

Appendix A: Grouping Individuals in Census Households into Families

A1 Summary of methodology

We define a family unit to consist of an adult, their spouse, and their children under 19 residing in the same Census household. Most people (about 98.0%) can be grouped into family units with a reasonable degree of certainty using the Census's indicator for relationship to householder. The remaining 2.0% are adults and children who have ambiguous relationships with one another based on the household relationship variables in the Census. In these cases, we assign each adult to his or her own family unit (i.e., we do not assume any spousal relationships between them). Of the 2.0% of remaining individuals with ambiguous family relationships, 1.8% are adults whom we assign to their own family unit. The remaining 0.2% are children belonging to indeterminate family units (i.e., there is more than one family in the household that the child could plausibly belong to), and in these cases we randomly assign children to a family unit in the household.

A2 Detailed description of methodology

A2.1 Immediate family of the householder

We group the householder's spouse and children under 19 (if present) into his or her family unit. We also include the householder's grandchildren under 19 if no adult child or son-/daughter-in-law of the householder is present, as well as the householder's siblings under 19 if the householder's parents are not present.

A2.2 Adult siblings, children, or grandchildren of the householder and their families

Siblings, children, or grandchildren of the householder who are over 19 become their own family units. When the householder has only one adult child, we assign his or her son- or daughter-in-law and grandchildren (if present) to the adult child's family unit. When there is a son- or daughter-in-law but no adult child, they become their own family unit along with any grandchildren. Finally, we assign any "other non-relative children" to the family of the adult sibling or adult grandchild.

A2.3 Unmarried partners and their children

Many people also reside in households where the householder has an unmarried partner. This unmarried partner forms their own family unit and we assign any children that are unrelated to the householder to this family unit.

A2.4 Parents of the householder and their families

Some households include one or two parents or parents-in-law of the householder. These parents/parents-in-law become their own family unit(s). In some cases, the household also includes siblings of the householder who are under 19. We assign these siblings to the family unit of the householder's parent(s), if present.

A2.5 Adults and children with ambiguous relationships to one another

The above-described scenarios allow us to group 98% of people into family units. The remaining 2% are in households where family units cannot be identified in a straightforward fashion using

relationship to household head variables available in the Census. These remaining cases largely involve the presence of multiple roomers/boarders or housemates/roommates and other non-relatives of the householder, where these individuals could be married to one another or not.

We assign each person over 19 in these categories becomes to own family unit, along with any children of the same category (e.g. roomer/boarder, housemate/roommate, non-relative). There are a very small number of people (0.2% of the Census population) who are children who could plausibly belong to multiple family units in the household. In these cases, we randomly assign them to one such family unit within the household.

Appendix B: Calculating Family Income in Tax Records

B1 Defining Income and Poverty

Because we wish to identify adults newly eligible for Medicaid under expansions, we follow the definitions of income and poverty status used to determine Medicaid eligibility. To calculate income, Medicaid employs an income concept called Modified Adjusted Gross Income (MAGI), which is equal to adjusted gross income (AGI) plus any untaxed foreign income, non-taxable Social Security benefits, and tax-exempt interest.

B2 Calculating Family Income and Poverty Status

We confront various issues in attaching income sources to family units and address these according to an approach adapted from Meyer et al. (2020).

B2.1 Attaching Income Sources to Families

We link all adults assigned a linkage key in the 2010 Census to 2009 IRS 1040s, W-2s, and 1099-Rs. We attach at most one 1040 return to each family, keeping only 1040s where the adult filer, co-filer, or both links to the family unit (i.e. we do not keep returns where only a dependent on the return links to the family).

When one adult in a family links to a joint return, but another does not we either bring in all of the income (when the other adult is not PIKed in the Census) or half if the other adult is PIKed and not on the return. In some cases, the two adults in a family link to separate 1040s; in such cases, we do not bring in the 1040 return information for either, but rather proceed to bring in income information from W2s associated with each of these individuals.

For any adult in the family who does not link to a 1040, we bring in W-2s and 1099-Rs, keeping all forms that link (since each form represents a separate income stream).

B2.2 Calculating Income to Poverty Ratio

When 1040s are available, we calculate MAGI as the sum of AGI, tax-exempt interest and estimated non-taxable SS benefits. When no 1040 is available, we sum taxable wages and retirement distributions from W-2s and 1099-Rs. For families with no W-2s or 1099-Rs, we set MAGI equal to zero. We then compare 2009 MAGI to the Federal Poverty Guidelines to identify adults in families with income less than 138% of the FPL who could have benefited expansions.

Appendix C: Comparing Proportional and Additive Hazard Models

Figure C1:

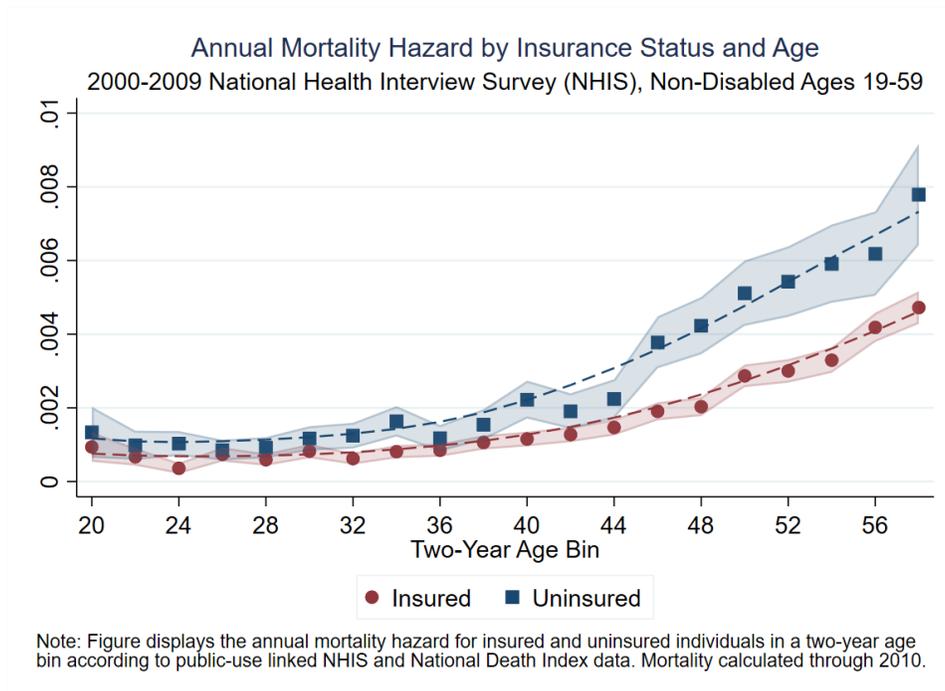
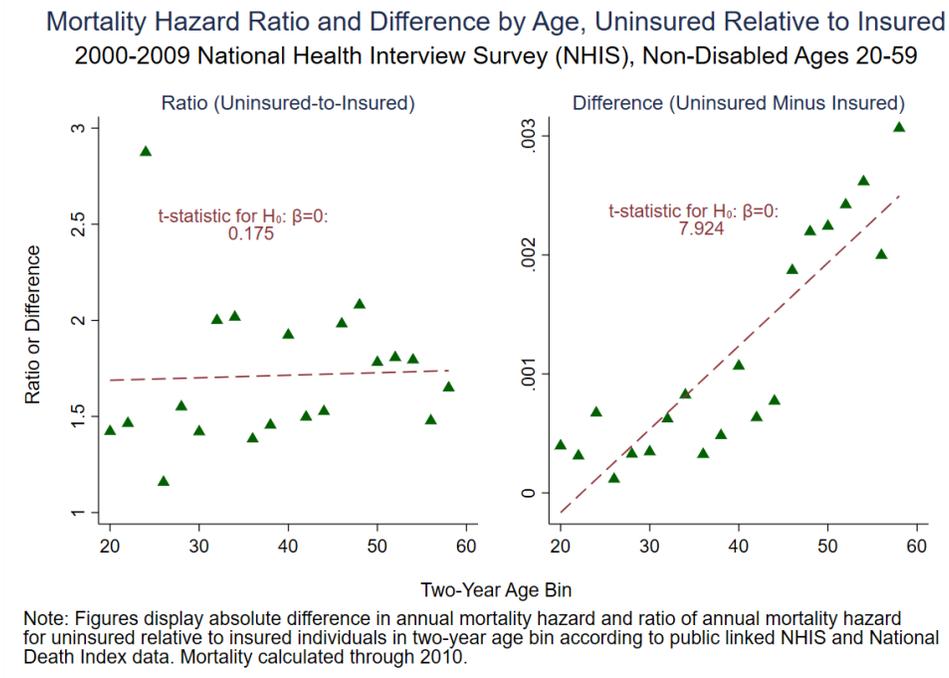


Figure C2:



Appendix D: Approximation of Estimates for Disabled Group

Table D1: Estimated Coefficients in Non-Disabled and Overall Samples and Approximated Coefficients in Disabled-Only Sample

Outcome	Non-Disabled (Estimated)	Disabled Only (Approximated)	Overall (Estimated)
Medicaid (Coefficient)	0.1170	0.0051*	0.1060
Mortality (Coefficient)	-0.0249	0.0982*	-0.0128
% Change in Mortality	-2.46%	10.32%*	-1.27%
N	441,200,000	48,100,000	489,300,000
Share	0.9017	0.0983	1.0000

*Starred numbers are approximated by assuming that the coefficient in the overall sample is a sample size-weighted average of the coefficients on the non-disabled and disabled-only samples.

Appendix E: Estimating Lives and Life-Years Saved by Medicaid Expansions, Avoidable Deaths, and Cost-Effectiveness

This Appendix presents a framework for estimating the number and age cohort distribution of lives and life-years saved by Medicaid expansions and estimating the cost per life and life-year saved by expansions.

E1 Estimating Lives and Life-Years Saved and Avoidable Deaths

E1.1 Life-Table Framework

We let $\lambda_j(t)$ be the mortality hazard for age cohort $j \in (19, \dots, 59)$ in period $t \geq 2010$, where cohorts are indexed by age in 2010. The cumulative survival rate $S_j(\lambda_j(t)) = \prod_{z=2010}^t (1 - \lambda_j(z))$ is calculated using the vector of mortality hazards up to time t . The share of individuals in age cohort j who survive to the end of our study is equal to $S_j(\lambda_j(2022)) = \prod_{z=2010}^{2022} (1 - \lambda_j(z))$. The average life expectancy for individuals in age cohort j in, T_j , is equal to the sum of the cumulative survival rates through the end of the human life span, i.e. $T_j = \sum_{t=2010}^{\infty} S_j(t)$.

E1.2 Estimating Lives and Life-Years Saved

We estimate the number of lives and life-years saved in each age cohort by Medicaid expansions. Allowing $D \in (0, 1)$ to index Medicaid expansion status, the number of lives saved is equal to the weighted sum of the change in survival probabilities:

$$\Delta_j^{lives} = \left(S_j^{D=1}(\lambda_j(2022)) - S_j^{D=0}(\lambda_j(2022)) \right) * N_j$$

and the number of life-years saved is the weighted sum of the change in life expectancies:

$$\Delta_j^{lifeyears} = (T_j^{D=1} - T_j^{D=0}) N_j$$

where N_j indicates the count of people in each age cohort residing in expansion states in our sample.

We obtain estimates of the mortality hazard $\lambda_j^{D=0}(t)$ for $t \in (2010, \dots, 2129)$ from SSA life tables, allowing individuals to age until the maximum of the human life span indicated in these tables (119 years old).¹ We use these mortality hazards to estimate $S_j^{D=0}(\lambda_j^{D=0}(2022))$ and $T_j^{D=0}$.

To obtain estimates of the mortality hazard under expansion, $\lambda_j^{D=1}(t)$, we deflate mortality hazards in post-expansion years from the SSA life tables by 2.5 percent, our estimated treatment effect. Because the population-weighted average number of post-expansion years in states that expanded

¹ Because the data in SSA life tables reflects the mortality hazard in the overall population, which we expect to be lower than the mortality hazard in the low-income population, we use the 2010-2013 National Health Interview Survey (NHIS) to obtain an estimate of the ratio of the annual mortality hazard among those ages 19-59 with incomes below 1.38 times the poverty level to the annual mortality hazard in the overall population of these ages.

is 8.5 and the total number of years in our study is 12, we employ the following stepwise function to estimate the mortality hazard:

$$\lambda_j^{D=1}(t) =$$

- $\lambda_j^{D=0}(t)$ for $t \in (2010, 2011, 2012)$
- $\lambda_j^{D=0}(t) * (1 - \frac{\tau}{2})$ for $t = 2013$
- $\lambda_j^{D=0}(t) * (1 - \tau)$ for $t \in (2014, \dots, 2022)$
- $\lambda_j^{D=0}(t)$ for $t \in (2023, 2129)$

We then use these mortality hazards to estimate $S_j^{D=1}(\lambda_j^{D=1}(2022))$ and $T_j^{D=1}$, which in turn allows us to estimate Δ_j^{lives} and $\Delta_j^{lifeyears}$.

E1.3 Estimating Avoidable Deaths

We adopt analogous methods to estimate the number of lives that could have been saved in expansion states if they had adopted early expansion in 2010 and non-expansion states if they had expanded in 2010, allowing

$$\lambda_j^{D=1}(t) = \lambda_j^{D=0}(t) * (1 - \tau) \text{ for } t \in (2010, \dots, 2129)$$

E2 Estimating Cost Per Life and Per Life-Year Saved

According to Kaiser Family Foundation (KFF) analysis of Medicaid data, the average cost for adults newly eligible under the ACA expansions was \$5,225 in 2019. This cost reflects enrollment at any point during the year. Using our first-stage estimates, we estimate that expansions resulted in an additional 28.7 million person-years of Medicaid enrollment, or about \$149.9 billion total. Dividing this by the number of lives and life-years saved by expansions yields cost estimates of about \$5.4 million and \$179,000, respectively. Braithwaite et al. (2008) use the rise in health expenditures and mortality changes over time to estimate that societal willingness-to-pay for each additional life-year is \$217,000 to \$314,000 (updated to 2019 dollars).