Parental Socioeconomic Status and Children's Early Life Mortality Risk in the 21st Century United States

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ABSTRACT

Objectives: We examine the association between parental socioeconomic status (SES) and mortality among children and youth (ages 1-24) in the United States from 1999-2015 using individual-level measures of SES.

Methods: We use Cox proportional hazard models to estimate all-cause and cause-specific mortality risk based on data from the National Health Interview Survey Linked Mortality Files, restricted to youth ages 1-17 at the time of survey (N=377,252) followed through age 24, or the end of the follow-up period.

Results: Children and youth raised in families with lower levels of any of the three measures of parental SES (mother's education, father's education, and family income-to-needs ratio) exhibit significantly higher mortality risk compared with children and youth living in higher SES households. Increases in parental educational attainment are associated with significant decreases in mortality risk due accidental cause of death. However, parental educational attainment is not significantly associated with other cause-specific mortality risks.

Conclusions: Today's children and youth experience vastly different mortality risk depending on the SES of their parents. Policies and programs should seek to reduce socioeconomic disparities in early life mortality and improve the United States' poor standing in early life mortality among wealthy industrialized countries.

INTRODUCTION

There is little doubt that socioeconomic status (SES) is a fundamental cause of mortality[1] both for adults[2–4] and infants[5,6], but little has been done to study the SES-mortality association in early life (i.e. ages 1-24). And while early life mortality is relatively rare and on the decline, its occurrence is still unacceptably high.[7] Compared to 16 peer countries, the United States has the highest rates of mortality in early life.[8] Furthermore, the death of a child is particularly traumatic for parents and changes their life in many ways,[9] but it also has consequences for the child's community and social contexts.[10] However, evidence suggests that increases in SES are associated with greater access to the flexible resources capable of decreasing mortality risk.[1] Children and youth rely on their parents' store of flexible resources to avoid mortality and morbidity.[11] Specifically, parent education and family income represent clear indicators of the quality and quantity of flexible resources families can leverage to improve the health and safety of their children.

Unfortunately, we know little about whether differences in parental socioeconomic status, and by extension the flexible resources families can access, result in differences in mortality risks for children and youth in early life. The majority of studies examining socioeconomic disparities in early life mortality rely on aggregate measures of SES from the country or other geographic area.[12,13] While valuable in their broad description of the links between SES and early life mortality, studies based on aggregate measures of SES cannot elucidate the link between family-level measures of SES and early life mortality.[12,13] This study seeks to advance our understand of the relationships between early life mortality in the U.S. and parental SES, by investigating the links between mother's educational attainment, father's educational attainment,

and the family's income-to-needs ratio and death between the ages of 1-24 in the U.S. from 1998-2015.

METHODS

We investigate patterns in the association between early life mortality and parental SES using National Health Interview Survey (NHIS), merged with the restricted use Linked Mortality Files (LMF) from 1998-2015. The NHIS is a nationally representative repeated cross-sectional study of the United States. We limit analyses to individuals aged 1–17 at the time of interview who were eligible for vital statistic follow-up. Individuals exit the sample on their 25th birthday, the end of the year 2015, or their death, whichever occurs first. Responses for children and youth are provided by a parent or responsible adult. Information on the timing and cause of death come from the LMF, complied by the National Center for Health Statistics (NCHS) from vital records. The resulting dataset consists of 377,252 children and youth of whom 2009 were reported as deceased prior to reaching their 25th birthday.

To analyze patterns in the associations of parental SES and early life mortality, we use Cox proportional hazards models to estimate the associations between mother's education, father's education, and family income (measured as an income-to-needs ratio) and early life mortality risk. We conduct analysis both for all-cause mortality and cause-specific mortality (i.e. accidents, homicides, suicides, and other causes of death). In supplemental analyses we stratified sample by age (i.e. ages 1-14 and 15-24) and re-analyze the associations between parental SES and all-cause mortality (results reported in Supplemental Table 1 and Supplemental Table 2).

In all models, age is used as the time scale for the Cox proportional hazards models. This approach controls for age implicitly, and produces less bias in model estimates compared to

models that include age as a covariate.[14] All analyses adjust for complex sampling design using weights provided by NCHS and include census region and year fixed effects. To account for a small portion of missing data (2.6% for mother's education, 4.3% for father's education, 16.3% for household income-to-needs ratio, 0.8% for self-reported race/ethnicity, and 0.1% for nativity), we use multiple imputation based on a multivariate Monte Carlo Markov Chain approach with five imputations.

Parental SES is measured using discrete categorizations of mother's educational attainment, father's educational attainment, and the household's income-to-needs ratio. Mother's and Father's educational attainment are separated into five dichotomous indicators of the highest level of education each parent completed. These levels are: completing a four-year college degree or more education (the reference group in all analyses), completing some college, graduating from high school, and completing less than high school. Since the underlying theory of the associations between parental SES and early life mortality concern the availability of flexible resources which arguably require the physical presence of a parent, we also include dichotomous measures of if the mother, or father, is absent from the home. The final measure of parental SES is a household income-to-needs ratio which reflects the ratio of household income relative to the U.S. Census-defined poverty threshold for that year and household size. We use four categories that compare households in which the total household income exceed the needs of all household members by 400% or more (the reference category in all analyses) to households with an income-to-needs ratio between 200% and 399%, 100% and 199%, and less than 100%.

Early life mortality is operationalized as all-cause mortality and cause-specific mortality, including mortality events due to: accidents, homicide, suicide, and other causes of death. All-cause mortality is based on any reported death in the NCHS LMF, including the few cases in which the cause of

death was unknown. Classifications of cause-specific mortality are based on the World Health Organization's 10th revision of the International Statistical Classification of Diseases, Injuries, and Causes of Death (ICD-10).[15] Accidental mortality evets include those attributable to any unintentional act, e.g., vehicular accidents, falls, and unintentional poisonings. Homicides and suicides represent mortality events resulting from assault and intentional self-harm respectively. All remaining mortality events, including those missing ICD-10 codes, are classified as other causes of death.

In results not reported here, we reanalyzed both the primary and supplementary analyses using highest parental educational attainment in place of mother's and father's educational attainment. In all cases the substantive results are unchanged. Consequently, we chose to report analyses that allow greater detail in parental SES, by delineating between maternal and paternal educational attainment.

RESULTS

Descriptive data in Table 1 show that roughly one in four children/youth in our sample were raised in households in which at least one parent obtained a four-year college degree or more education and/or household income exceeded household needs by at least 400%. This suggests that approximately 75% of children/youth experience at least one form of relative disadvantage in early life. Taking a closer look, we can see that, between 1998 and 2014, approximately 15% of children/youth lived with a mother who did not complete high school while 12% of children/youth lived with a father who did not complete high school, 25% of children/youth lived in households in which their father was not present while only 6% lived in

households in which their mother was not present, and 19% of children/youth lived below the poverty line.

(Table 1 about here)

All-cause Early Life Mortality

Each of the three measures of parental SES used in this study are significantly associated with all-cause early life mortality. When mother's education, father's education, and the total household income-to-needs ratio are included in the model separately, each is statistically and substantively associated with early life mortality net of age, sex, race, nativity, and regional and year fixed effects (see Model 1, Model 2, and Model 3 in Table 2). But, perhaps more importantly, all three indicators of parental SES retain a significant association with all-cause early life mortality when included in a joint prediction of early life all-cause mortality (see Model 4 in Table 2).

(Table 2 about here)

Compared to college graduates, lower levels of mother's education are associated with increased risk of early life mortality. Children and youth raised by mothers who completed, at most, some college are 28% more likely to die in early life compared to their peers whose mother completed college or more education (HR=1.276 $p<0.01$), net of the other parental SES measures and the other covariates in the model. Comparatively, children who whose mothers, at most, completed high school, attended some schooling but failed to graduate from high school, or who were absent from the home are 37%, 40%, and 48% more likely to die before age 24 than

their peers whose mothers are college graduates (the respective hazard ratios are: HR=1.373 $p<0.001$; HR=1.395 $p<0.002$; HR=1.484 $p<0.002$).

With the exception of high school graduates, the patterning of the association between father's education and early life mortality is similar to that between mother's education and early life mortality. Compared to children raised by fathers who graduated from college/university, children whose fathers, at most, completed some college, received some schooling but did not graduate from high school, or were absent from the home are respectively 23%, 41%, and 40% more likely to die before age 24 net of mother's education, household income, race, gender, and the other controls included in the model (the corresponding hazard ratios are: HR=1.226 $p<0.047$; HR=1.406 $p<0.003$; HR=1.396 $p<0.003$). Breaking from this pattern, children and youth raised by fathers who graduated from high school do not experience an increase in early life mortality risk compared to children/youth whose fathers completed college or further education (HR=1.076 $p<0.502$).

Similar to parental educational attainment, lower levels of household income are also associated with increased risk of mortality before to age 24, after controlling for the effects of parental educational attainment. Compared to peers whose household income is greater than 400% of household needs, children and youth who live in households in which the total household income is between 100% to 199% and less than 100% of household needs experience an increased risk of early life mortality of 37% and 38% respectively (the corresponding hazard ratios are: HR=1.366 $p<0.000$ and HR=1.380 $p<0.001$). However, children and youth who live in households in which total income covers between 200% and 399% of all household needs do not differ in their relative risk of early life mortality compared to children raised in households with an income-to-needs ratio of 400% or more.

Cause-specific Early Life Mortality

The patterning of associations between parental SES and early life mortality described above vary widely depending on the cause of death. While all three measures of parental SES are significantly associated with early life mortality due to accidents, only mother's education and the household income-to-needs ratio are associated with early life mortality due homicides, none of the measures of parental SES are associated with suicide, and only the household income-to-needs ratio is associated with other causes of death. Table 3 contains a full description of the cause-specific analyses.

(Table 3 about here)

DISCUSSION

A small body of literature has uncovered sizable differences in early life mortality rates by aggregate measures of SES.[12,13,16] But very little work has examined SES disparities in early life mortality at the individual level. The most recent study to examine patterns in the association between parental SES and early life mortality at the individual-level we are aware of is that by Robert Mare published in 1982.[16] In their analysis, Mare uses data from the June 1975 Current Population Survey to examine the impact of individual level SES on early life mortality, where mortality is based on mother's retrospective reports of child mortality before age 20. And, while more recent work investigating socioeconomic disparities in early life mortality exist, they rely solely on aggregate measures of SES.[12,13] We seek to fill this gap in our understanding of the associations between parental SES and early life mortality by using the NHIS-LMF and three

indicators of parental SES: mother's education, father's education, and household income (measured as the household income-to-need ratio).

We find large socioeconomic disparities in early life mortality risk among US children and youth over the period of 1998 to 2015 conforming to the premise that SES is a fundamental cause of mortality insofar as it affects the quality and quantity of flexible resources available to individuals (Link and Phelan). Youth whose parents have lower educational attainment or who are living in lower income households have much higher mortality risk compared to their higher SES peers. These disparities are even more striking when considering that more children live in poverty than any other age group.[17]

In the case of all-cause early life mortality, we find that mother's education, father's education, and household income have independent associations with mortality risk, net of race/ethnicity, nativity, sex, age, and region and year fixed effects. With one expectation, all three measures of parental SES maintain a relatively similar relationship with early life mortality across all levels of disadvantage. This suggests a qualitative patterning of the relationship between parental SES and early life mortality such that the distinction which matters most is that between children and youth raised in the most advantaged circumstances and everyone else. Unfortunately, the current study cannot identify the extent to which these associations are causal, but the patterning of results align with the hypothesis that parental SES is a fundamental cause of early life mortality.[1] Furthermore the results suggests that the flexible resources available to parents with a college degree or more education and/or those of greater financial means, may be important sources of differential mortality risk in early life.

The patterns identified in this study also suggest that the relationship between parental SES and early life mortality differ by cause of death. The risk of suicide is unrelated to any of the

243 measures of parental SES included in the analyses. On the other hand, the risk of being the
244 victim of homicide before the age of 25 is 91% higher for children living below the poverty line,
245 but has no significant association with being raised in a single parent household or father's
246 educational attainment. However, children whose mothers did not graduate from high school and
247 also live below the poverty line experience twice the risk of being the victim of homicide
248 compared to both children who live below the poverty line but whose mothers completed college
249 and those who live in household's with an income four times their needs but whose mothers did
250 not graduate from high school. Lastly, lower levels of parental educational attainment for either
251 mothers or father is the primary mechanism associated with an increased risk of accidental child
252 morality while access to greater financial resources is especially important for the prevention of
253 death due to medical and other causes.

254 The strong disparities we've documented here demonstrate the pernicious consequences
255 of social inequality experienced by today's youth. Policies and programs intending to reduce
256 disparities in early life mortality should target upstream factors shaping multiple dimensions of
257 risk. Specifically, improving mother's or father's education may have multiple benefits,
258 including increases in total household income as well as the accompanying decrease in the risk
259 of early life mortality associated with each independent of household income. As the US
260 continues to lag behind its peers in the health and mortality of Americans, more attention and
261 resources should be given to improving children's health and well-being, including the family
262 and household contexts in which our children live.

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Table 1: Sample Characteristics: U.S. National Health Interview Survey Linked Mortality Files 1998-2015

Characteristics	Weighted %	95% CI
Mother's education		
No resident mother	6.00	(5.86, 6.14)
Less than high school	15.07	(14.71, 15.44)
High school	24.10	(23.80, 24.40)
Some college	29.85	(29.53, 30.17)
College or more	24.98	(24.50, 25.47)
Father's education		
No resident father	25.01	(24.63, 25.40)
Less than high school	11.67	(11.35, 12.00)
High school	20.09	(19.78, 20.41)
Some college	19.84	(19.56, 20.12)
College or more	23.38	(22.87, 23.90)
Income-to-needs ratio[a]		
<100%	19.26	(18.83, 19.69)
100-<200%	22.69	(22.33, 23.04)
200-<400%	31.36	(30.98, 31.75)
≥400%	26.70	(26.18, 27.21)
Sex		
Female	48.89	(48.69, 49.08)
Male	51.11	(50.92, 51.31)
Race/ethnicity		
Non-Hispanic White	59.90	(59.25, 60.54)
Non-Hispanic Black	15.13	(14.67, 15.60)
Mexican American	13.69	(13.21, 14.19)
Other Hispanic	6.46	(6.25, 6.68)
Other race/ethnicity	4.81	(4.58, 5.06)
Nativity[b]		
Born in the U.S.	95.28	(95.14, 95.41)
Born outside the U.S.	4.72	(4.59, 4.86)
Region		
Northeast	17.14	(16.67, 17.62)
Midwest	23.79	(23.20, 24.40)
South	36.68	(36.00, 37.36)
West	22.39	(21.77, 23.03)
Age at interview		
1 to 5	29.26	(29.05, 29.48)
6 to 14	52.87	(52.67, 53.07)
15 to 17	17.87	(17.71, 18.03)
Unweight sample size	377,252	
Number of deaths (all causes)	2,009	

[a] Income-to-needs ratio represents the ratio of family income to the U.S. Census defined poverty threshold for the year in which the interview was conducted.

[b] Due to inherent differences between U.S. territories and U.S. States, individuals born in U.S. territories are included in Born outside the U.S.

Source: NHIS-LMF 1998-2015

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Table 2: Hazard Ratios for All-Cause Early Life Mortality (i.e. ages 1-24)

	Model 1		Model 2		Model 3		Model 4	
Mother's education								
No resident mother	1.88	(1.50, 2.36)					1.48	(1.16, 1.91)
Less than high school	1.92	(1.61, 2.29)					1.40	(1.14, 1.72)
High school	1.66	(1.41, 1.96)					1.37	(1.13, 1.66)
Some college	1.50	(1.27, 1.77)					1.28	(1.06, 1.54)
College or more	1	(Ref)					1	(Ref)
Father's education								
No resident father			1.90	(1.60, 2.27)			1.40	(1.12, 1.74)
Less than high school			1.94	(1.62, 2.33)			1.41	(1.13, 1.75)
High school			1.38	(1.15, 1.66)			1.08	(0.87, 1.33)
Some college			1.45	(1.21, 1.74)			1.23	(1.00, 1.50)
College or more			1	(Ref)			1	(Ref)
Income-to-needs ratio								
<100%					1.81	(1.54, 2.14)	1.38	(1.13, 1.68)
100-<200%					1.70	(1.46, 1.97)	1.37	(1.15, 1.62)
200-<400%					1.31	(1.11, 1.55)	1.15	(0.97, 1.37)
≥400%					1	(Ref)	1	(Ref)
Sex (female)								
Male	2.33	(2.12, 2.57)	2.34	(2.13, 2.58)	2.34	(2.12, 2.58)	2.34	(2.12, 2.58)
Female	1	(Ref)	1	(Ref)	1	(Ref)	1	(Ref)
Race/ethnicity								
Non-Hispanic Black	1.44	(1.26, 1.64)	1.32	(1.15, 1.51)	1.34	(1.17, 1.53)	1.24	(1.08, 1.42)
Mexican American	2.05	(1.80, 2.33)	1.99	(1.75, 2.27)	2.02	(1.78, 2.29)	1.82	(1.59, 2.08)
Other Hispanic	1.21	(1.01, 1.44)	1.17	(0.98, 1.39)	1.17	(0.98, 1.39)	1.09	(0.91, 1.30)
Other race/ethnicity	1.86	(1.50, 2.30)	1.86	(1.50, 2.30)	1.76	(1.42, 2.18)	1.80	(1.45, 2.23)
Non-Hispanic White	1	(Ref)	1	(Ref)	1	(Ref)	1	(Ref)
Nativity								
Born outside the U.S.	1.01	(0.86, 1.17)	1.02	(0.88, 1.19)	0.97	(0.83, 1.13)	0.98	(0.84, 1.15)
Born in the U.S.	1	(Ref)	1	(Ref)	1	(Ref)	1	(Ref)
Region								
Midwest	1.15	(0.97, 1.37)	1.16	(0.98, 1.38)	1.14	(0.96, 1.36)	1.14	(0.96, 1.36)
South	1.37	(1.18, 1.60)	1.38	(1.18, 1.60)	1.36	(1.17, 1.58)	1.35	(1.16, 1.58)
West	1.27	(1.08, 1.49)	1.27	(1.08, 1.50)	1.27	(1.08, 1.50)	1.26	(1.07, 1.48)
Northeast	1	(Ref)	1	(Ref)	1	(Ref)	1	(Ref)
Unweighted sample size	377,252							
Number of Deaths	2,009							

Note: All models include year fixed effects and adjust for complex sampling design. The 95% confidence intervals are in parentheses.
Source: NHIS-LMF 1998-2015

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Table 3: Hazard Ratios for Early Life Cause-Specific Mortality (i.e. ages 1-24)

	Accidents		Homicides		Suicides		Other	
Mother's education								
No resident mother	1.93	(1.35, 2.76)	1.62	(0.78, 3.36)	1.38	(0.74, 2.58)	1.05	(0.67, 1.63)
Less than high school	1.43	(1.03, 1.99)	1.95	(1.03, 3.67)	1.20	(0.67, 2.12)	1.21	(0.84, 1.74)
High school	1.66	(1.23, 2.25)	1.50	(0.82, 2.76)	1.24	(0.75, 2.04)	1.11	(0.80, 1.55)
Some college	1.48	(1.11, 1.97)	1.45	(0.78, 2.71)	0.93	(0.58, 1.50)	1.17	(0.86, 1.59)
College or more	1	(Ref)	1	(Ref)	1	(Ref)	1	(Ref)
Father's education								
No resident father	1.62	(1.18, 2.22)	1.47	(0.79, 2.73)	1.17	(0.69, 1.99)	1.20	(0.83, 1.71)
Less than high school	1.71	(1.22, 2.40)	1.16	(0.62, 2.17)	1.20	(0.66, 2.18)	1.32	(0.90, 1.94)
High school	1.29	(0.94, 1.76)	0.94	(0.49, 1.79)	0.84	(0.47, 1.49)	1.01	(0.70, 1.45)
Some college	1.30	(0.96, 1.75)	1.12	(0.60, 2.11)	1.33	(0.81, 2.19)	1.16	(0.83, 1.63)
College or more	1	(Ref)	1	(Ref)	1	(Ref)	1	(Ref)
Income-to-needs ratio								
<100%	1.32	(0.96, 1.80)	1.91	(1.12, 3.24)	0.81	(0.47, 1.42)	1.49	(1.06, 2.10)
100-<200%	1.39	(1.05, 1.82)	1.57	(0.97, 2.53)	1.05	(0.62, 1.80)	1.44	(1.04, 1.98)
200-<400%	1.21	(0.95, 1.55)	1.28	(0.79, 2.08)	1.01	(0.65, 1.56)	1.11	(0.81, 1.53)
≥400%	1	(Ref)	1	(Ref)	1	(Ref)	1	(Ref)
Sex (female)								
Male	2.26	(1.95, 2.63)	4.81	(3.62, 6.39)	3.60	(2.61, 4.97)	1.57	(1.34, 1.85)
Female	1	(Ref)	1	(Ref)	1	(Ref)	1	(Ref)
Race/ethnicity								
Non-Hispanic Black	0.57	(0.45, 0.73)	6.57	(4.43, 9.76)	0.82	(0.51, 1.30)	1.60	(1.25, 2.03)
Mexican American	1.43	(1.17, 1.75)	6.17	(4.06, 9.35)	1.89	(1.27, 2.80)	1.65	(1.29, 2.12)
Other Hispanic	0.75	(0.56, 1.00)	2.66	(1.57, 4.50)	1.36	(0.82, 2.25)	1.32	(0.97, 1.80)
Other race/ethnicity	1.14	(0.78, 1.65)	2.32	(1.07, 5.03)	2.66	(1.55, 4.55)	2.56	(1.83, 3.58)
Non-Hispanic White	1	(Ref)	1	(Ref)	1	(Ref)	1	(Ref)
Nativity								
Born outside the U.S.	1.16	(0.92, 1.47)	0.92	(0.64, 1.31)	0.66	(0.39, 1.10)	0.93	(0.69, 1.24)
Born in the U.S.	1	(Ref)	1	(Ref)	1	(Ref)	1	(Ref)
Region								
Midwest	1.14	(0.87, 1.51)	1.01	(0.65, 1.55)	1.32	(0.78, 2.21)	1.16	(0.87, 1.56)
South	1.66	(1.30, 2.12)	0.98	(0.67, 1.43)	1.65	(1.04, 2.62)	1.14	(0.88, 1.49)
West	1.28	(0.98, 1.67)	1.22	(0.81, 1.83)	1.32	(0.80, 2.17)	1.24	(0.94, 1.65)
Northeast	1	(Ref)	1	(Ref)	1	(Ref)	1	(Ref)
Unweighted sample size	377,252							
Number of deaths	825		338		224		622	

Note: All models include year fixed effects and adjust for complex sampling design. The 95% confidence intervals are in parentheses.
Source: NHIS-LMF 1998-2015

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Supplemental Table 1: Hazard Ratios for All-Cause Mortality between Ages 1 to 14

	Model 1		Model 2		Model 3		Model 4	
Mother's education								
No resident mother	2.40	(1.41, 4.09)					1.71	(0.95, 3.08)
Less than high school	2.22	(1.47, 3.36)					1.46	(0.88, 2.43)
High school	1.73	(1.17, 2.57)					1.23	(0.77, 1.97)
Some college	1.87	(1.27, 2.74)					1.45	(0.94, 2.24)
College or more	1	(Ref)					1	(Ref)
Father's education								
No resident father			2.01	(1.33, 3.05)			1.25	(0.75, 2.08)
Less than high school			1.99	(1.27, 3.12)			1.22	(0.71, 2.11)
High school			1.73	(1.14, 2.63)			1.23	(0.76, 2.01)
Some college			1.55	(1.01, 2.37)			1.18	(0.74, 1.88)
College or more								
Income-to-needs ratio								
<100%					2.15	(1.42, 3.26)	1.71	(1.02, 2.88)
100-<200%					2.26	(1.42, 3.59)	1.85	(1.06, 3.22)
200-<400%					1.36	(0.92, 2.01)	1.19	(0.78, 1.81)
≥400%					1	(Ref)	1	(Ref)
Sex (female)								
Male	1.41	(1.13, 1.76)	1.41	(1.13, 1.76)	1.41	(1.13, 1.76)	1.41	(1.13, 1.76)
Female	1	(Ref)	1	(Ref)	1	(Ref)	1	(Ref)
Race/ethnicity								
Non-Hispanic Black	1.42	(1.05, 1.93)	1.36	(0.99, 1.86)	1.30	(0.95, 1.78)	1.24	(0.90, 1.71)
Mexican American	1.17	(0.84, 1.62)	1.18	(0.85, 1.63)	1.11	(0.81, 1.52)	1.04	(0.74, 1.45)
Other Hispanic	1.06	(0.69, 1.63)	1.05	(0.68, 1.61)	1.00	(0.65, 1.53)	0.95	(0.62, 1.47)
Other race/ethnicity	1.73	(1.06, 2.84)	1.74	(1.06, 2.85)	1.61	(0.98, 2.64)	1.67	(1.02, 2.74)
Non-Hispanic White	1	(Ref)	1	(Ref)	1	(Ref)	1	(Ref)
Nativity								
Born outside the U.S.	0.56	(0.29, 1.10)	0.58	(0.29, 1.13)	0.53	(0.27, 1.03)	0.55	(0.28, 1.07)
Born in the U.S.	1	(Ref)	1	(Ref)	1	(Ref)	1	(Ref)
Region								
Midwest	1.41	(0.93, 2.12)	1.43	(0.94, 2.15)	1.39	(0.92, 2.10)	1.37	(0.91, 2.08)
South	1.43	(0.98, 2.09)	1.46	(1.00, 2.13)	1.41	(0.97, 2.06)	1.40	(0.96, 2.04)
West	1.38	(0.92, 2.08)	1.43	(0.95, 2.14)	1.39	(0.93, 2.10)	1.37	(0.91, 2.06)
Northeast	1	(Ref)	1	(Ref)	1	(Ref)	1	(Ref)
Unweighted sample size	312,036							
Number of Deaths	329							

Notes: All models include year fixed effects and adjust for complex sampling design. The 95% confidence intervals are in parentheses. Individuals are included in the analyses if they are between the ages of 1-14 at the time of interview. Deaths are counted as mortality events between the ages of 1-14.
Source: NHIS-LMF 1998-2015

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Supplemental Table 2: Hazard Ratios for All-Cause Mortality between Ages 15 to 24

	Model 1		Model 2		Model 3		Model 4	
Mother's education								
No resident mother	1.80	(1.40, 2.31)					1.44	(1.09, 1.91)
Less than high school	1.86	(1.53, 2.26)					1.38	(1.10, 1.74)
High school	1.66	(1.38, 1.99)					1.41	(1.14, 1.74)
Some college	1.43	(1.18, 1.73)					1.24	(1.00, 1.53)
College or more	1	(Ref)					1	(Ref)
Father's education								
No resident father			1.88	(1.56, 2.27)			1.43	(1.14, 1.79)
Less than high school			1.93	(1.58, 2.35)			1.44	(1.14, 1.82)
High school			1.32	(1.08, 1.62)			1.04	(0.83, 1.31)
Some college			1.43	(1.17, 1.75)			1.23	(0.99, 1.53)
College or more								
Income-to-needs ratio								
<100%					1.75	(1.47, 2.09)	1.32	(1.08, 1.61)
100-<200%					1.60	(1.36, 1.89)	1.28	(1.07, 1.53)
200-<400%					1.30	(1.07, 1.57)	1.14	(0.94, 1.39)
≥400%					1	(Ref)	1	(Ref)
Sex (female)								
Male	2.61	(2.34, 2.91)	2.62	(2.35, 2.92)	2.62	(2.35, 2.91)	2.62	(2.35, 2.91)
Female	1	(Ref)	1	(Ref)	1	(Ref)	1	(Ref)
Race/ethnicity								
Non-Hispanic Black	1.43	(1.24, 1.66)	1.31	(1.12, 1.52)	1.34	(1.16, 1.56)	1.24	(1.06, 1.44)
Mexican American	2.28	(1.98, 2.63)	2.21	(1.92, 2.54)	2.28	(1.99, 2.61)	2.04	(1.76, 2.35)
Other Hispanic	1.24	(1.02, 1.51)	1.19	(0.98, 1.45)	1.21	(0.99, 1.47)	1.12	(0.92, 1.37)
Other race/ethnicity	1.90	(1.50, 2.41)	1.89	(1.49, 2.40)	1.81	(1.43, 2.29)	1.84	(1.45, 2.34)
Non-Hispanic White	1	(Ref)	1	(Ref)	1	(Ref)	1	(Ref)
Nativity								
Born outside the U.S.	1.03	(0.88, 1.20)	1.04	(0.88, 1.21)	0.99	(0.85, 1.16)	1.00	(0.86, 1.18)
Born in the U.S.	1	(Ref)	1	(Ref)	1	(Ref)	1	(Ref)
Region								
Midwest	1.10	(0.91, 1.33)	1.10	(0.91, 1.33)	1.09	(0.90, 1.32)	1.09	(0.90, 1.32)
South	1.35	(1.14, 1.60)	1.35	(1.15, 1.60)	1.34	(1.13, 1.58)	1.34	(1.13, 1.58)
West	1.24	(1.04, 1.49)	1.24	(1.04, 1.48)	1.24	(1.04, 1.48)	1.23	(1.03, 1.47)
Northeast	1	(Ref)	1	(Ref)	1	(Ref)	1	(Ref)
Unweighted sample size	247,750							
Number of Deaths	1,680							

Note: All models include year fixed effects and adjust for complex sampling design. The 95% confidence intervals are in parentheses. Individuals are included in the analyses if they are between the ages of 1-14 at the time of interview and survived until at least age 15, or if they are between the ages of 15-17 at time of interview. Deaths are counted as mortality events between the ages of 15-24.
Source: NHIS-LMF 1998-2015

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