SE, Seligman H, Basu S. Cost effectiveness of subsidizing fruit and vegetable purchases through the Supplemental Nutrition Assistance Program. <i>Am J Prev Med.</i> 2017;52(5):e147-e155. doi:10.1016/j.amepre.2016.12.013</p> | <p>To identify the cost effectiveness of subsidizing fruit and vegetable purchases among the Americans that participate in the Supplemental Nutrition Assistance Program (SNAP).</p> | <p>Cost-effectiveness analysis using simulations to estimate lifetime costs and health gains associated with subsidizing fruit and vegetable purchases. Simulation of obesity, type 2 diabetes, myocardial infarction and stroke in the 2015 U.S. population was used.</p> | <p>From a societal perspective, the intervention was cost saving at a net savings of \$824 per capita, and had an incremental cost effectiveness ratio of \$3,432 per quality-adjusted life year gained. Benefits were seen most among African Americans supporting this intervention as a path to improve health equity.</p> | <p>Effects likely conservative. NHANES data may lead to underestimated SNAP participation and conservative impact estimates. All assumptions cannot be captured in the simulation.</p> |
| <p>Li R, Qu S, Zhang P, Chattopadhyay S, Gregg EW, Albright A, Hopkins D, Pronk NP. Economic evaluation of combined diet and physical activity promotion programs to prevent type 2 diabetes among persons at increased risk: a systematic review for the Community Preventive Services Task Force. <i>Ann Intern Med.</i> 2015;163(6):452-460. doi:10.7326/M15-0469</p> | <p>To systematically evaluate the evidence on cost, cost-effectiveness, and cost-benefit estimates of diet and physical activity promotion programs.</p> | <p>A systematic review of 28 studies was conducted.</p> | <p>The median incremental cost effectiveness ratio for diet and physical activity promotion programs was \$13,761 per quality-adjusted life year saved.</p> | <p>Few studies estimated the cost associated with recruiting and engaging eligible persons, which may generate additional costs. Only two of the studies provided rigorous cost analysis. Only two studies evaluated the cost-effectiveness of programs implemented in primary care and community settings. Only eight studies reported societal perspectives.</p> |

| CITATION | AIM/PURPOSE | METHODS | FINDINGS | LIMITATIONS |
|---|--|---|--|---|
| <p>Magnus A, Cobiac L, Brimblecombe J, Chatfield M, Gunther A, Ferguson M, et al. The cost-effectiveness of a 20% price discount on fruit, vegetables, diet drinks and water, trialed in remote Australia to improve Indigenous health. PLOS One. 2018;13(9):e0204005. doi:10.1371/journal.pone.0204005</p> | <p>Estimates the cost-effectiveness of a 20% price discount on healthy food and beverages with and without consumer nutrition education in Australia. This was a simulation study.</p> | <p>Changes in store sales from the pre-discount baseline were analyzed for population impact on consumption of fruit and vegetables, water and artificially sweetened soft drinks. Disability adjusted life years arising from changes in dietary risk were estimated in a Markov model.</p> | <p>The discount strategy, with or without consumer education, resulted in a net loss of population health — -36 DALYs and -21 DALYs, respectively — alongside increased costs to the retail and health sectors of AUD 860,000 and AUD 500,000.</p> | <p>The analysis did not account for other dietary factors, limiting estimates of total health impact. Child and adult responses could not be separated, and BMI changes were modeled rather than measured.</p> |
| THEME 2: ECONOMIC IMPACTS OF CARDIOMETABOLIC DISEASE AND REDUCTION | | | | |
| <p>Goldman D, Michaud PC, Lakdawalla D, Zheng Y, Gailey A, Vaynman I. The fiscal consequences of trends in population health. Natl Tax J. 2010;63(2):307-330. doi:10.2307/41791016</p> | <p>To quantify how shifting trends in population health — particularly obesity, smoking and mortality improvements — affect U.S. public finances over the next 50 years. The authors sought to assess the competing fiscal impacts of changes in morbidity, mortality, labor supply, medical costs and entitlement program spending.</p> | <p>A dynamic microsimulation model (the Future Elderly Model) was used to project health, longevity and economic outcomes for Americans aged 50+. Data sources included the Health and Retirement Study (HRS) and National Health Interview Survey (NHIS). The model simulated transitions in disease, disability, labor participation and mortality across scenarios including the status quo, obesity rollback, smoking maintained and mortality improvement.</p> | <p>Rolling back obesity to 1978 levels would yield an estimated \$467 billion net fiscal savings to the U.S. government (2004–2050), combining \$70.5 billion in additional tax revenues with reduced Medicare and Medicaid expenditures.</p> | <p>This study was limited in how it presented the scenarios for smoking and life expectancy. The obesity scenario depicted reductions in obesity. The smoking scenario depicted stable rates, and the mortality scenario did not consider health improvements in earlier age. As such, only data for the obesity scenario is depicted here.</p> |

| CITATION | AIM/PURPOSE | METHODS | FINDINGS | LIMITATIONS |
|---|---|--|---|--|
| <p>Khan T, Tsipias S, Wozniak G. Medical care expenditures for individuals with prediabetes: the potential cost savings in reducing the risk of developing diabetes. <i>Popul Health Manag.</i> 2017;20(5):389-396. doi:10.1089/pop.2016.0134</p> | <p>To estimate differences in medical expenditures between adults with prediabetes who later develop diabetes and those who do not, and to project potential cost savings and return on investment (ROI) from participation in the CDC-recognized National Diabetes Prevention Program (DPP).</p> | <p>The study used a retrospective cohort design with commercial insurance claims data to compare medical expenditures between adults with prediabetes who developed diabetes and those who did not over a three-year period. Statistical analyses assessed spending differences, and a modeling algorithm estimated potential cost savings and return on investment from participation in a diabetes prevention program.</p> | <p>Over three years, 29% of adults with prediabetes developed diabetes. Annual medical expenditures were ≈\$2,671 higher (~30% more) among those who developed diabetes compared to those who did not. Modeling showed that employer coverage of a National DPP could yield a 3-year ROI ranging from 19% to 42%, depending on enrollment and completion rates.</p> | <p>Rates of diabetes onset may differ in other populations, and administrative claims data lack detail on reasons for HbA1c screening. The study could not stratify by all patient characteristics due to sample size. Program milestones (e.g., completion rates, costs) were based on literature rather than observed data, and results may not generalize beyond commercially insured adults.</p> |
| <p>Enyeji AM, Barengo NC, Ibrahimou B, Ramirez G, Arrieta A. Association between non-dietary cardiovascular health and expenditures related to acute coronary syndrome in the U.S. between 2008-2018. <i>Int J Environ Res Public Health.</i> 2023;20(9):5743. doi:10.3390/ijerph20095743</p> | <p>To quantify the potential significance of ideal CVH scores as a tool in secondary cardiovascular disease prevention.</p> | <p>Ten years of Medical Expenditure Panel Survey data from 2008 to 2018 were pooled, comparing ACS to non-ACS subgroups.</p> | <p>The financial impact of an ACS event was approximately \$88,500. A unit improvement in CVH management score would generate savings of approximately \$4,160 in total health expenditures.</p> | <p>The study may underestimate ACS prevalence due to coding limitations and self-reported cardiovascular health data. Excluding over-the-counter medication costs and unmeasured factors like insurance type, provider rates and patient behavior may also bias expenditure estimates.</p> |

| CITATION | AIM/PURPOSE | METHODS | FINDINGS | LIMITATIONS |
|--|---|--|--|--|
| <p>Enyeji AM, Obi C, Stegall A, Davis J, Surani R, Forbes J, Wetzell DL. Relation between non-dietary cardiovascular health and costs associated with stroke in the U.S. J Health Popul Nutr. 2025;44(1):224. doi:10.1186/s41043-025-00984-2</p> | <p>To evaluate the effectiveness of cardiovascular health as a potential tool for secondary prevention by reducing overall health care expenditures associated with stroke.</p> | <p>A cross-sectional study using data from the Medical Expenditure Panel Survey from 2011 to 2022 was conducted. Annual costs were assessed using linear regression. Sociodemographic factors, comorbidity and other covariates were controlled for.</p> | <p>Stroke patients faced average annual health care expenditures of approximately \$76,000. A one-unit improvement in cardiovascular health scores was linked to an estimated reduction of \$10,100 in health care costs.</p> | <p>The study may underestimate ACS prevalence due to coding limitations and self-reported cardiovascular health data. Excluding over-the-counter medication costs and unmeasured factors such as insurance type, provider rates and patient behaviors may also bias estimates of health care expenditures.</p> |
| <p>Kotsopoulos N, Connolly MP. Assessing the fiscal burden of obesity in Canada by applying a public economic framework. Adv Ther. 2024;41(1):379-390. doi:10.1007/s12325-023-02718-4</p> | <p>To estimate the broader consequences of obesity in Canada by applying a government perspective framework that captures lost tax revenues and increased government spending on social benefit programs.</p> | <p>Age-specific prevalence model to quantify the fiscal burden of disease for government from obesity.</p> | <p>The fiscal burden of obesity in Canada was estimated at \$22.97 billion in 2021, including \$9.4 billion in lost tax revenue from reduced consumption, \$7.9 billion in health care costs, and \$3.7 billion in disability costs annually. The fiscal burden among taxpayers was estimated at \$752 per capita. For every 1% reduction in obesity prevalence, an estimated \$229.7 million in net fiscal gains could be achieved.</p> | <p>The study may overestimate fiscal impacts due to assuming a linear relationship between obesity prevalence and costs and combining data from multiple sources. It only includes direct health care costs, assumes formerly obese individuals return to average health levels, and excludes personal costs to individuals.</p> |

| CITATION | AIM/PURPOSE | METHODS | FINDINGS | LIMITATIONS |
|---|---|--|--|---|
| THEME 3: ECONOMIC IMPACTS OF FETAL ALCOHOL SPECTRUM DISORDER | | | | |
| <p>Greenmyer JR, Popova S, Klug MG, Burd L. Fetal alcohol spectrum disorder: a systematic review of the cost of and savings from prevention in the United States and Canada. <i>Addiction</i>. 2020;115(3):409-417. doi:10.1111/add.14841</p> | <p>To review the literature on the costs and savings from prevention of fetal alcohol spectrum disorder (FASD) and present a model for projected savings based on expansion of existing evidence-based prevention models.</p> | <p>A systematic review was conducted on the cost of FASD prevention and experts were interviewed.</p> | <p>FASD costs the U.S. \$1.29 billion to \$10.1 billion and Canada \$1.9 billion to \$10.5 billion. Interventions focused on women who have previously given birth to a child with FASD would cost \$20,200 per case prevented but save society \$1,235,000; a 62-fold cost reduction. Interventions that treated women of low socioeconomic status who are heavy drinkers and smokers would cost \$316,800 per case prevented but save \$939,200 per case prevented, a 3-fold cost reduction.</p> | <p>There is a risk of bias in the reviewed studies and there are difficulties predicting the cost of care and cost of prevention for individuals with FASD. Estimates in this study are likely underestimated.</p> |
| <p>Popova S, Lange S, Burd L, Rehm J. Cost attributable to fetal alcohol spectrum disorder in the Canadian correctional system. <i>Int J Law Psychiatry</i>. 2015;41:76-81. doi:10.1016/j.ijlp.2015.03.010</p> | <p>To estimate the direct cost for youths (12-17 years old) and adults (18+ years old) with FASD to the Canadian correctional system in 2011/2012.</p> | <p>The prevalence of FASD in the Canadian correctional system, obtained from the current epidemiological literature, was applied to the average number of youths and adults in the correctional system in 2011/ 2012. The average daily cost for corrections was then applied to the estimated number of youths and adults with FASD in custody.</p> | <p>The cost of corrections among youths with FASD was approximately \$1.1 million and with FASD was approximately \$17.5 million in 2011/12 in Canada. The cost of corrections among adults with FASD was estimated to be \$21.8 million and with FASD was \$356.2 million in 2011/12 in Canada.</p> | <p>The study relied on modeled estimates due to a lack of FASD-specific correctional data in Canada. It assumed a one-year custody period and used general inmate sex distributions, which may not reflect true patterns. Findings should be interpreted cautiously until better data become available.</p> |

| CITATION | AIM/PURPOSE | METHODS | FINDINGS | LIMITATIONS |
|--|---|--|---|---|
| <p>Popova S, Lange S, Burd L, Rehm J. The economic burden of fetal alcohol spectrum disorder in Canada in 2013. Alcohol. 2016;51(3):367-375. doi:10.1093/alcalc/agg117</p> | <p>To estimate the economic burden and cost attributable to Fetal Alcohol Spectrum Disorder (FASD) in Canada in 2013.</p> | <p>Analyzed direct costs of resources expended on health care, law enforcement, children and youth in care, special education, supportive housing, long-term care, prevention and research as well as the indirect costs of productivity losses of individuals with FASD due to their increased morbidity and premature mortality.</p> | <p>The costs of FASD totaled approximately \$1.8 billion. The largest contributor was productivity losses, accounting for 41% of total costs, followed by correctional costs at 29% and health care costs at 10%.</p> | <p>The study's main limitations include the unknown true prevalence of FASD in Canada and reliance on rough population estimates. Key cost components — such as courts, policing, caregiver productivity losses and respite care — were excluded due to limited data, making the total cost a likely underestimation based on conservative assumptions.</p> |

INDIVIDUAL AND HOUSEHOLD ECONOMIC IMPACTS

Eleven studies were included in the individual and household economic impacts domain after excluding those focused on low- or middle-income countries, commentaries and dissertations. Three thematic areas emerged: (1) environmental conditions and economic mobility, (2) health, health services and employment outcomes, and (3) health shocks and financial hardship. Together, these studies describe how health status and conditions across the life course shape individual economic opportunity, employment stability and household financial security.

Environmental Conditions and Economic Mobility

Environmental and neighborhood conditions early in life influence the capacity for upward economic mobility. O'Brien et al. linked U.S. county-level air pollution data to intergenerational income records and found that higher concentrations of total suspended particulates during birth years were associated with lower adult income ranks among children from low-income families.⁶⁵ Lee et al. reached similar conclusions using tract-level measures of PM_{2.5} exposure in infancy, showing that each 1 µg/m³ increase in fine-particulate pollution was associated with a 1.1 percent reduction in absolute upward mobility more than three decades later, with the strongest effects observed in the South and Midwest.⁶⁶

Neighborhood stressors can compound these environmental disadvantages. Manduca and Sampson found that "punishing and toxic" neighborhoods — characterized by high levels of incarceration, violence and environmental hazards — independently predicted lower intergenerational income mobility for both Black and White children in Chicago, with larger effects among Black youth.⁶⁷ Together, these studies indicate that early exposure to environmental hazards and punitive neighborhood conditions can restrict economic advancement and reinforce racial and spatial inequities in opportunity.

Health, Health Services and Employment Outcomes

Several studies examined how health status and access to care affect employment and income trajectories. Smith found that poor childhood health predicted lower educational attainment, earnings and labor supply in adulthood, even after accounting for parental socioeconomic status.⁶⁸ Baumann et al. observed that part-time work late in life was more common among healthy older adults in Europe but also among those in poor health in the United States, suggesting that national labor policies and welfare systems shape the degree to which poor health forces reductions in work.⁶⁹

Health services also can improve employment outcomes. Singhal et al. reported that dental treatment among social-assistance recipients in Ontario increased the likelihood of leaving welfare for employment by 124 percent compared with those not receiving care.⁷⁰ These findings underscore that good health and access to essential health services are prerequisites for stable employment and economic independence, particularly for individuals with limited financial resources.

Health Shocks and Financial Hardship

A third group of studies explored how sudden or serious illness affects labor participation and household finances. Jones et al. found that acute health shocks — such as cancer, stroke or myocardial infarction — substantially reduced labor-market participation, working hours and earnings, with effects that persisted for several years and were most pronounced among older workers and women.⁷¹

Financial consequences were especially severe for individuals with cancer. Banegas et al. reported that one-third of working-age survivors went into debt and more than half accrued over \$10,000 in medical debt,⁷² while Ramsey et al. found that cancer patients were 2.6 times more likely to file for bankruptcy than peers without cancer, with younger adults facing up to tenfold

higher risk.⁷³ Yabroff et al. estimated that one in four cancer survivors experienced material financial hardship and one in three reported psychological distress about medical bills.⁷⁴

Among low-income women, Blinder et al. found that 27 percent of breast-cancer survivors never returned to work within five years after diagnosis, with the lowest-income and Latina participants most affected.⁷⁵ Together, these studies demonstrate that health shocks can destabilize household finances through prolonged income loss, debt and bankruptcy, particularly among vulnerable populations.

KEY POINTS

- **Environmental conditions shape lifetime opportunity.** Early-life exposure to air pollution and toxic or punitive neighborhood environments reduces economic mobility, particularly for children from low-income and racially marginalized communities.
- **Health and access to care influence employment.** Poor childhood health limits adult earnings, while access to preventive and restorative services — such as dental care — enhances pathways from public assistance to work.
- **Serious illness drives long-term financial strain.** Health shocks, such as cancer, stroke or myocardial infarction, reduce employment and income and increase risks of debt and bankruptcy.
- **Household resilience depends on health security.** Policies that improve environmental quality, strengthen preventive care access, and protect income during illness can promote both individual opportunity and family economic stability.

Figure 6. EVIDENCE TABLE – EVIDENCE TABLE – INDIVIDUAL AND HOUSEHOLD ECONOMIC IMPACTS

| CITATION | AIM/PURPOSE | METHODS | FINDINGS | LIMITATIONS |
|--|---|--|--|---|
| THEME 1: ENVIRONMENTAL CONDITIONS AND ECONOMIC MOBILITY | | | | |
| O'Brien RL, Neman T, Rudolph K, Casey J, Venkataramani A. Prenatal exposure to air pollution and intergenerational economic mobility: evidence from U.S. county birth cohorts. <i>Soc Sci Med.</i> 2018;217:92-96. doi:10.1016/j.socscimed.2018.09.056 | To estimate the impact of exposure to air pollution in the birth year on the average intergenerational mobility outcomes of children from low-income families as measured in adulthood. | Link measures of intergenerational economic mobility for U.S county cohorts born between 1980 to 1986 to the county average concentration of total suspended particulates in the birth year. Multivariate linear regression was used to adjust for birth-cohort fixed effects, county-fixed effects, and time varying county-level covariates. | Higher levels of total suspended particulates are associated with less upward economic mobility for children from low-income families. A one standard deviation increase is associated with a 0.14-point reduction in average income percentile ranking in adulthood. No association was found for children from high-income families. | The study relied on county-level data, which limited exploration of mechanisms and within-county variation. Air quality data from the early 1980s may have measurement error, and total suspended particulate (TSP) levels could capture effects of other correlated pollutants. As a result, causal interpretation is limited, and findings may reflect broader air quality conditions rather than the specific effects of particulate matter. |
| Lee SAK, Merlo L, Dominici F. Childhood PM2.5 exposure and upward mobility in the United States. <i>Proc Natl Acad Sci U S A.</i> 2024;121(38):e2401882121. doi:10.1073/pnas.2401882121 | The goals of this study are to estimate the overall and county-level associations of childhood exposure to PM2.5 in 1982 with absolute upward mobility (AUM) in 2015 adjusting for several potential confounders, to investigate spatial heterogeneity in the response to air pollution, and to identify its potential sources. | Data from census tracts were used to assess PM2.5 concentrations in infancy (1982) and linking these to AUM in 2015. Multiple causal-inference methods were used to adjust for socio-demographic, meteorological, and tract-level confounders. | Census tracts with 1 µg/m ³ higher PM2.5 concentration in 1982 are associated with 1.146% lower AUM in 2015. The analyses indicate that counties, especially those in the South, Midwest and Pacific regions experience the most adverse effects on AUM from increasing PM2.5 exposure. | The study's observational design limits causal inference, and modeled pollution data may cause exposure misclassification. Unmeasured local factors and county-level analysis may also obscure finer community differences. |

| CITATION | AIM/PURPOSE | METHODS | FINDINGS | LIMITATIONS |
|--|--|---|--|--|
| <p>Manduca R, Sampson R.J. Punishing and toxic neighborhood environments independently predict the intergenerational social mobility of Black and White children. <i>Proc Natl Acad Sci U S A</i>. 2019;116(16):7772-7777. doi:10.1073/pnas.1820464116</p> | <p>To examine how neighborhood environments characterized by punitive (e.g., criminal justice exposure) and toxic (e.g., environmental hazard) conditions influence intergenerational social mobility for Black and White children in Chicago.</p> | <p>Data from the American Community Survey were linked with the Opportunity Atlas to measure intergenerational income mobility among children from different neighborhoods. Indices of punitive environments and toxic environments were created. Multivariate regression models were used to estimate how these characteristics affected adult income outcomes for Black and White children.</p> | <p>Childhood exposure to "punishing and toxic" neighborhoods, marked by high levels of violence, incarceration and lead exposure predict lower intergenerational income mobility and higher incarceration. Associations were found for both Black and White youth, although the effects were stronger among Black youth. Black neighborhoods exhibit greater exposure to these conditions.</p> | <p>The study is observational, limiting causal inference. Neighborhood measures may miss key contextual factors, and findings may not generalize beyond the studied areas and time period.</p> |
| THEME 2: HEALTH, HEALTH SERVICES AND EMPLOYMENT OUTCOMES | | | | |
| <p>Smith JP. The impact of childhood health on adult labor market outcomes. <i>Rev Econ Stat</i>. 2009;91(3):478-489. doi:10.1162/rest.91.3.478</p> | <p>Examines impacts of childhood health on SES outcomes observed during adulthood — levels and trajectories of education, family income, household wealth, individual earnings and labor supply.</p> | <p>The study used longitudinal data from the Panel Study of Income Dynamics (PSID) to examine how self-reported childhood health predicts adult socioeconomic outcomes (education, wealth, labor supply). Regression models controlled for parental education and family income, with sibling comparisons to adjust for shared family factors.</p> | <p>Childhood health status affects adult SES outcomes, including one's ability to earn in the labor market, total family income, wealth, and work effort.</p> | <p>The study relied on self-reported childhood health, which may involve recall bias and limited detail. Unmeasured individual factors could still confound results despite sibling controls, and findings may not generalize beyond the U.S. PSID sample.</p> |

| CITATION | AIM/PURPOSE | METHODS | FINDINGS | LIMITATIONS |
|--|---|--|---|--|
| <p>Baumann I, Cabib I, Eyjólfsson HS, Agahi N. Part-time work and health in late careers: evidence from a longitudinal and cross-national study. <i>SSM Popul Health</i>. 2022;18:101091. doi:10.1016/j.ssmph.2022.101091</p> | <p>To explore how older workers' part-time employment and health are associated in four countries.</p> | <p>Data from representative panel surveys was used and multichannel sequence analysis was used to identify the most typical interlocked employment and health trajectories for each country with different welfare regime.</p> | <p>Part-time employment among older age groups is used mainly by workers in good health. Although in the U.S. it is also used by workers in poor health.</p> | <p>Examined only one country per welfare regime; limited variation may reduce generalizability. Country categorization and part-time work cut-off (35 h/week) may not fully capture policy or contextual differences. Gender mechanisms and employment quality not analyzed. SHARE and HRS data may differ slightly despite harmonization.</p> |
| <p>Singhal S, Mamdani M, Mitchell A, Tenenbaum H, Lebovic G, Quiñonez C. Dental treatment and employment outcomes among social assistance recipients in Ontario, Canada. <i>Health Policy</i>. 2016;120(10):1202-1208. doi:10.1016/j.healthpol.2016.08.011</p> | <p>To assess the impact of dental treatment on employment outcomes among social assistance recipients in Ontario, Canada.</p> | <p>A retrospective cohort study using administrative data was used. Employment outcomes among treatment and no-treatment cohorts were assessed at three, six and 12 months. Multivariable regression was used.</p> | <p>The change in proportion of individuals leaving social assistance for employment was significantly higher among those receiving treatment (124% increase) than those not receiving treatment (83% increase).</p> | <p>The study lacked baseline oral health data and assumed equal access to dental care across groups. It did not include participants' prior assistance histories and lacked information on psychosocial or behavioral factors that could affect both oral health and employment outcomes.</p> |

| CITATION | AIM/PURPOSE | METHODS | FINDINGS | LIMITATIONS |
|---|--|--|--|--|
| THEME 3: HEALTH SHOCKS AND FINANCIAL HARDSHIP | | | | |
| <p>Jones AM, Rice N, Zantomio F. Acute health shocks and labour market outcomes: evidence from the post-crash era. <i>Econ Hum Biol.</i> 2020;36:100811. doi:10.1016/j.ehb.2019.100811</p> | <p>Provide evidence of the causal effect of exogenous shocks to health to the labor supply, including evidence on labor market and employer attachment, earnings and job security of individuals remaining active in the labor market following a health shock in the U.K.</p> | <p>Longitudinal data from the Understanding Society survey were used to examine how acute health shocks, defined as the onset of cancer, stroke or myocardial infarction, affect labor market outcomes. It used a two-step matching process and weighted parametric regression models to estimate average treatment effects.</p> | <p>Acute health shock reduces labor market participation, working hours and earnings. These effects persisted for several years and were stronger among older workers, women and those with severe functional limitations. Strokes and myocardial infarctions produced larger and more immediate reductions than cancer.</p> | <p>The study's limitations include a small number of health shock cases, possible residual confounding between health and labor outcomes, limited clinical detail on shock severity, and a focus on short- to medium-term rather than long-term effects.</p> |
| <p>Banegas MP, Guy GP Jr, de Moor JS, Ekwueme DU, Virgo KS, Kent EE, Nutt S, Zheng Z, Rechis R, Yabroff KR. For working-age cancer survivors, medical debt and bankruptcy create financial hardships. <i>Health Aff (Millwood).</i> 2016;35(1):54-61. doi:10.1377/hlthaff.2015.0830</p> | <p>Examines the proportion of cancer survivors who reported going into debt or filing for bankruptcy, as well as the amount of debt they incurred.</p> | <p>Data from a 2012 survey of working-age cancer survivors conducted by the Livestrong Foundation, linked to self-reported measures of medical debt and bankruptcy, were used. Logistic regression models controlling for demographic, clinical and insurance factors were used to examine associations between cancer history and the odds of experiencing debt or filing for bankruptcy.</p> | <p>Approximately one-third had gone into debt and 55% had incurred \$10,000 or more in debt. 3% filed for bankruptcy. Cancer survivors who were younger, had lower incomes, or had public health insurance were more likely to go into debt or file for bankruptcy.</p> | <p>The study relied on self-reported survey data, which may be subject to recall and selection bias. Its cross-sectional design limits causal inference, and the sample may not represent all U.S. cancer survivors. Additionally, financial outcomes were not verified through objective records.</p> |

| CITATION | AIM/PURPOSE | METHODS | FINDINGS | LIMITATIONS |
|--|--|--|--|---|
| <p>Ramsey S, Blough D, Kirchhoff A, Kreizenbeck K, Fedorenko C, Snell K, Newcomb P, Hollingworth W, Overstreet K. Washington State cancer patients found to be at greater risk for bankruptcy than people without a cancer diagnosis. <i>Health Aff (Millwood)</i>. 2013;32(6):1143-1152. doi:10.1377/hlthaff.2012.1263</p> | <p>To estimate the incidence and relative risk of bankruptcy for people diagnosed with cancer compared to people the same age without cancer</p> | <p>A retrospective cohort analysis using a variety of medical, personal, legal and bankruptcy sources covering the Western District of Washington State for the period 1995 to 2009 was used.</p> | <p>Cancer patients had a rate of bankruptcy that was 2.65 times higher than people without cancer. Younger cancer patients had up to ten times the rate of bankruptcy than older age groups.</p> | <p>The study lacked detailed person-level financial and insurance information, as neither SEER nor bankruptcy records consistently capture these data. Treatment type was excluded from analyses because it could be influenced by patients' financial circumstances, potentially biasing results. Additionally, the study was limited to western Washington, which may restrict the generalizability of findings to other regions.</p> |
| <p>Yabroff KR, Dowling EC, Guy GP Jr, Banegas MP, Davidoff A, Han X, Virgo KS, McNeel TS, Chawla N, Blanch-Hartigan D, Kent EE, Li C, Rodriguez JL, de Moor JS, Zheng Z, Jemal A, Ekwueme DU. Financial hardship associated with cancer in the United States: findings from a population-based sample of adult cancer survivors. <i>J Clin Oncol</i>. 2016;34(3):259-267. doi:10.1200/JCO.2015.62.0468</p> | <p>To estimate the prevalence of financial hardship associated with cancer in the U.S. and identify characteristics of cancer survivors associated with financial hardships.</p> | <p>Data from the 2011 Medical Expenditure survey were used to identify cancer survivors diagnosed or treated at 18+ years of age. Material financial hardship was measured by ever borrowing money or going into debt, filing for bankruptcy, being able to cover one's share of medical costs, or making other financial sacrifices. Psychological financial hardship was measured as ever worrying about paying large medical bills.</p> | <p>One in four working-age cancer survivors reported ever having any material financial hardship and one in three reporting psychological financial hardship.</p> | <p>The study had a modest response rate and relied on self-reported cancer diagnoses without clinical or treatment details. Most respondents were long-term survivors of common cancers, limiting generalizability. A small sample size also restricted subgroup analyses and may have underestimated financial hardship.</p> |

| CITATION | AIM/PURPOSE | METHODS | FINDINGS | LIMITATIONS |
|--|--|--|---|--|
| <p>Blinder V, Patil S, Eberle C, Griggs J, Maly RC. Early predictors of not returning to work in low-income breast cancer survivors: a 5-year longitudinal study. <i>Breast Cancer Res Treat.</i> 2013;140(2):407-416. doi:10.1007/s10549-013-2625-8</p> | <p>Identification of early risk factors for not returning to work in the long term for low-income breast cancer survivors.</p> | <p>Conducted a prospective four-year longitudinal study of low-income, medically underserved women with a new diagnosis of breast cancer. They were surveyed at 6, 18, 36, and 60 months after diagnosis. Correlates of not returning to work were identified.</p> | <p>Among the 274 participants, 36% returned to work by six months, and an additional 21% by 18 months, 10% by 36 months, and 5% by 60 months; 27% never returned to work. Predictors of never returning to work included the lowest annual income (<\$10,000), Latina ethnicity, high comorbidity burden, and receipt of chemotherapy.</p> | <p>The study lacked data on work interruptions, baseline quality of life, and symptom management, limiting insight into return-to-work patterns. It also lacked information on workplace conditions and employer accommodations that may affect employment outcomes.</p> |

DISCUSSION

This rapid scoping review examined the economic value of health by synthesizing evidence across four major domains: macroeconomics, private-sector firm performance, public finance, and individual or household outcomes. Using a structured search strategy, researchers screened more than 3,000 articles and conducted in-depth reviews of 61 studies that assessed how population health outcomes, determinants, programs and policies influence key economic indicators. The review identified consistent patterns showing that improvements in population health strengthen economic performance at multiple levels – spanning national productivity and fiscal stability to firm performance and household income. The sections that follow interpret these findings in greater depth, highlighting what the evidence suggests for economic growth, workforce and business productivity, public budgets and household prosperity.

HEALTH IMPACTS INDIVIDUALS' AND FAMILIES' FINANCIAL SECURITY

Health has direct impacts on the economic security of individuals and families. Multiple studies in this review showed that major health shocks – such as cancer, heart attacks and stroke – create immediate and lasting financial strain. These shocks lead to high medical bills, debt, bankruptcy and extended absences from work that reduce household income. For example, studies found that more than half of cancer patients incur over \$10,000 in medical debt and are 2.6 times more likely to file for bankruptcy than those without a cancer diagnosis.^{72,73} Among low-income breast cancer survivors, only 36 percent returned to work within six months of diagnosis and more than one-quarter never returned within five years, with the lowest-income women and those receiving chemotherapy least likely to resume employment. These findings illustrate that even short-term health shocks can trigger long-term economic setbacks by disrupting employment trajectories, reducing lifetime earnings and depleting household savings.

The review also identified longer-term pathways through which health shapes economic opportunity. Several studies showed that early-life exposure to pollution was associated with lower income as adults – effects observed up to 30 years later and concentrated among children born into low-income families.⁶⁵⁻⁶⁷ These findings highlight how fundamental social and environmental conditions regulate the risks people face and reinforce inequities across generations. In this way, poor health not only limits present-day income and work participation but also constrains future mobility and wealth accumulation.^{2,12}

While these negative outcomes are pervasive, they are preventable. Evidence-based interventions – from chronic-disease management programs to environmental and early-childhood health initiatives – can mitigate both health and financial hardship. Although the number of intervention studies was limited in this review, independent bodies such as the Community Preventive Services Task Force provide systematic evidence that prevention programs often produce strong returns, improving both population health and economic outcomes. These findings suggest that investments in prevention and equitable health policies represent sound economic strategy.⁷⁶

HEALTH STRENGTHENS FISCAL STABILITY AND SOCIETAL BENEFITS

Health can play a critical role in the fiscal stability of governments and the overall prosperity of society. Across studies in this review, poor health was associated with higher societal costs, lost productivity and lower tax revenues, while improvements in population health, especially those addressing preventable chronic disease and early-life conditions, produced measurable returns for society.

Nutrition and chronic disease prevention programs showed some of the strongest fiscal and social payoffs. Modeling studies found that policies promoting healthier diets, such as fruit and vegetable subsidies for SNAP participants,

were cost-saving from a societal perspective, potentially able to generate hundreds of millions of dollars in lifetime health care savings and productivity gains.⁵⁴ Similarly, meeting Australia's national whole-grain intake target could generate up to AUD \$5 billion in savings over 20 years, primarily through reduced diabetes and cardiovascular disease costs.⁵² Together, these findings demonstrate how targeted nutrition investments can improve population health while relieving long-term pressure on health and social service budgets.

Fiscal analyses of cardiometabolic disease reduction also demonstrated substantial potential returns. A U.S. microsimulation estimated that rolling obesity rates back to 1978 levels would yield \$467 billion in net fiscal savings by 2050. Here, tax revenue would increase from improved productivity and higher income, while Medicare and Medicaid expenditures would lower.⁵⁷ Similarly, employer coverage of the National Diabetes Prevention Program was projected to achieve a 19-42 percent return on investment within three years, reinforcing that prevention can be fiscally advantageous for both public and private payers.⁵⁹

Evidence on fetal alcohol spectrum disorder (FASD) also highlights how early prevention yields outsized returns. In Canada, the total economic burden of FASD was estimated at \$1.8 billion annually, with nearly half attributable to lost productivity and correctional cost.⁶³ Prevention programs targeting high-risk women were projected to save close to \$1 million per case prevented, underscoring the fiscal and social efficiency of selective prevention.⁶⁴

This suggests that investments in prevention and health promotion can strengthen fiscal stability by reducing expenditures and supporting revenues. Data show that numerous programs are cost effective and would produce more societal financial benefits than they would cost. Health promotion is not just a public health strategy but a fiscal strategy that can yield compounding returns across the economy.

HEALTH STRENGTHENS PRODUCTIVITY AND BUSINESS PERFORMANCE

Health also plays a central role in determining private sector performance. Across studies in this review, workforce health was strongly associated with key indicators of firm productivity, including absenteeism, presenteeism, turnover and profitability. Companies with healthier, more engaged employees reported higher job performance, lower replacement costs, and reduced disability claims, while those with higher burdens of chronic disease and mental distress experienced measurable losses in output and efficiency.

Analyses of workplace productivity showed that depression, obesity, arthritis and heart disease accounted for some of the highest employer costs, with productivity losses often exceeding direct medical expenditures.³⁸ In one large employer sample, presenteeism represented up to 60 percent of the total cost associated with common physical and mental health conditions.⁴⁰ These findings emphasize that poor health is not only a clinical problem but also a major business expense that reduces competitiveness and profit margins.

Conversely, investments in employee health and well-being generated meaningful financial returns. Longitudinal studies found that programs promoting physical activity, stress management and chronic disease prevention improved job performance and lowered absenteeism.³⁶ Employers that integrated health promotion into broader organizational culture, through supportive leadership, flexible work environments and evidence-based wellness programs, reported measurable gains in retention and morale alongside improved productivity. Similarly, interventions addressing psychological distress reduced sickness, absence, presenteeism and underemployment, reinforcing the link between mental health and sustained workforce participation.³⁵

These results indicate that the private sector can realize substantial value by treating employee health as a form of human capital investment.

Beyond lowering insurance and disability costs, healthier workforces contribute directly to firm resilience, innovation and long-term profitability. As with public sector investments, the evidence suggests that prevention and wellness programs are strategic assets that strengthen the economic performance of firms. In this sense, advancing workforce health is both good business and good economics, enhancing productivity today while safeguarding the labor capacity essential for future growth.

HEALTH STRENGTHENS ECONOMIC GROWTH

At the broadest level, population health shapes the strength and resilience of entire economies. Studies in this review showed that healthier populations are more productive, participate longer in the labor force, and contribute to higher gross domestic product growth and national income. In contrast, poor health and premature mortality constrain economic output, reduce labor supply and increase dependency ratios, pressuring both households and public budgets.

Cross-national and national studies found that improvements in life expectancy and reductions in chronic disease burden were linked to measurable gains in GDP growth and labor-force participation.^{17,30,31} Modeling analyses estimated that each additional year of population life expectancy was associated with roughly a 4-percent increase in GDP per capita, underscoring the macroeconomic dividends of health investment.³⁰ Similarly, dynamic microsimulation studies in the United States and Germany projected that improving health and education among aging workers would mitigate labor-force shrinkage and sustain economic output over coming decades.³

Poor population health also places a measurable drag on national productivity and long-term economic performance. Modeling studies show that preventable conditions such as obesity and chronic disease reduce labor-force participation, increase absenteeism and shift resources toward health care and social spending.^{57,58} Over time, these dynamics can slow economic output and weaken growth potential, particularly in countries with aging workforces and rising burdens of

chronic disease. Strengthening population health, therefore, is not only a fiscal strategy but an essential foundation for sustained economic vitality and competitiveness.

These findings demonstrate that improving population health can be a core driver of national economic performance. A healthier population expands the effective labor supply, supports consumer demand, and reduces fiscal drag from health care costs and disability payments. From a policy standpoint, health functions as macroeconomic infrastructure, a prerequisite for sustained growth, competitiveness and fiscal stability. Governments that invest in prevention, early-life health and equitable access to care build not only human capital but also long-term economic resilience.

IMPLICATIONS FOR POLICY AND PRACTICE

This review provides evidence that health contributes to economic performance at every level of society. Health is not merely a byproduct of growth; it is also a driver of it. Leaders can articulate this relationship in economic terms for audiences not persuaded by health framing alone. For individuals, that means showing how health supports family financial security. For companies, showing how it strengthens workforce performance, innovation and profitability. For governments, showing how it sustains fiscal stability and long-term growth. The framing will vary, but the underlying message is consistent: Investing in health is an investment in economic outcomes. Below are strategic moves to put this into practice.

- **Know the Economic Value of Health:** It is not enough to quantify the health impacts of health programs and policies. Leaders also need to measure the economic impacts. Building evaluation infrastructure and capabilities for economic analysis is essential and could be considered part of data modernization.
- **Make the Case for Long-Term Benefits:** Health improvements and their economic value often accrue over the long-term. Using long-term visioning and connecting the dots between quick wins and long-term goals may help.

- **Address “Wrong Pocket” Problems:** The health and economic benefits of the health system often accrue to parties that do not directly invest in the infrastructure or recognize the value they receive. This evidence provides the opportunity to communicate with these parties about what they are gaining and make appeals for support. Economic analyses, such as cost-consequence analysis, may be able to help with this as it does not synthesize all economic benefits into a summary score.⁷⁷
- **Partner With Business:** Public health has shifted from a purely regulatory role toward a support and capacity-building role. For example, public health not only inspects restaurants but helps them improve food safety. Similarly, agencies can help employers support worker health and well-being to improve company performance. Health benefits could accrue through improved worker health as well as improved social determinants of health via economic improvements.
- **Multi-Criteria Decision Analysis:** There are multiple paths toward population health improvement. Applying approaches such as multi-criteria decision analysis, which can incorporate health and economic benefits, along with community values, political framing and other issues, can be a way to support more purposeful decisions and clearer communication with decision makers.

Treating health as a means toward economic prosperity may be a way to present the value of health policies and programs to decision makers and other stakeholders. This review shows that there is evidence to communicate the case for health in the language that audiences value.

STRENGTHS AND LIMITATIONS

This review has several strengths. First, a clear conceptual framework defined the population health and economic outcomes to be included in this study. This focused both the search and the synthesis rather than allowing a scatter of loosely related findings. Second, the search and screening processes were transparent and replicable, with prespecified rules that another team could follow. Third, citation chaining (backward and forward) was used deliberately

to follow **threads** of literature, helping the review assemble coherent lines of evidence instead of a smattering of isolated facts and figures. Finally, a structured quality review examined extraction accuracy and framing against the framework, with harmonization steps to keep interpretations consistent across domains.

The review also has important limitations. Initial screening was capped at the first 250 results per economic domain, so relevant studies beyond those sets were likely missed. As such, this should be viewed as elements of the economic case for health, but not the entire case. While study methods were recorded, researchers did not conduct a formal appraisal of methodological quality or risk of bias. In addition, most included studies were observational; as a result, the reported associations should not be interpreted as causal without caution.

Taken together, these strengths support a clear, practice-oriented synthesis across economic levels, while the limitations suggest the findings should be read as directional and hypothesis-generating. Future work should extend the search beyond ranked caps, incorporate formal quality appraisal and prioritize designs that strengthen causal inference.

CONCLUSION

This review shows that improving health is an economic strategy. Healthier people and communities can fuel productivity, stabilize budgets and strengthen communities' capacity to prosper. The evidence across macroeconomic, fiscal, firm and household domains largely suggests that improving health yields economic dividends. This information can be used to engage policymakers, business leaders and communities in new ways that might resonate with them on their own terms. This may help make the case for investment in the programs and policies needed to improve population health and health equity. Next steps include building the infrastructure, training and culture needed to embed economic framing into routine practice.

APPENDIX A: ENDNOTES

1. Link BG, Phelan J. Social conditions as fundamental causes of disease. *J Health Soc Behav.* 1995;36(Spec No):80-94. doi:10.2307/2626958
2. Phelan JC, Link BG, Tehranifar P. Social conditions as fundamental causes of health inequalities: theory, evidence, and policy implications. *J Health Soc Behav.* 2010;51(Suppl):S28-S40. doi:10.1177/0022146510383498
3. Böheim R, Horvath T, Leoni T, Spielauer M. The impact of health and education on labor force participation in aging societies: projections for the United States and Germany from dynamic microsimulations. *Popul Res Policy Rev.* 2023;42(3):Article 39. doi:10.1007/s11113-023-09781-3
4. Rehkopf DH, Adler NE, Rowe JW. The impact of health and education on future labour force participation among individuals aged 55–74 in the United States of America: the MacArthur Foundation Research Network on an Aging Society. *Ageing Soc.* 2017;37(7):1313-1337. doi:10.1017/S0144686X16000171
5. Steketee G, Ross AM, Wachman MK. Health outcomes and costs of social work services: a systematic review. *Am J Public Health.* 2017;107(S3):S256-S266. doi:10.2105/AJPH.2017.304004
6. Loeppke R, Taitel M, Haufle V, Parry T, Kessler RC, Jinnett K. Health and productivity as a business strategy: a multiemployer study. *J Occup Environ Med.* 2009;51(4):411-428. doi:10.1097/JOM.0b013e3181a39180
7. Trondillo J. Estimating the effect of maternal and child health outcomes on GDP per capita. *Br J Econ Manag Trade.* 2016;12(1):1-12. doi:10.9734/BJEMT/2016/22802
8. Kovach KA, Uridge E, Sterkhova V, Lin WC. What happened to health in Kansas? Themes contextualizing why health in Kansas has not kept pace with the United States. Kansas Health Institute; 2025.
9. Kovach KA, Sterkhova V, Uridge E, Lin WC. What happened to health in Kansas? Priorities for reversing a long-term decline in health rankings. Kansas Health Institute; 2025.
10. America's Health Rankings. Executive summary: 2019 annual report. 2019.
11. America's Health Rankings. State summaries—U.S. summary: 2024 annual report. 2024.
12. Glass TA, McAtee MJ. Behavioral science at the crossroads in public health: extending horizons, envisioning the future. *Soc Sci Med.* 2006;62(7):1650-1671. doi:10.1016/j.socscimed.2005.08.044
13. Braveman P, Gottlieb L. The social determinants of health: it's time to consider the causes of the causes. *Public Health Rep.* 2014;129(Suppl 2):19-31. doi:10.1177/00333549141291S206
14. Mariotti A. The effects of chronic stress on health: new insights into the molecular mechanisms of brain–body communication. *Future Sci OA.* 2015;1(3):FSO21. doi:10.4155/fso.15.21
15. O'Campo P, Dunn JR, eds. *Rethinking Social Epidemiology: Towards a Science of Change.* Springer; 2012. doi:10.1007/978-94-007-2138-8
16. Berkman LF, Kawachi I, Glymour MM, eds. *Social Epidemiology.* 2nd ed. Oxford University Press; 2014. doi:10.1093/med/9780195377903.001.0001

17. Bloom DE, Canning D, Kotschy R, Prettner K, Schünemann J. Health and economic growth: reconciling the micro and macro evidence. CESifo Working Paper No. 9806; 2022.
18. Monterubbianesi PD, Grandes M, Dabús C. New evidence of the health status and economic growth relationship. *Panoeconomicus*. 2017;64(4):439-460. doi:10.2298/PAN150505020M
19. Aghion P, Howitt P, Murtin F. The relationship between health and growth: when Lucas meets Nelson-Phelps. *Rev Econ Inst*. 2011;2(1). doi:10.5202/rei.v2i1.22
20. Herzer D, Nagel K, Dewenter R. The effects of adult and non-adult mortality on long-run economic development: evidence from a heterogeneous dynamic panel. HSU Economics Working Paper No. 177; 2017.
21. Rocco L, Fumagalli E, Mirelman AJ, Suhrcke M. Mortality, morbidity and economic growth. *PLoS One*. 2021;16(5):e0251424. doi:10.1371/journal.pone.0251424
22. Bloom DE, Canning D, Fink G. Disease and development revisited. NBER Working Paper No. 15137; 2009.
23. Gavurova B, Ivankova V, Rigelsky M, Kmecova I. How do gender inequalities in health relate to the competitiveness of developed countries? *J Competitiveness*. 2020;12(3):99-118. doi:10.7441/joc.2020.03.06
24. Ghosh S, Renna F. The relationship between communicable diseases and FDI flows: an empirical investigation. *World Econ*. 2015;38(10):1574-1593. doi:10.1111/twec.12261
25. Ay İC. Air pollution, health and economic growth: a panel data analysis for countries with the highest CO₂ emissions. *Akad Hassasiyetler*. 2021;8(15):269-288.
26. Nau C, Bishai D. Green pastures: do U.S. real estate prices respond to population health? *Health Place*. 2018;49:59-67. doi:10.1016/j.healthplace.2017.11.008
27. Bowser D. The effect of life expectancy on economic growth in the United States. Presented at: Population Association of America Annual Meeting; April 15-17, 2010; Dallas, TX.
28. Hansen CW. Causes of mortality and development: evidence from large health shocks in 20th century America. Economics Working Paper No. 2012-29. Aarhus University; 2012. doi:10.2139/ssrn.2181403
29. Ajayi OF, Akinbobola TO. Health status and economic growth. In: *Encyclopedia of the UN SDGs: Decent Work and Economic Growth*. Springer; 2020:1-10. doi:10.1007/978-3-319-71058-7_87-1
30. Bloom DE, Kuhn M, Prettner K. Health and economic growth. IZA Discussion Paper No. 11939; 2018.
31. Fumagalli E, Pinna Pintor M, Suhrcke M. The impact of health on economic growth: a narrative literature review. *Health Policy*. 2024;143:105039. doi:10.1016/j.healthpol.2024.105039
32. Bleakley H. Health, human capital, and development. *Annu Rev Econ*. 2010;2:283-310. doi:10.1146/annurev.economics.102308.124436
33. Holden L, Scuffham PA, Hilton MF, Ware RS, Vecchio N, Whiteford HA. Which health conditions impact on productivity in working Australians? *J Occup Environ Med*. 2011;53(3):253-257. doi:10.1097/JOM.0b013e31820d1007
34. O'Neil A, Williams ED, Stevenson CE, Oldenburg B, Sanderson K. Co-morbid depression is associated with poor work outcomes in persons with cardiovascular disease. *BMC Public Health*. 2012;12:47. doi:10.1186/1471-2458-12-47

35. Keramat SA, Comans T, Pearce A, Basri R, Hashmi R, Dissanayaka NN. Psychological distress and productivity loss: a longitudinal analysis of Australian working adults. *Eur J Health Econ.* 2025. doi:10.1007/s10198-025-01764-9
36. Merrill RM, Aldana SG, Pope JE, et al. Self-rated job performance and absenteeism according to employee engagement, health behaviors, and physical health. *J Occup Environ Med.* 2013;55(1):10-18. doi:10.1097/JOM.0b013e31827b73af
37. Nawata K. Evaluation of physical and mental health conditions related to employees' absenteeism. *Front Public Health.* 2023;11:1326334. doi:10.3389/fpubh.2023.1326334
38. Sen E, Pransky G. Assessing the relationship between chronic health conditions and productivity loss trajectories. *J Occup Environ Med.* 2014;56(12):1249-1257. doi:10.1097/JOM.0000000000000328
39. Wang L, Cocker F, Kilpatrick M, et al. The associations of multimorbidity with health-related productivity loss in a large and diverse public sector setting. *J Occup Environ Med.* 2018;60(6):528-535. doi:10.1097/JOM.0000000000001243
40. Goetzel RZ, Long SR, Ozminkowski RJ, Hawkins K, Wang S, Lynch W. Health, absence, disability, and presenteeism cost estimates of certain physical and mental health conditions affecting U.S. employers. *J Occup Environ Med.* 2004;46(4):398-412. doi:10.1097/O1.jom.0000121151.40413.bd
41. Marzec ML, Scibelli A, Edington D. Impact of changes in medical condition burden index and stress on absenteeism among employees of a U.S. utility company. *Int J Workplace Health Manag.* 2015;8(1):15-33. doi:10.1108/IJWHM-09-2013-0035
42. Goetzel RZ, Fabius R, Roemer EC, et al. The stock performance of American companies investing in a culture of health. *Am J Health Promot.* 2019;33(3):439-447. doi:10.1177/0890117118824818
43. Loeppke R, Taitel M, Richling D, et al. Health and productivity as a business strategy. *J Occup Environ Med.* 2007;49(7):712-721. doi:10.1097/JOM.0b013e318133a4be
44. Fabius R, Thayer RD, Konicki DL, et al. The link between workforce health and safety and the health of the bottom line: tracking market performance of companies that nurture a culture of health. *J Occup Environ Med.* 2013;55(9):993-1000. doi:10.1097/JOM.0b013e3182a6bb75
45. Goetzel RZ, Fabius R, Fabius D, et al. The stock performance of C. Everett Koop Award winners compared with the Standard & Poor's 500 Index. *J Occup Environ Med.* 2016;58(1):9-15. doi:10.1097/JOM.0000000000000632
46. Fabius R, Phares S. Companies that promote a culture of health, safety, and wellbeing outperform in the marketplace. *J Occup Environ Med.* 2021;63(6):456-461. doi:10.1097/JOM.0000000000002153
47. Payne BC, Bredthauer JS. Revisiting the performance of firms recognized for creating a healthy culture. *J Occup Environ Med.* 2022;64(2):e41-e52. doi:10.1097/JOM.0000000000002434
48. Cornelsen L, McGowan Y, Currie-Murphy LM, Normand C. Systematic review and meta-analysis of the economic impact of smoking bans in restaurants and bars. *Addiction.* 2014;109(5):720-727. doi:10.1111/add.12486

49. Carter HE, Schofield DJ, Shrestha R, Veerman L. The productivity gains associated with a junk food tax and their impact on cost-effectiveness. *PLoS One*. 2019;14(7):e0220209. doi:10.1371/journal.pone.0220209
50. Lee Y, Mozaffarian D, Sy S, et al. Cost-effectiveness of financial incentives for improving diet and health through Medicare and Medicaid: a microsimulation study. *PLoS Med*. 2019;16(3):e1002761. doi:10.1371/journal.pmed.1002761
51. Mozaffarian D, Liu J, Sy S, et al. Cost-effectiveness of financial incentives and disincentives for improving food purchases and health through the U.S. Supplemental Nutrition Assistance Program (SNAP): a microsimulation study. *PLoS Med*. 2018;15(10):e1002661. doi:10.1371/journal.pmed.1002661
52. Abdullah MMH, Hughes J, Grafenauer S. Healthcare cost savings associated with increased whole grain consumption among Australian adults. *Nutrients*. 2021;13(6):1999. doi:10.3390/nu13061999
53. Baldwin JN, Ashton LM, Forder PM, et al. Increasing fruit and vegetable variety over time is associated with lower 15-year healthcare costs. *Nutrients*. 2021;13(8):2630. doi:10.3390/nu13082630
54. Choi SE, Seligman H, Basu S. Cost-effectiveness of subsidizing fruit and vegetable purchases through the Supplemental Nutrition Assistance Program. *Am J Prev Med*. 2017;52(5):e147-e155. doi:10.1016/j.amepre.2016.12.013
55. Li R, Qu S, Zhang P, et al. Economic evaluation of combined diet and physical activity promotion programs to prevent type 2 diabetes among persons at increased risk. *Ann Intern Med*. 2015;163(6):452-460. doi:10.7326/M15-0469
56. Magnus A, Cobiac L, Brimblecombe J, et al. The cost-effectiveness of a 20% price discount on fruit, vegetables, diet drinks and water trialled in remote Australia to improve Indigenous health. *PLoS One*. 2018;13(9):e0204005. doi:10.1371/journal.pone.0204005
57. Goldman D, Michaud PC, Lakdawalla D, Zheng Y, Gailey A, Vaynman I. The fiscal consequences of trends in population health. *Natl Tax J*. 2010;63(2):307-330. doi:10.17310/ntj.2010.2.07
58. Kotsopoulos N, Connolly MP. Assessing the fiscal burden of obesity in Canada by applying a public economic framework. *Adv Ther*. 2024;41(1):379-390. doi:10.1007/s12325-023-02718-4
59. Khan T, Tsipas S, Wozniak G. Medical care expenditures for individuals with prediabetes: the potential cost savings in reducing the risk of developing diabetes. *Popul Health Manag*. 2017;20(5):389-396. doi:10.1089/pop.2016.0134
60. Enyeji AM, Barengo NC, Ibrahimou B, Ramirez G, Arrieta A. Association between non-dietary cardiovascular health and expenditures related to acute coronary syndrome in the U.S., 2008–2018. *Int J Environ Res Public Health*. 2023;20(9):5743. doi:10.3390/ijerph20095743
61. Enyeji AM, Obi C, Stegall A, et al. Relation between non-dietary cardiovascular health and costs associated with stroke in the U.S. *J Health Popul Nutr*. 2025;44(1):11. doi:10.1186/s41043-025-00984-2
62. Popova S, Lange S, Burd L, Rehm J. The economic burden of fetal alcohol spectrum disorder in Canada in 2013. *Alcohol Alcohol*. 2016;51(3):367-375. doi:10.1093/alcalc/agg117
63. Popova S, Lange S, Burd L, Rehm J. Cost attributable to fetal alcohol spectrum disorder in the Canadian correctional system. *Int J Law Psychiatry*. 2015;41:76-81. doi:10.1016/j.ijlp.2015.03.010

64. Greenmyer JR, Popova S, Klug MG, Burd L. Fetal alcohol spectrum disorder: a systematic review of the cost of and savings from prevention in the United States and Canada. *Addiction*. 2020;115(3):409-417. doi:10.1111/add.14841
65. O'Brien RL, Neman T, Rudolph K, Casey J, Venkataramani A. Prenatal exposure to air pollution and intergenerational economic mobility. *Soc Sci Med*. 2018;217:92-96. doi:10.1016/j.socscimed.2018.09.056
66. Lee S-AK, Merlo L, Dominici F. Childhood PM2.5 exposure and upward mobility in the United States. *Proc Natl Acad Sci U S A*. 2024;121(38):e2401882121. doi:10.1073/pnas.2401882121
67. Manduca R, Sampson RJ. Punishing and toxic neighborhood environments independently predict the intergenerational social mobility of Black and White children. *Proc Natl Acad Sci U S A*. 2019;116(16):7772-7777. doi:10.1073/pnas.1820464116
68. Smith JP. The impact of childhood health on adult labor market outcomes. *Rev Econ Stat*. 2009;91(3):478-489. doi:10.1162/rest.91.3.478
69. Baumann I, Cabib I, Eyjólfssdóttir HS, Agahi N. Part-time work and health in late careers: evidence from a longitudinal and cross-national study. *SSM Popul Health*. 2022;18:101091. doi:10.1016/j.ssmph.2022.101091
70. Singhal S, Mamdani M, Mitchell A, Tenenbaum H, Lebovic G, Quiñonez C. Dental treatment and employment outcomes among social assistance recipients in Ontario, Canada. *Health Policy*. 2016;120(10):1202-1208. doi:10.1016/j.healthpol.2016.08.011
71. Jones AM, Rice N, Zantomio F. Acute health shocks and labour market outcomes: evidence from the post-crash era. *Econ Hum Biol*. 2020;36:100811. doi:10.1016/j.ehb.2019.100811
72. Banegas MP, Guy GP Jr, de Moor JS, et al. For working-age cancer survivors, medical debt and bankruptcy create financial hardships. *Health Aff (Millwood)*. 2016;35(1):54-61. doi:10.1377/hlthaff.2015.0830
73. Ramsey S, Blough D, Kirchhoff A, et al. Washington State cancer patients found to be at greater risk for bankruptcy than people without a cancer diagnosis. *Health Aff (Millwood)*. 2013;32(6):1143-1152. doi:10.1377/hlthaff.2012.1263
74. Yabroff KR, Dowling EC, Guy GP Jr, et al. Financial hardship associated with cancer in the United States. *J Clin Oncol*. 2016;34(3):259-267. doi:10.1200/JCO.2015.62.0468
75. Blinder V, Patil S, Eberle C, Griggs J, Maly RC. Early predictors of not returning to work in low-income breast cancer survivors: a 5-year longitudinal study. *Breast Cancer Res Treat*. 2013;140(2):407-416. doi:10.1007/s10549-013-2625-8
76. Centers for Disease Control and Prevention. About the Community Preventive Services Task Force. Updated 2025.
77. Turner HC, Archer RA, Downey LE, et al. An introduction to the main types of economic evaluations used for informing priority setting and resource allocation in healthcare. *Front Public Health*. 2021;9:722927. doi:10.3389/fpubh.2021.722927



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