

Health Impacts of Raising California's Minimum Wage



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Human Impact Partners is a national nonprofit working to transform the policies and places people need to live healthy lives by increasing the consideration of health and equity in decision making.

Summary

California's state minimum wage, currently \$8, is scheduled to increase to \$9 on July 1, 2014. [State Senate Bill 935](#), introduced by Sen. Mark Leno of San Francisco in February 2014, proposes to increase the state's minimum wage in three steps, starting at \$11 an hour in 2015 and by an additional \$1 per hour in both 2016 and 2017. After 2017, the minimum wage would increase with inflation.

This health analysis finds that raising the state's current minimum wage to \$13 by 2017 would significantly benefit health and well-being. As a result of the proposed law, about 7.5 million lower-income Californians could expect an increase in family income. Californians would experience fewer chronic diseases and disabilities; less hunger, smoking and obesity; and lower rates of depression and bipolar illness. In the long run, raising the minimum wage would prevent the premature deaths of hundreds of lower-income Californians each year.

A multitude of studies have established family income as one of the strongest and most far-reaching determinants of health. Our analysis of the California Health Interview Survey (CHIS), the nation's largest state health survey, found that people whose family incomes are below the federal poverty line are more than four times as likely to rate their health as poor or fair compared to people with family incomes of more than three times the federal poverty level.

Income affects health not only through one's ability to meet material needs, but through access to health care, the quality of neighborhoods in which people can afford to live, child health and development, chronic stress, and interpersonal relationships.

- Nationally, one-third of food insecure families had to skip meals or cut portions at some point during the year.
- Lower-income neighborhoods tend to have fewer resources for healthy living, including nutritious and affordable food options, safe and comfortable parks and trails, and public services.
- Children in lower-income families are exposed to multiple, cumulative physical and psychosocial risk factors including family turmoil, community violence, early childhood separation, substandard housing, noise, and crowding.
- The longer one lives with low income, the more negative health impacts accumulate.

Federal and state minimum wage laws were established to ensure that working Americans had enough income to live healthy lives. But in recent decades, not only have most Americans had no significant gain in real income, workers earning the minimum wage have actually seen their purchasing power decline.

In 1968, California's minimum wage was \$1.65 an hour. Adjusted for inflation, to buy the same amount of goods and services today's Californians would need \$10.77 – roughly equal to the \$11 an hour minimum wage that SB 935 would mandate starting in 2015.

This analysis found:

- The proposed minimum wage of \$13 would substantially increase income for families in the lowest quarter of the income distribution.
- Californians in families whose income increased as a result of the higher minimum wage would be more likely to be born healthier, develop stronger bodies and brains, and suffer from fewer chronic diseases as adults and into old age.
- Fewer Californians would live in poverty, ensuring that they would get enough to eat. Fewer would be forced to live in the unhealthy environments of substandard housing and poor neighborhoods. More Californians would have adequate health care and access to health insurance.

- More of California's children would be better prepared for school and achieve more in school, which in itself leads to healthier adult lives. Children would miss fewer school days. Our analysis of CHIS data found that children under 5 whose family incomes are more than three times the federal poverty level are 2.6 times more likely to have been read to by a caregiver than children whose family incomes are below the poverty level. Teens whose family incomes are below the poverty level are almost twice as likely to miss three or more days of school in a month when compared to teens in families with incomes of more than three times the poverty level.
- Fewer people would smoke. Our analysis shows that adults in families in poverty are 50% more likely to smoke than those in families earning more than three times the poverty level.
- More would exercise regularly. Our analysis indicates that adults in families below the poverty level are half as likely to get recommended weekly amounts of physical activity as those in families whose incomes are three times the poverty level. Children in California's lower income families also get less exercise. Teens in families below the poverty level are 2.5 times as likely to be overweight or obese as teens in families whose incomes are three times the poverty level.
- Fewer Californians would suffer from emotional and psychological problems, such as depression and poor self-esteem. Our analysis shows that adults in families who live in poverty are over twice as likely to face serious psychological distress and to suffer from family life impairment as those in higher income families.
- Most dramatically, premature deaths of 389 lower-income Californians would be prevented each year. Nationally, people who live above the federal poverty line can expect to live more than five years longer than those below the line.

While low income limits health, amplifying the negative impact is the fact that poor health can also lead to lower income. People with physical or mental disabilities are much less likely to be employed than people without disabilities, and may earn less income even when employed.

In conclusion, this health analysis finds that SB 935 would result in significantly improved health and well-being for Californians.

Introduction

Of the many factors that can predict health and disease, income is one of the strongest and most far-reaching (Adler 2010; Braveman 2011). Having sufficient income protects people against material deprivation and diverse environmental and social stressors including hunger and overcrowding, financial strain, substandard housing, pollution, and threats to safety. Adverse exposures and experiences associated with poverty impair children's development, place stress and strain on the body, undermine control over one's life circumstances, and limit opportunities. Cumulatively, the physical and psychosocial impacts of lower income manifest in behaviors harmful to health, higher disease rates, and lower life expectancy.

Over the past several decades, only a minority of American workers have had significant income gains (Congressional Budget Office 2011). Aggregate national income has increased, but personal income has increased predominantly for the top tiers of earners. Disparities in income have been growing. In 2012, the average income for the top one percent of earners was \$1.3 million compared with a national median household income of \$51,000 (Alvaredo 2014). Income gains by low and middle-income households in comparable societies such as Canada, the Netherlands, and the United Kingdom have surpassed income gains in the U.S. For the lowest tenth of households – those whose health is most likely to benefit from a boost in income – incomes have declined or stagnated (Leonhart 2014).

By increasing family incomes, minimum wage policies generate significant and wide-ranging benefits for public health. Reducing the number of poor families supports childhood development and in the longer term reduces avoidable disease, morbidity, and premature mortality. Children in families with higher income are more likely to be ready for school and achieve more in school. Higher income means better nutrition, more leisure time physical activity, and less smoking and other risky behaviors. Higher income also means more choice and stability for health insurance.

The protections of the Fair Labor Standards Act of 1938 (FLSA) – including the minimum wage, the maximum workweek, overtime, and prohibition of “oppressive child labor” – shared the goal of protecting health and well-being. Yet today the minimum wage and other strategies to increase income and reduce poverty are rarely considered in terms of their benefits for health.

California's state minimum wage, currently \$8, is scheduled to increase to \$9 on July 1, 2014. [State Senate Bill 935](#), introduced in February 2014, proposes to further increase the state's minimum wage in three steps, starting at \$11 an hour in 2015 and by an additional \$1 per hour in both 2016 and 2017. Beginning in 2018, the minimum wage would be adjusted annually to the rate of inflation.

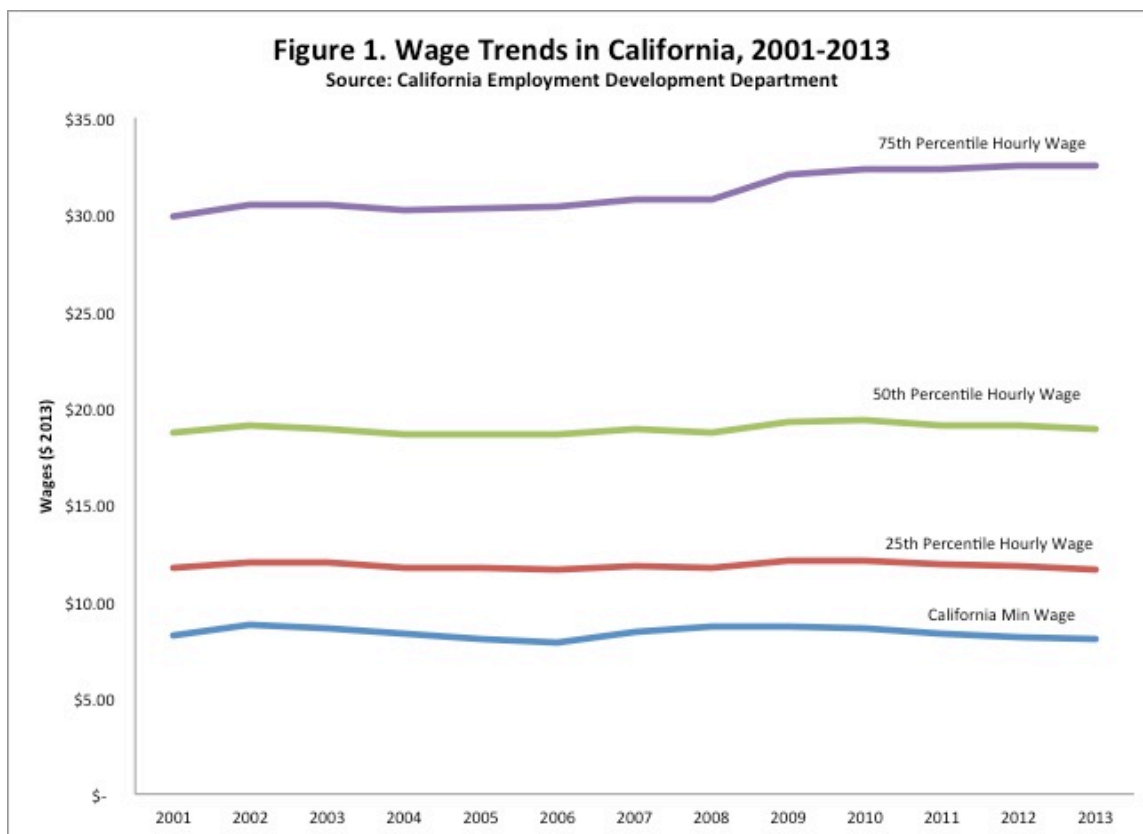
This health analysis aims to inform public discussion about California SB 935 by explaining the mechanisms through which income protects and improves health, examining the relationship between income and health outcomes for Californians, and enumerating the health benefits of a \$13 minimum wage. Section I discusses recent trends in wages and the expected effect of changes in the minimum wage on income. Section II reviews mechanisms through which income impacts health and well-being, and Section III provides California-specific statistics on the relationship between health indicators and income for children, teens, and adults. Section IV quantifies the likely impacts of a \$13 minimum wage on preventable mortality in California.

Due to limitations in resources and time, this analysis was not able to enumerate all of the ways an increase in California's minimum wage could affect public health. For example, additional analysis could estimate the benefits of minimum wage changes on physical and mental functioning and childhood development. In addition, increasing the minimum wage will have health and economic effects by changing household eligibility for various public subsidies, including those for health insurance.

I. Wages and Income in California

Wages Are Stagnant For Most California Workers

For most workers, both nationwide and in California, wages have increased only modestly over the past three decades (Congressional Budget Office 2011). For lower-wage workers, real wages have been stagnant or, for some groups, have regressed. The stagnation of wages has been particularly evident in the past decade. Based on data from the State of California Employment Development Department, for the lower half of wage earners real wages did not increase at all between 2001 and 2013. For workers in the 75th percentile of earners, wages have increased only modestly.



The federal minimum wage is currently \$7.25 per hour (although there are legislative proposals to increase it to \$10.10.) The California state minimum wage, currently \$8, is scheduled to increase to \$9 on July 1, 2014 due to prior legislation.

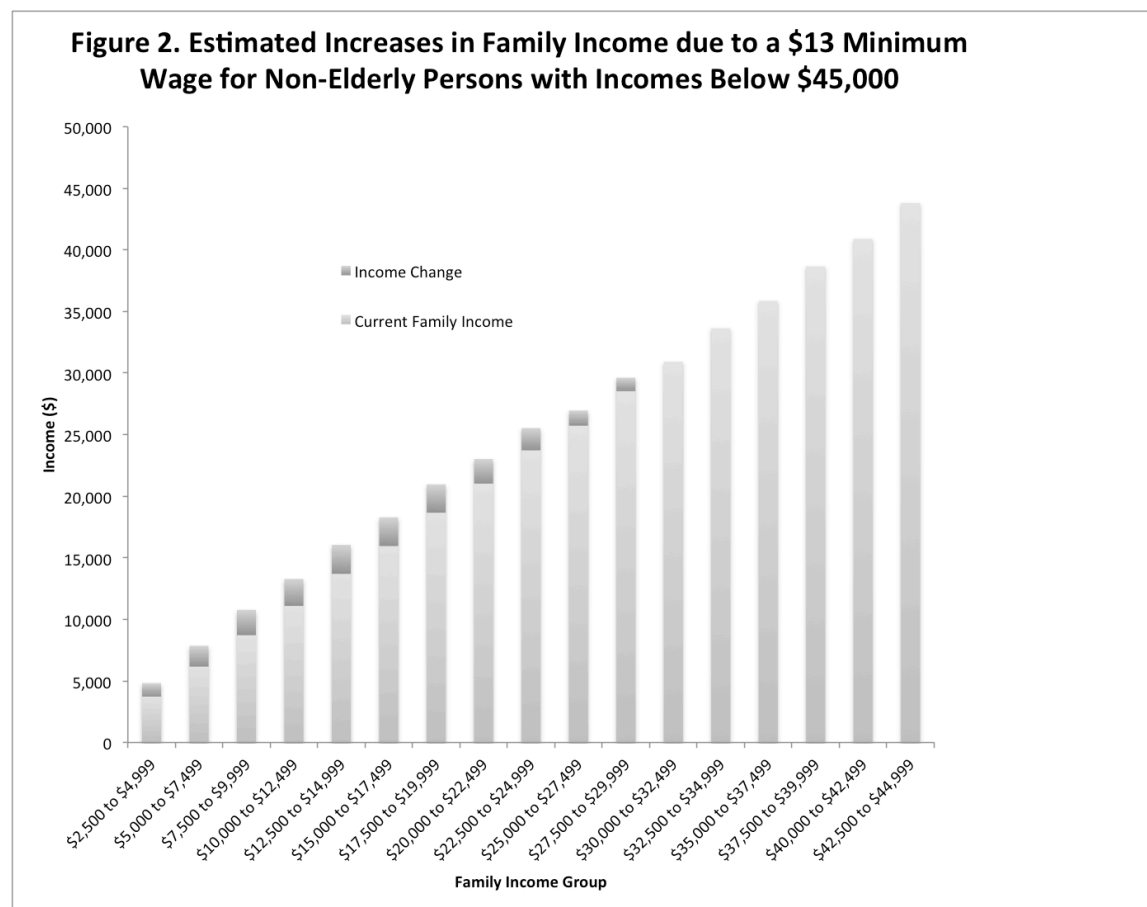
As of January 2014, 21 states and the District of Columbia had a minimum wage that was higher than the federal standard. In 11 of those states, the minimum wage is adjusted automatically each year for inflation. But the real value of the minimum wage is eroded by inflation. Federal and state governments increase the nominal federal minimum wage periodically, but because of inflation, the real purchasing power of the minimum wage has not materially increased over time. Neither federal nor California law requires automatic increases in the minimum wage to protect future earnings against inflation. If the state's minimum wage in 1968 were adjusted for inflation, its value today would be \$10.77 – more than the current minimum but less than the minimum wage proposed by SB 935.

Increases in the Minimum Wage Increase Family Income for Most Low-Income Households

Most analyses conclude that increasing the minimum wage, in aggregate, will lead to increases in income for a majority of low-income earners and significant reductions in the number of households living in poverty (Dube 2013). Increasing the minimum wage increases earnings for those earning above the minimum wage as well. In addition, the minimum wage will have some effect on employment and work hours (Congressional Budget Office 2014).

The federal Congressional Budget Office recently estimated the effects on employment and family income of increasing the federal minimum wage to \$9 and to \$10.10 (Congressional Budget Office 2014). They concluded that the large majority of low-wage workers (earning up to \$11.50) would have higher wages and family income. A much smaller number of low-wage workers might lose their jobs. Overall, net incomes would increase for families with incomes less than six times the poverty threshold. A similar analysis does not exist for the proposed minimum wage change in California, but it is reasonable to assume that the distribution of benefits would follow a similar pattern.

The study *Minimum Wages and the Distribution of Family Income* examined the relationship between the family income distribution for people under 65 and changes since 1990 in the minimum wage (Dube 2013). Notably, this study takes into account impacts of the minimum wage on employment and work hours. The study produced wage-income elasticity estimates (changes in income expected for a change in minimum wage) for different levels of income distribution.



Applying the elasticity estimates from the Dube study to the proposed minimum wage of \$13 and the current family income distribution for the non-elderly California population produces estimates of changes in income for different income groups (Figure 2). The model predicts increased income for about 7.6 million Californians in families in the lowest quarter of the income distribution. For the top 75% of households, net incomes would not change.

II. Income and Health

Higher Incomes Lead to Better Health

Most measures of injury, poor health, and disease vary inversely with income. These include measures of self-rated health, birth outcomes and child development, adult functioning, and premature mortality.

Self-rated health: Self-rated health is a widely used and powerful predictor of health and disease. Rating oneself as having fair or poor health predicts premature mortality even when taking into account other variables (Idler 1997). Self-rating of poorer health also correlates with many other health outcomes, including functioning, chronic disease, and mental status (Kennedy 1998). Studies on self-rated health in the U.S. show that people with the lowest incomes are four to five times more likely to rate their health as fair or poor than those with the highest incomes (Furnee 2010).

Birth outcomes and child development: The impact of income on health begins before birth. Infants born to mothers with less education and lower income are more likely to experience intrauterine growth restriction, be born prematurely, and have a low birth weight (Kramer 1998; Kramer 2000). Children in low-income households are more likely to be diagnosed with developmental delay (Simon 2013) and are more frequently diagnosed with chronic health conditions (Case 2002). An examination by Chen et al. of children in the National Longitudinal Survey of Youth found that persistently lower family income predicted a greater likelihood of limitations of childhood activities and conditions requiring treatment by a physician (Chen 2007). Korzrskyi found that children experiencing persistently low income were more likely to develop chronic asthma (Korzrskyj 2010). Using data from the U.S. National Health Interview Survey, Case et al. demonstrated that for children up to age 17, lower income was associated with restricted activity, missed school, and hospital admissions (Case 2002). An international review of the literature also found that children in low-income households experienced more activity-limiting illness, parent-reported poor health status, acute and recurrent infections, and hospitalization (Spencer 2012).

Adult functioning: Lower income is also associated with adult functional limitations. Analyses by Ettner have demonstrated a significant inverse relationship between income and depression, number of sick days used, work limitations, and limitations in activities of daily life (Ettner 1996).

Premature mortality: Premature death reflects the lifetime cumulative impact of lower income. Studies that have followed people over a long period of time also find a strong inverse relationship between income and longevity (Pappas 1993; Rogot 1992). In the U.S., residents below the poverty line can expect to live 5.6 years less than those above the line (Muennig 2005).

Long-term studies establish that income gains protect against premature death, not just for those below the poverty line but also for those in the middle of the income distribution (Sorlie 1995; Backlund 1996; McDonough 1997; Lantz 1998; Rehkopf 2008). In one of the longest studies on the topic, McDonough and colleagues examined relationships between income and mortality, considering both single-year and multiyear measures of income, in a population followed between 1968 and 1994 (McDonough 1997). Adjusting for other social and demographic factors, average income over a five-year period predicted mortality for persons under 65, with the lowest income group experiencing three times the rate of

mortality as the highest income group (Table 1). Persistent low income and drops in income also increased the risk for early death. These findings have been replicated by multiple other studies.

Table 1. Risk of early death by income group

Average income over five years*	Odds ratio for mortality**
<\$15,000	3.03
\$15-20,000	2.5
\$20-30,000	2.0
\$30-50,000	1.5
\$50-70,000	1.4
>\$70,000	1

Source: McDonough P, Duncan G.J., Williams D, House J. Income dynamics and adult mortality in the United States, 1972 through 1989. *American Journal of Public Health* 1997; 87(9): 1476-83.

*Income adjusted to 1993 dollars

**Odds ratios for income groups adjusted for age, race, sex, and household size

Income Influences Health Through Many Mechanisms

Income affects health through material needs, access to health care, neighborhood quality, child health and development, chronic psychological stress, and interpersonal relationships. The multiple negative effects of low income accumulate for an individual and over time.

Material needs: Most households use income first to meet basic needs, including nutrition, shelter, heat, child care, and transportation. Higher-income households are thus more able to meet these basic needs than lower-income ones. For example, food insufficiency is primarily related to income status (Alaimo 1998). In 2012, 46.5 million Americans – 15 percent of the population – lived in poverty and 49 million lived in "food insecure" households (feedingamerica.org 2014), defined by the Department of Agriculture as when "consistent access to adequate food is limited by a lack of money and other resources at times during the year." Nationally, one-third of food insecure families had to skip meals or cut portions at some point during the year because they lacked money (DeParle 2009).

Examples of how the inability to meet basic material needs impacts health include:

- Children in households receiving subsidies for home heating are protected from malnutrition and impairment of growth (Frank 2006).
- Lower-cost housing is often of lower quality and may have mold, poor ventilation, cockroaches, rodents, asbestos, or lead, all of which can have serious health effects, especially for children (Krieger 2002).
- People with lower incomes may have to live doubled up with other families or individuals, putting them at higher risk for certain infectious diseases.

Access to Health Care: Use of medical care services depends on many factors, including access to care. Access, in turn, depends on health insurance coverage, transportation options, scheduling flexibility, and sense of self-efficacy and control. Each of these is influenced by income.

Under the Affordable Care Act (ACA) and rules for health insurance program participation, income affects health insurance options and thereby the quality of health care. Increasing the minimum wage may require some households to switch from Medicaid to a private insurance plan through the ACA's health care exchanges. Depending on the increase in income, some households may be eligible for a subsidy to purchase health insurance on an exchange; however increases in income may be offset by increases in health insurance costs for households. The impact of increasing the minimum wage will differ from state to state based on whether the state chose to expand Medicaid eligibility as well as the private programs available, their accessibility, and their quality.

Neighborhood quality: Income sorts households into neighborhoods where environmental quality varies significantly. Lower-income neighborhoods tend to have fewer resources for

healthy living, including nutritious and affordable food options, safe and comfortable parks and trails, and public services. At the same time, households in low-income neighborhoods have greater exposure to noise and air pollution, busy roadways, and crime and violence. Poor neighborhood quality and reduced sense of personal security can lead to heightened fear and anxiety and inhibit health-promoting activities such as walking, jogging, meeting friends, or socializing. Cumulatively, these differences in neighborhood quality and risks contribute to differences in life expectancy among residents of poor and non-poor neighborhoods (Haan 1987).

Childhood Health and Development: Lower income directly affects children's health and development, but it also affects children through the quality of parental and other caregiver relationships. Parents who are stressed about finances, perhaps working at multiple jobs with irregular hours, may understandably have less time to spend with their children. They may read to them and talk with them less often, resulting in poorer language skills.

Impairment of children's physical, cognitive, or behavioral development translates into lower educational attainment and, consequentially, lower income as adults. The relationship between family income and poorer school performance for children is well established (Duncan 1998). Furthermore, recent experimental studies show that increasing income can improve school performance. A synthesis of experimental studies of income supplementation found: "Programs that included earnings supplements, all of which increased both parental employment and income, had positive effects on elementary-school-aged children. Specifically, these programs led to higher school achievement, a reduction in behavior problems, increased positive social behavior, and/or improved overall health (Duncan 2011)." Longer-term studies have demonstrated large detrimental effects of childhood poverty on adult earnings and employment (Duncan 2010).

Health effects of childhood deprivation persist into adulthood (Karlamaña 2005). One review, including 40 studies examining the link between childhood socioeconomic status and adult mortality, found that individuals with lower socioeconomic status as children were at elevated risk of premature mortality, regardless of their adult socioeconomic circumstances (Galobardes 2008). Another review found that poorer socioeconomic conditions during childhood place people at risk for adult cardiovascular disease and cardiovascular-related mortality, independent of adult socioeconomic status, with the severity of the effect related to the duration of deprivation (Pollitt 2005).

Chronic Psychological Stress: Stressors are perceived or actual threats and can be environmental or social. Stressors trigger a biologic stress response, which includes the release of hormones such as epinephrine and cortisol. Chronic or repeated exposure to stressors that exceed one's capacity to cope damages the body's ability to regulate these hormones, undermine immune defenses, and contribute to chronic diseases (McEwen 1998; Seeman 2004; Orpana 2004). Children in lower-income families are exposed to multiple, cumulative physical and psychosocial risk factors including family turmoil, community violence, early childhood separation, substandard housing, noise, and crowding (Evans 2002; Evans 2010). Both the financial strain of poverty and the experience of lower economic standing relative to peers are sources of physiological stress in adults that contribute the cumulative negative impact of stress on health (Talyor 1997; Wilkinson 1999; Orpana 2004).

Poor Health Can Also Limit Employment and Reduce Income: While low income limits health, it is also important to acknowledge that poor health can impair economic status. Five of the ten leading causes of disability are mental illnesses: bipolar disorder, depression, schizophrenia, alcohol use, and obsessive-compulsive disorders. People with physical or mental disabilities are much less likely to be employed than people without disabilities, and may earn less when employed. The relationship between income and health persists even when taking factors like disability into account. In the prospective study of mortality conducted by McDonough and colleagues, the independent effect of income persisted after the inclusion of variables for disability (McDonough 1997).

III. California Health Indicators Are Better at Higher Family Incomes

To illustrate the breadth and magnitude of the relationship between income and health, this analysis utilized data from the California Health Interview Survey (CHIS). CHIS is a random-dial telephone survey that asks questions on a wide range of health topics to a representative sample of Californians. CHIS surveys more than 50,000 adults, teenagers and children in each survey cycle. (For more information see <http://healthpolicy.ucla.edu/chis/>.) In this section, we report on the relationship between income and self-reported health status and various child, teen, adult health, and health care indicators.

Figure 3 illustrates the relationship between rating oneself as having fair or poor health and family income. As discussed above, self-rated health is a widely used and powerful predictor of health and disease. In Figure 3, income is represented as a multiple of the federal poverty line, which adjusts for differences in household size.

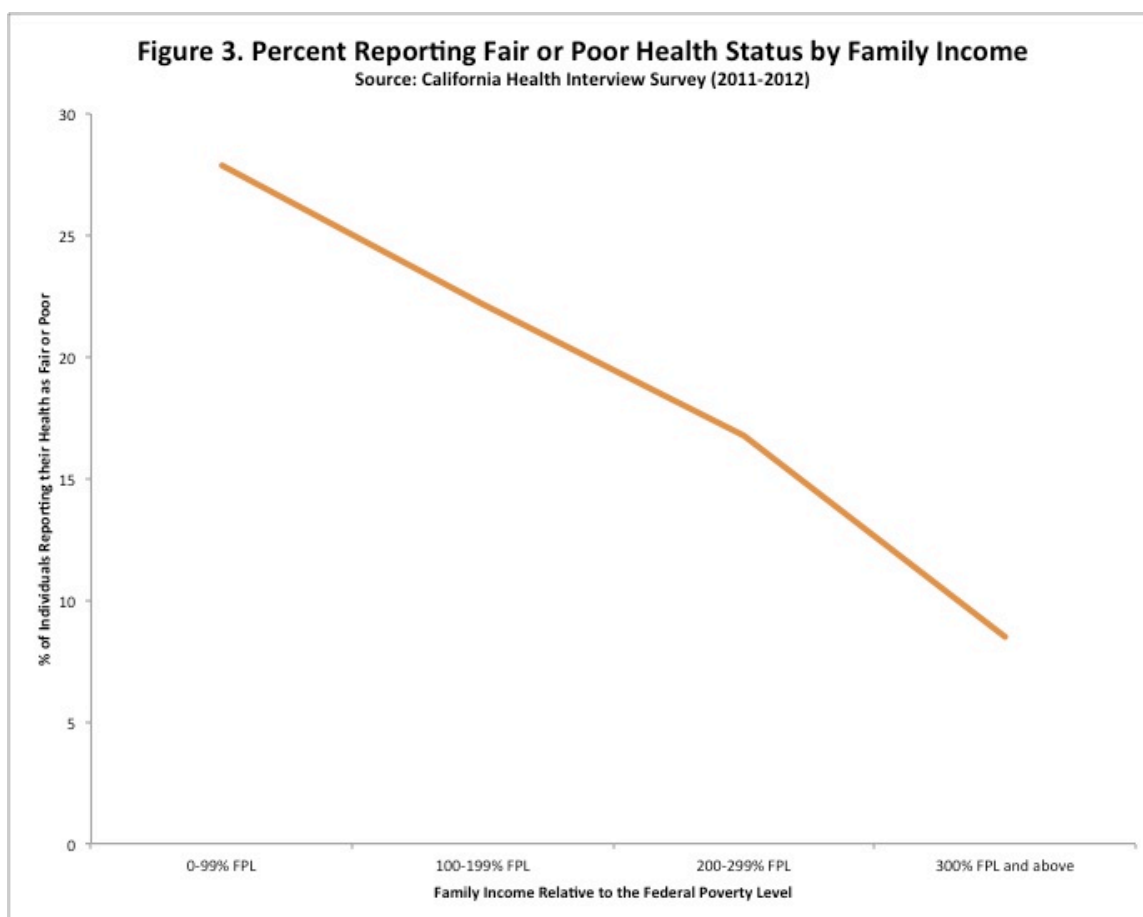


Figure 4 illustrates the relationship between indicators of healthy childhood development and income. Caregiver reading, physical activity, and preschool attendance increases significantly with increasing household income. Notably, however, the proportion of children eating the recommended serving of fruits and vegetables is somewhat greater for lower-income children, a finding that may be a result of federal and state nutrition subsidies for low-income families, including WIC, SNAP, and the National School Lunch Program.

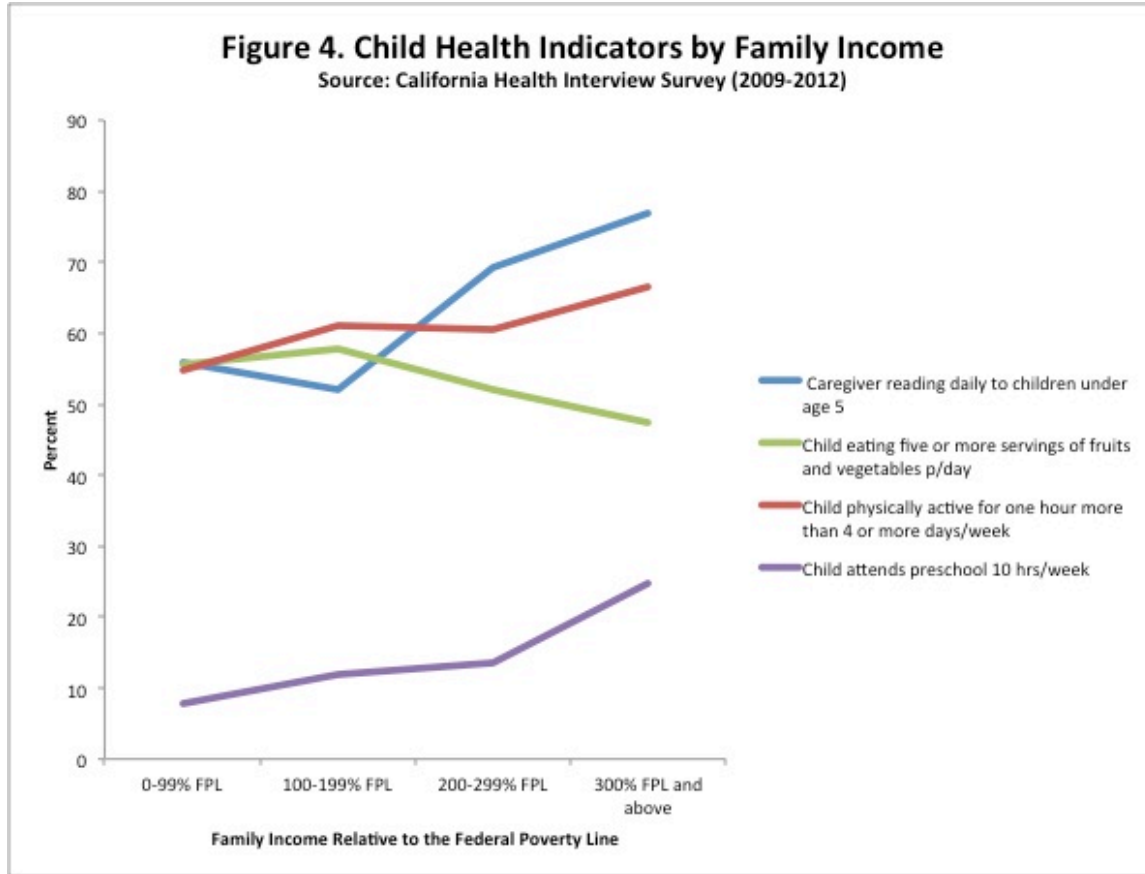


Figure 5 illustrates that indicators of teen health and well-being also correlate with family income levels. Teens from higher-income families are more likely to eat fruits and vegetables and participate in community organizations, and less likely to be overweight or chronically absent from school.

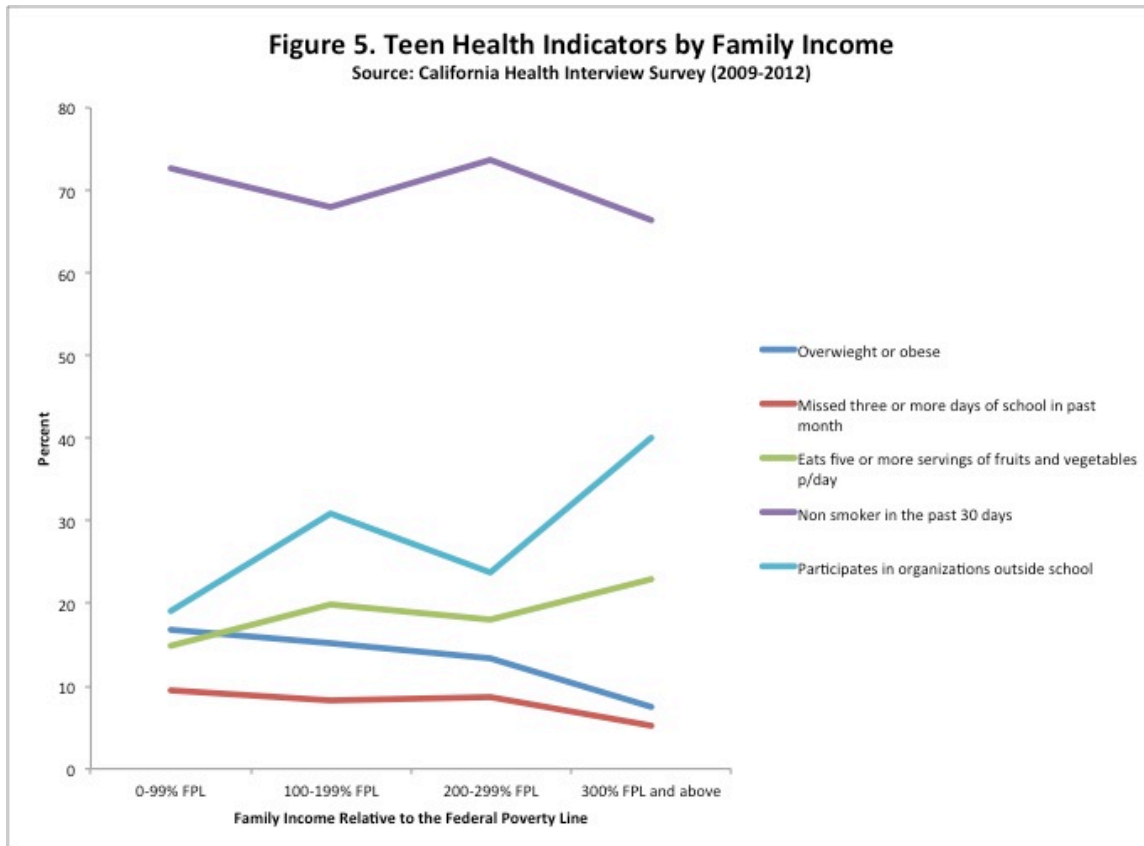
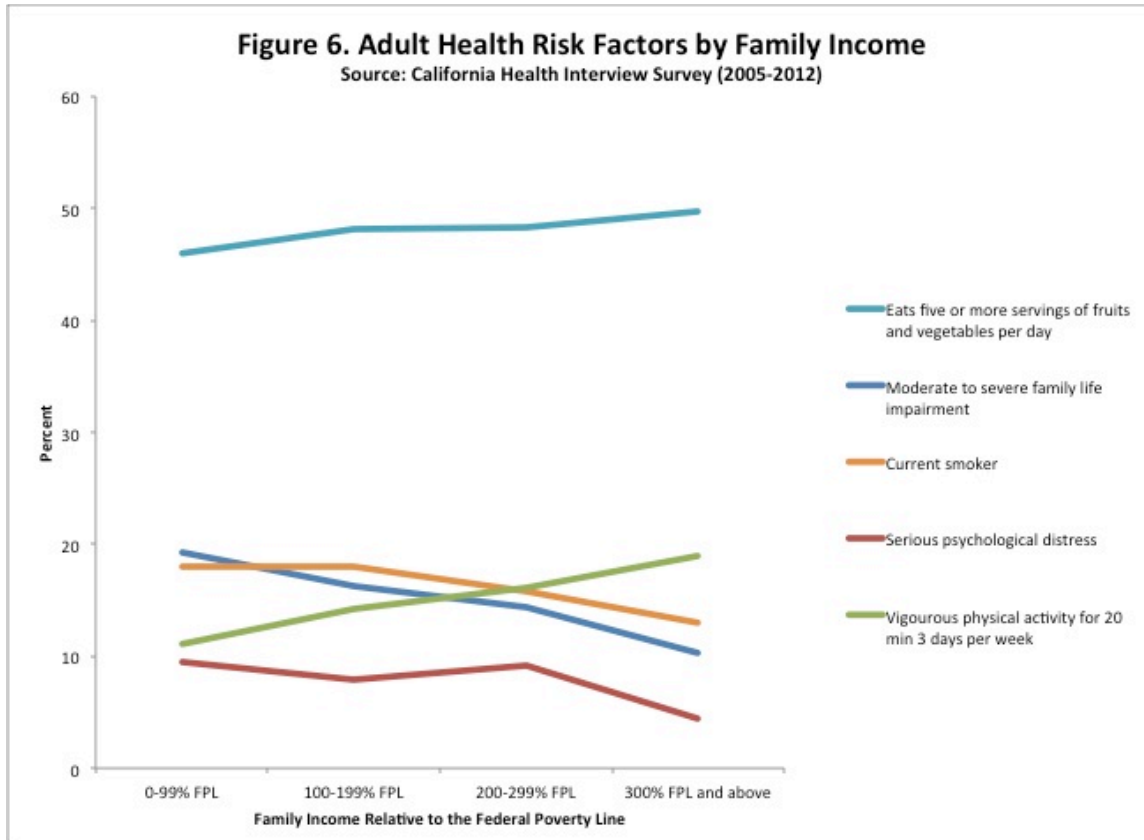


Figure 6 illustrates that behavioral risk factors also correlate with income for California adults. Higher income is associated with better nutrition, more physical activity, and less family impairment, psychological distress, and smoking.



Finally, Figure 7 illustrates that several health care indicators also vary strongly by income. As income increases, far fewer people report having no place to go for routine primary care and fewer people utilize emergency services for chronic diseases such as asthma and diabetes.

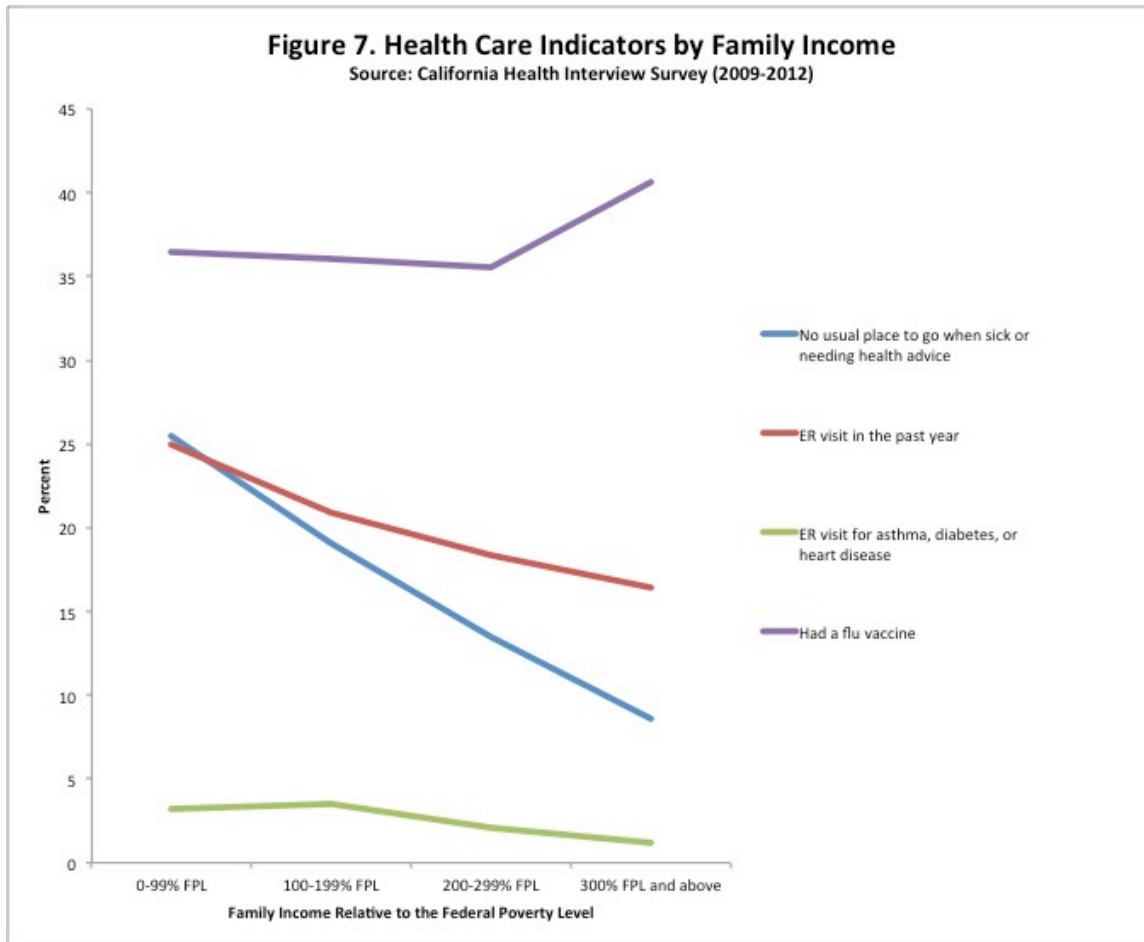


Table 2 provides the odds ratios for the income and various child, teen, adult, and health care indicators reported in the above figures.

Table 2. Odds ratio for selected health outcomes for individuals living under the federal poverty threshold^a

Health outcome	Odds ratio ^b
All Californians	
Fair or Poor Self-rated Health	4.2
Child outcomes	
Caregiver reading daily to children under age 5	0.4
Child physically active for one hour more than 4 or more days/week	0.6
Child eats five or more servings of fruits and vegetables per day	1.4
Child attends preschool 10 hours per week	0.3
Teen outcomes	
Missed three or more days of school in past month	1.9
Participates in organizations outside school	0.4
Non smoker in the past 30 days	1.3
Eats five or more servings of fruits and vegetables per day	0.6
Overweight or obese	2.5
Adult outcomes	
Moderate to severe family life impairment	2.1
Serious psychological distress	2.3
Vigorous physical activity for 20 min 3 days per week	0.5
Eats five or more servings of fruits and vegetables per day	0.9
Current smoker	1.5
Health care	
No usual place to go when sick or needing health advice	3.6
Had a flu vaccine	0.8
ER visit in the past year	1.7
ER visit for asthma, diabetes, or heart disease	2.7

^a Source: California Health Interview Survey. See above graphs for more specific source information.

^b Odds ratios calculated for individuals with family incomes less than the federal poverty threshold relative to those with family incomes greater than 300% of the federal poverty line.

IV. A Higher Minimum Wage Could Reduce Early Deaths for Low-Income Californians

Many studies that have examined the relationship between income and mortality in the general U.S. population found significant inverse relationships between income and mortality. The studies show that the benefit to longevity of an increase in income is greatest for those in the lowest income groups, but flattens out for higher incomes. The research also finds much stronger effects for people under 65.

Forecasting the effect of minimum wage changes on health requires combining two different steps.

- First, estimating of the impact of a proposed minimum wage on changes in family income; and
- Second, estimating the impact of changes in family income on health outcomes.

This analysis predicted changes in household income using Dube's observational study of how changes in minimum wage laws have affected the individual distribution of family income (see above). This analysis then estimated changes in mortality among working age adults attributable to a \$13 California state minimum wage by drawing on the findings of the study by Backlund et al. (1996). That study estimated the hazard for mortality for income in adults over 25 using data from the National Longitudinal Study of Mortality from 1979 to 1985, adjusted (controlled) for a number of possible confounders, including age, household size, education, and marital status. More recent studies have found similar quantitative relationships between income and mortality.

Applying the income-mortality relationship in the Backlund study with estimates of income changes resulting from the \$13 per hour minimum wage to California's 2012 population produced the estimates of mortality reductions presented in the table below. (The methodology is described in detail in Appendix 1.) Under this approach, the population benefiting from the increased minimum wage is limited to persons with family incomes less than \$30,000 a year or the bottom quarter of the income distribution.

Current (2010) California state mortality rates estimate 6,581 deaths annually in a population of 2.01 million men aged 25 to 64 and 4,699 deaths among 2.21 million similarly aged women.

By increasing the state minimum wage to \$13, we anticipate a reduced risk of death for families in the lowest quartile of income. Specifically, we estimate 389 deaths would be avoided among working-age adults.

Table 3. Estimated annual reductions in mortality among working-age Californians from a \$13 minimum wage^a

	Males				
Age group	25 to 34	35 to 44	45 to 54	55 to 64	Totals
Annual mortality rate (per 100,000)^b	103	152	373	863	
Total population^c	2,858,000	2,573,000	2,513,000	2,094,000	10,038,000
Population earning less than \$30K p/year^c	627,000	533,000	451,000	399,000	2,010,000
Annual expected deaths^d	646	810	1682	3443	6581
Deaths avoided with \$13 min wage^a	22	27	65	150	264
	Females				
Age group	25 to 34	35 to 44	45 to 54	55 to 64	Totals
Annual mortality rate (per 100,000)^b	45.6	91.6	232.9	522.5	
Total population^c	2,725,000	2,464,000	2,701,000	2,333,000	10,223,000
Population earning less than \$30K p/year^c	708,000	509,000	447,000	549,000	2,213,000
Annual expected deaths^d	323	466	1041	2869	4699
Deaths avoided with \$13 min wage^a	7	11	27	80	125

Sources:

^a See appendix 1 for methods.^b Age and sex-specific mortality rate from California Department of Health Services Vital Statistics Data.^c Population and income data from the 2012 Current March Population Survey^d Calculated by multiplying total population by age and gender-specific mortality rate.

Conclusion

Increased household income improves health and well-being through several mechanisms, including fulfillment of material needs, living conditions, access to health care, and interpersonal relationships. This analysis shows that that increasing California's minimum wage would lead to a number of positive health and well-being outcomes for low-income residents benefiting from the wage increase.

California data illustrates that those currently earning higher incomes experience better health outcomes including better self-rated health, child and teen health outcomes, adult health behaviors, and health care system usage. We predict that increasing the minimum wage to \$13 an hour would result in almost 400 fewer premature deaths annually among working-age Californians.

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Appendix 1. Methodology to Forecast Changes in Mortality Attributable to Changes in the Minimum Wage

Many studies have examined the relationship between income and mortality in the general U.S. population and found a similar and significant inverse relationship between income and the incidence of death. Collectively, the research indicates that the shape of the relationship is non-linear and that the benefit of an increase in income on longevity is much greater for those in the lowest income groups and attenuates for incomes above the median. The research also finds much stronger effects in non-elderly populations.

This prediction method utilizes a study by Backlund et al. (1996) which examined the relationship between mortality and income in adults over 25 years using data from the National Longitudinal Study of Mortality (NSLM) from 1979 to 1985. The method follows an approach applied in an analysis of San Francisco's living wage ordinance conducted in 1999. A published, peer-reviewed version of that analysis considers strengths and limitations of the approach (Bhatia 2001).

The study by Backlund et al. modeled the hazard ratio as a function of the natural log of income separately for different age and gender groups (Equation 1). The study additionally adjusted (controlled) for a number of possible confounders, including age, household size, education, and marital status. Values of the β_1 Coefficient for natural log of income from the application of this model to the NLSM data are listed in the table below.

$$(1) \quad \ln(\text{HR}_{\text{Mortality}}) = \alpha_0 + \beta_1 * \ln(\text{Family Income}) + \sum_i \beta_i \times \text{covariate}_i$$

Values for β_1 Coefficient for natural log of income from Backlund et al. (1996)

Age Group	Women	Men
25-44	-0.175	-0.265
45-64	-0.199	-0.301
>65	-0.050	-0.125

This model allows one to estimate the hazard for mortality for a change in income holding other parameters constant (Equation 2). Since the change in income is a function of the elasticity of income relative to the minimum wage and the change in the minimum wage, the hazard ratio can be directly estimated as a function of elasticity and the percent change in the minimum wage (Equation 3).

$$(2) \quad \text{HR}_{\text{Mortality}} = \exp\{\beta_1 * \ln(\text{Income}_{\text{New}} / \text{Income}_{\text{Old}})\}$$

$$(3) \quad \text{HR}_{\text{Mortality}} = \exp\{\beta_1 * \ln(1 + \varepsilon_{\text{Income} / \text{Min Wage}} \times \delta_{\text{Min Wage}})\}$$

The empirical analysis conducted by Dube (2013), *Minimum Wages and the Distribution of Family Income*, provides a source of age-income elasticity estimates for quantiles of the income distribution. The study examined the relationship between the family income distribution for non-elderly individuals (< 65 years) and changes in the minimum wage since 1990. The approach accounts for wage impacts on employment and work hours. Quantile-specific elasticity estimates from the Dube study are presented in the table below. Elasticity is quantified as the ratio of the percentage change in a response variable to the percentage change in a predictive variable and in this case represents the percent change in family income for a percent change in the minimum wage. Based on the Dube analysis, above 25% of the income distribution, the estimates of elasticity are insignificant.

Quantile of Family Income	Estimated of the Elasticity of Income Relative to the Minimum Wage	Estimated Effect on Family Income of a 40% Change in Minimum Wage
5%	0.466	18.6%
10%	0.316	12.6%
15%	0.212	8.2%
20%	0.136	5.4%
25%	0.061	2.4%
30%	0.024	0.0%
35%	0.012	0.0%
40%	0.024	0.0%
45%	-0.005	0.0%
50%	0.01	0.0%

Thus, for a given change in the minimum wage, hazard ratios can then be calculated for each gender and age group for specific quantile of family income. The table below illustrates estimated mortality rate reductions for persons in a family at the lowest 10% of the income distribution for a change in the federal minimum wage from \$7.25 to \$10.10.

Reductions in mortality rates attributed to minimum wage change from \$7.25 to \$10.10.

	25 to 34	35 to 44	45 to 54	55 to 64
Male	3.1%	3.1%	3.5%	3.5%
Female	2.1%	2.1%	2.3%	2.3%

The hazard ratios for each gender, age group, and income quantile can be then applied with baseline mortality rates and population estimates to estimate mortality reductions from a given wage change.

$$(4) \quad \text{Change in Deaths} = (1 - \text{HR}_{\text{Mortality}}) \times \text{Population} \times \text{IR}_{\text{Mortality}}$$