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IZA DP No. 16503

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ABSTRACT

The Long Shadow of the Past: Early-Life Disease Environment and Later-Life Mortality*

A recently growing literature evaluates the influence of early-life conditions on life-cycle health and mortality. This paper extends this literature by estimating the associations between birth-state infant mortality rates experienced during early-life (as a proxy for general disease environment, health-care access, and nutrition) and life-cycle mortality rates. Using the universe of death records in the US over the years 1979-2020 and implementing two-way fixed effect models, we find that a 10 percent rise in birth-state infant mortality rate is associated with about 0.23 percent higher age-specific mortality rate. These correlations are more concentrated in ages past 50, suggesting delayed effects of early-life exposures. Moreover, we find substantially larger correlations among nonwhites, suggesting that the observed racial disparities in mortality can partly be explained by disparities in early-life conditions. Further, we provide empirical evidence to argue that reductions in education, income, and socioeconomic scores are likely mechanism channels.

JEL Classification: I18, J13, N31, N32

Keywords: mortality, infant mortality, early-life exposures

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1. Introduction

There is a recently growing literature that examine the role of early-life environment in explaining the disparities in later-life outcomes. Empirical studies in various setting provide suggestive evidence that policy and environmental exposures experienced by infants and children may have lingering influence across their life course (Almond et al., 2018; Almond & Currie, 2011a, 2011b; Barker, 1994, 1995; Currie & Rossin-Slater, 2013). For instance, studies point to the relevance of disease environment experienced during in-utero, early-life, and childhood for children's health and their later-life outcomes. Case & Paxson (2009) document that those born in census regions with a higher infant mortality rates are more likely to reveal impaired cognitive functioning during old age. Bozzoli et al. (2009) employ data from several developed countries and show that individuals who were born in countries with higher infant mortality reveal lower height across the life course. Although the extent of the outcomes explored in these studies is limited, they point to declining health outcomes for individuals with higher exposure to adversities in early life with potential spillover and effects on other outcomes.

Mortality outcomes offer an extreme but precise measure of health. Empirical studies link mortality outcomes to early-life conditions and childhood environment (Aizer et al., 2016; Fletcher, 2018a, 2018b; Hayward & Gorman, 2004; Lindeboom et al., 2010; Van Den Berg et al., 2006). For instance, Fletcher (2018a) provides evidence that cohorts who were in utero during the infamous 1918 influenza reveal higher mortality rates later in life. Similarly, Mazumder et al. (2010) show that cohorts exposed to the 1918 influenza during in utero have higher cardiovascular diseases during adulthood and old age.

The current study extends this literature by evaluating the correlations between infant mortality rates at birth-state-year, as a proxy for general disease environment, undernutrition, and lack of healthcare access, and later-life age-specific mortality rates. We find that those born in states with higher infant mortality rates reveal higher mortality rates across the life course, although these effects are more concentrated for mortality in ages past 50. We observe that these correlations are substantially larger among nonwhite population suggesting the role of early-life environment in racial disparity in mortality outcomes. Further, we provide evidence of reductions in income, socioeconomic scores, and educational attainments as potential mechanism channels.

We make two important contributions to the literature. First, to our knowledge, this is the first study to examine the links between infant mortality rate in early-life and later-life mortality in the US. While previous studies focus on the link between early-life postnatal mortality and other outcomes (Almond et al., 2012; Bozzoli et al., 2009; Saavedra, 2017) or other disease exposures and later-life mortality links (Beach, Clay, et al., 2022; Fletcher, 2018a, 2018b; Mazumder et al., 2010), no study has directly explored the associations between infant mortality rate in early-life and later-life mortality. Second, also we add to the small but growing literature that evaluates the relevance of early life conditions and adversities on later-life mortality and longevity (Aizer et al., 2016; Cutler et al., 2006; Noghanibehambari & Engelman, 2022; Noghanibehambari & Fletcher, 2022, 2023; Schmitz & Duque, 2022).

The rest of the paper is organized as follows. Section 2 introduces data sources. Section 3 discusses the econometric method. Section 4 reviews the results. Finally, we conclude the paper in section 5.

2. Data Sources

The primary source of data is vital statistics death certificates extracted from NCHS (2020). The NCHS data covers the universe of deaths in the US. Starting from 1979, the NCHS reports state-of-birth of the deceased, an important identifier in our setting. The data contains the age, race, ethnicity, and state-year of death. We use age-at-death and year-of-death to infer birth cohort. We use the restricted version of this data which covers death records up to 2020. The initial sample contains 88,095,864 death records.

Infant mortality data is extracted from Bailey et al. (2016). The data contains infant death data at the county level from 1915 to 2007. We aggregate the data at the state-level since the NCHS sample reports birth-states.

To calculate mortality rates, we collapse the NCHS data by birth-year, birth-state, current-year, current-state, and age. We then calculate mortality rates as follows:

$$MR_{bcsta} = \frac{N_{bcsta}}{POP_{sta}} \times 100{,}000$$

Where MR is mortality rate of cohort c born in state b died at age a in state s in year t. The denominator is aggregate population by state, year, and age taken from SEER (2019). We then merge this data with the infant mortality data of Bailey et al. (2016) based on birth-state and birth-year. Therefore, the final sample covers the birth cohorts of 1915-2007 who died between 1979-2020.

We also use decennial censuses combined with American Community Survey data from 1910-2007 to calculate a series of birth-state covariates. We interpolate these covariates for inter-decennial years. This data is extracted from Ruggles et al. (2020).

Summary statistics of the final sample are reported in left and right panels of Table 1 for below-median and above-median birth-state infant mortality rate, respectively. The average age-specific mortality rate is 20.8 (60.2) per 100,000 for below-median (above-median) infant death rate, respectively. Similarly, the average infant mortality rate is 2,396 (6859) per 100,000 for below-median (above-median) infant death rate, respectively. States with above-median infant mortality have slightly higher share of nonwhites (15.8 versus 13.7) and lower socioeconomic index (27.3 versus 34.7).

Figure 1 depicts the geographic distribution of states in the final sample based on the quartiles of infant mortality rate over the years 1915-2007 (top panel) and quartiles of age-specific death rates (bottom panel). In Table 2, we report the states with available infant mortality data for several selected years. In 1915, there are only 15 states in the sample. By 1930, we have information on 47 states. From 1940 onwards, there are 50 states in the final sample.

3. Econometric Method

Our identification strategy compares age-specific death rates of cohorts born in states with higher infant mortality rate to those born in states with lower infant mortality rates, net of fixed effects and controls. Specifically, we implement panel data fixed effect models as follows:

$$MR_{bcrst} = \alpha_0 + \alpha_1 IMR_{bc} + \alpha_2 X_{bcrst} + \alpha_3 Z_{bc} + \eta_{cr} + \gamma_b + \xi_s + \zeta_t + \varepsilon_{bcrst} \qquad (1)$$

Where b indexes birth-state, c cohort, r census-region, and a age. Variable IMR represents infant mortality rate for cohort c born in state b. In X, we include share of females and nonwhites from the NCHS data. In Z, we include birth-state covariates, including average socioeconomic scores, female labor force participation rate, and share of whites, females, blacks, Hispanics, homeowners, people of different age groups, workers of different occupation groups, literate, and married. Parameter γ represents birth-state fixed effects. Parameter η represents region-by-cohort fixed effects to account for secular convergence of mortality outcomes across cohorts of different regions of the country. Fixed effects for current state and year are included in ξ and ζ, respectively. Finally, ε is a disturbance term. We cluster standard errors at the birth-state level to account for serial correlations in error terms. We weight regressions by the number of observations in each cell prior to collapsing the NCHS data.

4. Results

4.1. Main Results

The main results of the paper are reported in Table 3. We report the parsimonious results of regressions that only include birth-state and birth-year fixed effects in column 1. We then add more covariates across consecutive columns. The fully parametrized model of column 3 suggests that a 10 percent rise in infant mortality at state-year-of-birth is associated with 0.23 percent higher age-specific mortality rate later in life. To put this number into perspective, we use the reduction in infant mortality rate between the years 1920-2000. During this period, infant mortality dropped from 84.1 to 5.3 per 1,000, a decrease of about 94 percent. Therefore, the reduction in age-specific later-life mortality rate associated with this reduction is about 21.6 percent.

These results are in line with several studies that suggest the disease burden in early-life is associated with adverse life-cycle health outcomes (Bozzoli et al., 2009; Case & Paxson, 2009). However, these findings are in contrast with the results of Haywarda et al. (2016) who use Finnish data and show that child mortality rates during the early years of life has no association with mortality rates between ages 15-50.

In Table 4, we examine the correlations across different ages. We observe mixed results across ages 1-49. We observe negative correlations for age groups 1-9, 15-24, and 40-49 while positive associations for age groups 10-14 and 25-39. However, we observe consistently positive correlations for ages post-50, suggesting that early-life adversities and disease burden have delayed effects which are more likely to appear during older ages.

In Table 5 and Table 6, we examine the heterogeneity in the results based on race and gender, respectively. We observe substantially larger effects among nonwhites. The coefficient of full model of column 4 (nonwhites) is roughly 16 times larger than that of column 2 (whites). This is in line with several previous empirical research suggesting the higher impacts of exposures to disease environment for minorities and the disadvantaged population (Almond, 2006; Beach, Brown, et al., 2022). We also observe larger impacts among females. The respective coefficient of male mortality is about half the size compared with that of females and becomes statistically insignificant.

Disease exposure during early-life and specifically during prenatal development could result in later-life mortality risks through several channels, including changes in fetal programming. For instance, disease exposure may lead to malnutrition and alterations in the metabolism of glucose and insulin in the body with a permanent and long-lasting stamp. This adaptation could be advantageous in an environment with limited nutrition during later stages of life but can elevate the risks of cardiovascular disease and diabetes once the nutritional burden is removed (Barker, 1997; Myrskylä et al., 2013). Further, early-life disease exposure may cause infections which could also suppress the immune system to later-life infections or alternatively could alert the immune system with side effects on chronic conditions (Ochoa et al., 2004). To examine these channels, we examine the correlations across causes of death. The results are reported in Table 7. We find correlations that vary between 0.015-0.031 for various diseases including infectious diseases, diabetes, and cardiovascular diseases (columns 1-6). However, we do not observe a significant correlation for external causes of deaths and suicide mortality. Considering the nature of these types of deaths, their coefficients may be interpreted as placebo tests as they could not have been impacted by early-life exposures.

4.2. Mechanism Channel

Several studies suggest that improvements in education, income, and socioeconomic status lead to increases in longevity and are associated with mortality gains (Chetty et al., 2016; Fletcher, 2015; Lleras-Muney, 2005; Meghir et al., 2018). Since the NCHS data does not report these outcomes, we use alternative data sources to explore these potential mechanism channels. In so doing, we use decennial censuses between the years 1940-2000 combined with the American Community Survey for the years 2001-2020. We implement similar regressions as equation 1 and report the results in Table 8. We observe significant reductions in socioeconomic score (column 1), increases in the probability of low education (columns 3-4), and reductions in household and individual income (columns 5-6). For instance, a 10 percent rise in birth-state infant mortality rate is associated with 1.7 units drop in socioeconomic score (off a mean of 44.9), a 3.6 percentage-points increase in the probability of having less than 12 years of schooling (off a mean of 0.13), and 0.09 percent reduction in individual income.

To understand what portion of correlations can be explained by these channels, we use estimates from previous research. Lindahl (2005) estimates the effects of income on health and mortality. He estimates that an increase of 10 percent in income is associated with a reduction of about 0.2 percentage-points in 5-year mortality, off a mean of 0.065. This can be translated into a reduction of about 3 percent with respect to the mean. Based on column 6 of Table 8, a 10 percent rise in birth-state infant mortality is correlated with 0.088 percent rise in income. Based on Lindahl (2005)'s estimates, this rise in income suggests a drop in mortality by about 0.26 percent. This is very similar to the observe correlation of column 3 of Table 3.

5. Conclusion

Understanding the determinants of health and mortality outcomes is important for policymakers as they provide solutions to improve these outcomes. A recently developed and growing literature points to the relevance of early-life and childhood environment and conditions for life-cycle health outcomes (Almond et al., 2018; Almond & Currie, 2011a, 2011b). The current study joined this literature and investigated the associations between state-level infant mortality experienced early-life, as a measure of general disease environment, undernutrition, and lack of healthcare access, on life-cycle age-specific mortality rate. We employed the universe of death records in the US over the years 1979-2020 and implemented two-way fixed effect models.

Conditional on a full set of fixed effects and controls, a 10 percent higher infant mortality is associated with an increase of 0.23 percent in age-specific mortality rate over the life course. However, we observed that these effects are more concentrated in older ages, specifically ages past 50, suggesting delayed influences of early-life exposures. Moreover, we found substantially larger effects among nonwhites, suggesting that the observed racial disparities in mortality can be attributable to disparities in early-life conditions and exposures. Finally, we provided evidence of negative correlations between early-life infant mortality rate and later-life education, income, and socioeconomic scores. We argued that almost all the observed associations for mortality can be explained by changes in these mediatory channels.

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Tables

Table 1 - Summary Statistics

	Below Median Birth-State Infant Mortality Rate		Above Median Birth-State Infant Mortality Rate	
	Mean	Std. Dev.	Mean	Std. Dev.
Mortality Rate (per 100,000)	20.832	96.971	60.225	283.268
Log Mortality Rate	1.852	1.236	2.57	1.402
Infant Mortality (per 100,000)	2396.015	1029.856	6859.694	2818.648
Log Infant Mortality Rate	7.611	.794	8.764	.359
Female	.363	.365	.442	.335
Nonwhite	.137	.28	.158	.298
Number of Deaths	12.392	66.228	23.665	123.211
Birth-State Covariates:				
Share of Whites	.905	.091	.859	.15
Share of Blacks	.078	.082	.133	.153
Share of Hispanics	.03	.054	.02	.055
Share of Other Races	.018	.046	.007	.017
Share of Females	.506	.011	.495	.014
Share of Homeowners	.496	.222	.413	.152
Share of Aged 0-4	.095	.021	.106	.019
Share of Aged 5-10	.113	.018	.127	.019
Share of Aged 11-18	.14	.015	.155	.018
Share of Aged 19-25	.104	.015	.119	.012
Share of Aged 26-55	.379	.031	.379	.036
Share of Aged 56-more	.169	.039	.114	.023
Share of Immigrants	.085	.054	.088	.082
Share of White-Collar Workers	.106	.046	.045	.019
Share of Farmers	.067	.083	.178	.124
Share of Literate	.82	.069	.773	.113
Share of Other Occupations	.033	.132	.553	.419
Share of Married	.635	.046	.617	.034
Female Labor Force Participation Rate	.407	.125	.269	.069
Average Socioeconomic Index	34.768	4.122	27.303	3.91
Observations	1538992		1538960	

Table 2 - Birth States in the Final Sample for Selective Years

Years:				
1915	1920	1925	1930	2000
Connecticut	California	California	Alabama	Alabama
District of Columbia	Connecticut	Connecticut	Arizona	Arizona
Maine	District of Columbia	Delaware	Arkansas	Arkansas
Massachusetts	Indiana	District of Columbia	California	California
Michigan	Kansas	Florida	Colorado	Colorado
Minnesota	Kentucky	Illinois	Connecticut	Connecticut
New Hampshire	Maine	Indiana	Delaware	Delaware
New York	Maryland	Iowa	District of Columbia	District of Columbia
Pennsylvania	Massachusetts	Kansas	Florida	Florida
Rhode Island	Michigan	Kentucky	Georgia	Georgia
Vermont	Minnesota	Maine	Idaho	Hawaii
	Nebraska	Maryland	Illinois	Idaho
	New Hampshire	Massachusetts	Indiana	Illinois
	New York	Michigan	Iowa	Indiana
	North Carolina	Minnesota	Kansas	Iowa
	Ohio	Mississippi	Kentucky	Kansas
	Oregon	Montana	Louisiana	Kentucky
	Pennsylvania	Nebraska	Maine	Louisiana
	South Carolina	New Hampshire	Maryland	Maine
	Utah	New Jersey	Massachusetts	Maryland
	Vermont	New York	Michigan	Massachusetts
	Virginia	North Carolina	Minnesota	Michigan
	Washington	North Dakota	Mississippi	Minnesota
	Wisconsin	Ohio	Missouri	Mississippi
		Oregon	Montana	Missouri
		Pennsylvania	Nebraska	Montana
		Rhode Island	Nevada	Nebraska
		Utah	New Hampshire	Nevada
		Vermont	New Jersey	New Hampshire
		Virginia	New Mexico	New Jersey
		Washington	New York	New Mexico
		West Virginia	North Carolina	New York
		Wisconsin	North Dakota	North Carolina
		Wyoming	Ohio	North Dakota
			Oklahoma	Ohio
			Oregon	Oklahoma
			Pennsylvania	Oregon
			Rhode Island	Pennsylvania
			South Carolina	Rhode Island
			Tennessee	South Carolina
			Utah	South Dakota
			Vermont	Tennessee
			Virginia	Texas
			Washington	Utah
			West Virginia	Vermont
			Wisconsin	Virginia
			Wyoming	Washington
				West Virginia
				Wisconsin
				Wyoming

Table 3 - Birth State Infant Mortality and Later-Life Mortality

	Log Age-Specific Mortality Rate		
	(1)	(2)	(3)
Log Birth-State Infant Mortality Rate	.04908*	.02631**	.02339***
	(.02699)	(.01295)	(.00818)
Observations	3077952	3077952	3077952
R-squared	.33917	.34101	.34163
Mean DV	5.332	5.332	5.332
Birth-State and Birth-Year FE	✓	✓	✓
State and Year FE	✓	✓	✓
Controls		✓	✓
Region-by-Birth-Year FE			✓

Notes. Standard errors, clustered on birth-state, are in parentheses. Controls include birth-state covariates, including average socioeconomic scores, female labor force participation rate, and share of whites, females, blacks, Hispanics, homeowners, people of different age groups, workers of different occupation groups, literate, and married. Regressions are weighted using the average number of deaths in each cell.
*** p<0.01, ** p<0.05, * p<0.1

Table 4 - The Correlations between Birth State Infant Mortality and Later-Life Mortality across Age Groups

	Log Age-Specific Mortality Rate			
	Age 1-4	Age 5-9	Age 10-14	Age 15-19
	(1)	(2)	(3)	(4)
Log Birth-State Infant Mortality Rate	-.0097	-.03927*	.00307	-.00405
	(.0183)	(.01971)	(.01249)	(.01686)
Observations	27717	25730	40783	92087
R-squared	.29311	.16792	.19085	.13668
Mean DV	3.374	2.498	2.728	3.499
	Age 20-24	Age 25-29	Age 30-34	Age 35-39
	(5)	(6)	(7)	(8)
Log Birth-State Infant Mortality Rate	-.00144	.01961**	.01301*	.00537
	(.0087)	(.00926)	(.00711)	(.00614)
Observations	117511	131459	151013	174528
R-squared	.15136	.17726	.19132	.19409
Mean DV	3.527	3.493	3.559	3.708
	Age 40-44	Age 45-49	Age 50-54	Age 55-59
	(9)	(10)	(11)	(12)
Log Birth-State Infant Mortality Rate	-.00142	-.00193	.00373	.00341
	(.00417)	(.00393)	(.00567)	(.00891)
Observations	202828	235273	264279	281349
R-squared	.19475	.1982	.20944	.22952
Mean DV	3.952	4.270	4.623	4.978
	Age 60-64	Age 65-69	Age 70-74	Age 75-80
	(13)	(14)	(15)	(16)
Log Birth-State Infant Mortality Rate	.0032	.02398	.07378*	.11589***
	(.01032)	(.01697)	(.04367)	(.03405)
Observations	282708	261719	232150	196130
R-squared	.26054	.28812	.30821	.3271
Mean DV	5.337	5.663	6.023	6.432
Birth-State and Birth-Year FE	✓	✓	✓	✓
State and Year FE	✓	✓	✓	✓
Controls	✓	✓	✓	✓
Region-by-Birth-Year FE	✓	✓	✓	✓

Standard errors, clustered on birth-state, are in parentheses. Controls include birth-state covariates, including average socioeconomic scores, female labor force participation rate, and share of whites, females, blacks, Hispanics, homeowners, people of different age groups, workers of different occupation groups, literate, and married. Regressions are weighted using the average number of deaths in each cell.
*** p<0.01, ** p<0.05, * p<0.1

Table 5 – Heterogeneity in the Correlations by Race

	Log Age-Specific Mortality Rate			
	Whites		Nonwhites	
	(1)	(2)	(3)	(4)
Log Birth-State Infant Mortality Rate	.00293	.0048	.05903	.08031**
	(.00902)	(.00652)	(.03849)	(.03677)
Observations	2871110	2871110	1029746	1029746
R-squared	.36204	.36251	.43717	.43894
Mean DV	5.416	5.416	5.459	5.459
Birth-State Birth-Year and Age FE	✓	✓	✓	✓
State and Year FE	✓	✓	✓	✓
Controls	✓	✓	✓	✓
Region-by-Birth-Year FE	✓	✓	✓	✓

Notes. Standard errors, clustered on birth-state, are in parentheses. Controls include birth-state covariates, including average socioeconomic scores, female labor force participation rate, and share of whites, females, blacks, Hispanics, homeowners, people of different age groups, workers of different occupation groups, literate, and married. Regressions are weighted using the average number of deaths in each cell.
*** p<0.01, ** p<0.05, * p<0.1

Table 6 – Heterogeneity in the Correlations by Gender

	Log Age-Specific Mortality Rate			
	Females		Males	
	(1)	(2)	(3)	(4)
Log Birth-State Infant Mortality Rate	.02175	.02138**	.01145	.01038
	(.0144)	(.00942)	(.01147)	(.00872)
Observations	2118815	2118815	2555530	2555530
R-squared	.33286	.33335	.35112	.35173
Mean DV	5.252	5.252	5.503	5.503
Birth-State Birth-Year and Age FE	✓	✓	✓	✓
State and Year FE	✓	✓	✓	✓
Controls	✓	✓	✓	✓
Region-by-Birth-Year FE	✓	✓	✓	✓

Notes. Standard errors, clustered on birth-state, are in parentheses. Controls include birth-state covariates, including average socioeconomic scores, female labor force participation rate, and share of whites, females, blacks, Hispanics, homeowners, people of different age groups, workers of different occupation groups, literate, and married. Regressions are weighted using the average number of deaths in each cell.
*** p<0.01, ** p<0.05, * p<0.1

Table 7 - Heterogeneity in the Correlations by Causes of Death

	Outcome: Log Mortality Rate, Cause:							
	TB, Syphilis Other Infectious Diseases	Neoplasm Diseases	Diabetes	Cardiovascular Diseases	Influenza, Pneumonia, Peptic Ulcer, Nephritis	All other Diseases	External Causes	Suicide
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log Birth-State Infant Mortality Rate	.02888***	.01512**	.02232**	.03026**	.01927**	.03145***	-.00106	-.0026
	(.00948)	(.00675)	(.01088)	(.01184)	(.0077)	(.0084)	(.00863)	(.00382)
Observations	252260	1659487	614676	1666350	1026618	1332906	1086726	491864
R-squared	.47892	.33502	.37308	.36362	.3561	.3614	.20881	.29403
Mean DV	1.947	4.274	3.098	4.547	3.592	3.851	2.789	1.844
Birth-State Birth-Year and Age FE	✓	✓	✓	✓	✓	✓	✓	✓
State and Year FE	✓	✓	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓	✓	✓
Region-by-Birth-Year FE	✓	✓	✓	✓	✓	✓	✓	✓

Notes. Standard errors, clustered on birth-state, are in parentheses. Controls include birth-state covariates, including average socioeconomic scores, female labor force participation rate, and share of whites, females, blacks, Hispanics, homeowners, people of different age groups, workers of different occupation groups, literate, and married. Regressions are weighted using the average number of deaths in each cell.

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 8 - Mechanism Channel Using Census Data 1940-2000 and American Community Survey Data 20011-2020

	Outcomes:					
	Socioeconomic Score	Years of Schooling	Education < High School	Education < 12	Log Household Income	Log Personal Income
	(1)	(2)	(3)	(4)	(5)	(6)
Log Birth-State Infant	-.16968***	-.00367	.00253***	.00366**	-.00282***	-.0088***
Mortality Rate	(.05727)	(.00781)	(.00095)	(.00149)	(.00108)	(.00243)
Observations	57220143	16909378	72832571	72832571	61903404	62166401
R-squared	.05825	.23995	.11542	.1205	.1858	.2557
Mean DV	44.953	11.906	0.045	0.125	10.788	9.911
Birth-State Birth-Year and Age FE	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓
Region-by-Birth-Year FE	✓	✓	✓	✓	✓	✓
State and Year FE	✓	✓	✓	✓	✓	✓

Notes. Standard errors, clustered on birth-state, are in parentheses. Controls include birth-state covariates, including average socioeconomic scores, female labor force participation rate, and share of whites, females, blacks, Hispanics, homeowners, people of different age groups, workers of different occupation groups, literate, and married. Regressions are weighted using the IPUMS-provided person weights.
*** p<0.01, ** p<0.05, * p<0.1

Figures

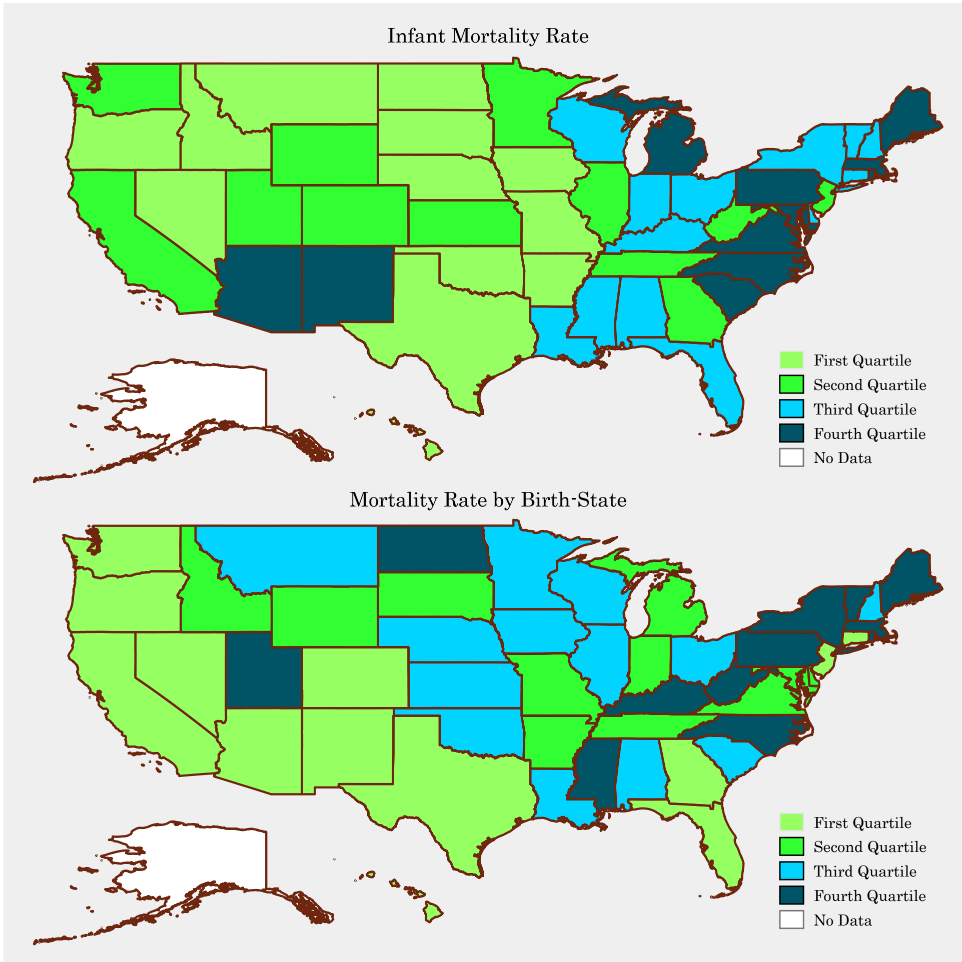

Figure 1 - Geographic Distribution of Infant Mortality Rate by Birth States