

# The Epidemic of Despair and Infant Mortality: A Research Note

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**ABSTRACT** This research note documents that progress against infant mortality in the United States has stalled in the twenty-first century among infants born to White non-Hispanic women without a bachelor's degree. In contrast, the mortality rate fell considerably among infants born to White non-Hispanic women with a bachelor's degree, Black non-Hispanic women across levels of education, and Hispanic women with a bachelor's degree. The decline in infant mortality for Hispanic women without a bachelor's degree was small, but still greater than the decline for White non-Hispanic women without a bachelor's after adjusting for changes in the distribution of maternal age within groups. I also document a marked difference in trends for sudden unexpected infant death (SUID) rates by maternal education. The SUID rate increased among those born to women without a bachelor's degree across racial and ethnic groups, while declining or staying constant for those born to women with a bachelor's degree. The lack of progress against infant mortality for White non-Hispanic women without a bachelor's degree was driven by a relatively large increase in SUID rates, coupled with relatively slow progress against other types of infant mortality.

**KEYWORDS** Infant mortality • Maternal education • Maternal race • Sudden unexpected infant death

## Introduction

The infant mortality rate in the United States fell from roughly 100 deaths per 1,000 births in 1915 to 7 deaths per 1,000 births in 2000 (Singh and Yu 2019). This decline was one of the main drivers of increasing life expectancy during the twentieth century (Cutler et al. 2006). Since the turn of the century, however, the decline in the infant mortality rate has slowed, and as of 2017 it was 6 deaths per 1,000 births.

This research note documents that progress against infant mortality stalled during the last two decades among infants born to White non-Hispanic women without a bachelor's degree. The leveling off of the infant mortality rate for this demographic group stands in contrast to continued, substantial declines among infants born to White non-Hispanics with a bachelor's degree, Black non-Hispanics across levels of education, and Hispanics with a bachelor's degree. Although the decline in

infant mortality among infants born to Hispanic women without a bachelor's degree was small, it was still greater than the decline for those born to White non-Hispanic women without a bachelor's degree after adjusting for changes in the distribution of maternal age within groups.

I show that the lack of progress for infants born to White non-Hispanics without a bachelor's degree is driven by a relatively large increase in the sudden unexpected infant death (SUID) rate and relatively slow progress against other types of infant death. While the SUID rate increased among infants born to Black non-Hispanics and to Hispanics without a bachelor's degree, the increase for these groups was smaller in both absolute and percentage terms and occurred more recently. The medical literature suggests that SUID is largely preventable and is more likely with unsafe sleep environments, maternal smoking or drug use during pregnancy, secondhand smoke exposure, and alcohol or drug use by those supervising the infant (Moon and Hauck 2018).

While differences in infant mortality by race and ethnicity are well documented, no work to my knowledge has delineated the time trend in infant mortality by race and ethnicity *and* by mother's educational attainment. Centers for Disease Control and Prevention (CDC) reports have noted differences by race and ethnicity at single points in time (Mathews and Driscoll 2017) and the difference in the time trend by race and ethnicity (Woodall and Driscoll 2020), but have not jointly considered mother's education.

There is evidence of increasing mortality and morbidity among White non-Hispanics in the twenty-first century, particularly among those without a college degree (Case and Deaton 2015, 2017, 2020). The increase in mortality for this group has been driven by an increase in deaths by drug overdose, suicide, and alcohol-related liver disease, which Case and Deaton (2017) collectively termed "deaths of despair." Further, Kolata and Cohen (2016) documented that rising mortality rates for White non-Hispanics were evident for all age-groups and that the trend has been particularly pronounced for young women, including women of childbearing age. There is a large body of evidence indicating that a mother's health and economic circumstance are important predictors of an infant's health, and early-life health is an important predictor of later-life health and circumstance (Aizer and Currie 2014; Case et al. 2005).

The results presented here may represent a further manifestation of increasing despair among working-class Whites, suggesting that poor maternal and infant health is a pathway for intergenerational transmission of the ongoing epidemic of despair. As noted earlier, maternal smoking or drug use during pregnancy, secondhand smoke exposure, and alcohol or drug use by those supervising the infant are all risk factors for SUID. Case and Deaton (2020) documented that drug use and binge drinking were increasing among White non-Hispanics without a bachelor's degree and that smoking has remained relatively steady for this group while decreasing among other demographic groups. SUID is also responsive to public health campaigns, such as the "Back to Sleep Campaign" that was launched in the United States in 1994 (Parks et al. 2017). However, I am not aware of any evidence that the effectiveness of these public health campaigns differs significantly across groups by race, ethnicity, or education. Other work has documented an increase in neonatal abstinence syndrome (NAS) since the turn of the century, and there is some evidence that the increase has been concentrated among White non-Hispanics (Tolia et al. 2015; Winkelman

et al. 2018). NAS occurs most often as a result of opioid exposure in utero. There is also evidence that maternal mortality and morbidity have been increasing in recent decades (Molina and Pace 2017), however, I am unaware of research that delineates trends in maternal health and mortality by race, ethnicity, and education.

## Data and Methods

The analysis was performed using the CDC's Linked Birth/Infant Death data files for 1989 through 2017. These files include information from the birth and death certificates for every infant who was born in the United States in a given year and died within one year. The death certificate provides the cause of death, and the birth certificate provides mother's age, educational attainment, race, and ethnicity. The CDC did not create the linked files for the 1992 through 1994 birth cohorts. My analysis begins with the 1989 cohort to show trends in infant mortality for each demographic group leading up to the turn of the century. While the linked files are available back to 1983, I do not use data on cohorts born prior to 1989 because a new U.S. Standard Birth Certificate was adopted in 1989 and information on mother's education was much more likely to be missing for infants born prior to 1989.

The U.S. Standard Birth Certificate changed in 2003 and was gradually adopted from 2003 to 2015. A difference between the 1989 and 2003 standards is how mother's educational attainment is recorded. Birth records following the 1989 standard report years of education completed, for which the mother reported either a number from zero to 12 years of elementary/secondary education or a number from one to four years of college (or five or more years). In contrast, certificates following the 2003 standard report highest degree completed. For all observations for which education is reported based on the 1989 standard, I coded the mother as not having a bachelor's degree if she reported completing anything less than four years of college education. The CDC files code education as missing for 2011 through 2015 whenever education is based on the 1989 standard; however, for the 2015 cohort, only 1.5% of records used the 1989 standard (357 out of 23,357). Hence, the 2011 to 2014 years were excluded from the analysis.<sup>1</sup> Finally, maternal education is not reported on the birth certificate for 4.6% of infant deaths among White non-Hispanics, Black non-Hispanics, and Hispanics from 1989 through 2017 (excluding 2011–2014). Observations for which mother's education is not reported are excluded from both the numerator and denominator when calculating rates.<sup>2</sup>

<sup>1</sup> The online appendix provides additional details on the percentage of records using the 1989 birth certificate standard from 2011 through 2014. The appendix also shows that the trends in infant mortality and SUID for the 2011 through 2014 cohorts (based on observations for which maternal education is available) are consistent with the trends before and after that period.

<sup>2</sup> As detailed in the online appendix, there are small differences in the rate at which maternal education is missing across race, ethnicity, and maternal age. I performed a sensitivity analysis using a logistic regression to impute education in a way that is consistent with the observed distribution of maternal education across race, ethnicity, maternal age, and year. After imputing the missing education data, I ran all of the analyses without excluding observations. The results from this sensitivity analysis are presented in the online appendix and are very similar to what is presented here.

The maternal age distribution has shifted within demographic groups over time.<sup>3</sup> Hence, I calculated maternal age-adjusted rates for each demographic group using the direct standardization method (Curtin and Klein 1995). I used the 2017 population of births within a group as the reference population; this adjustment standardizes the maternal age distribution within but not across demographic groups.<sup>4</sup>

To consider trends by cause of death, I calculated rates for each of the 130 causes of infant death that are monitored by the CDC's Division of Vital Statistics. I also used ICD-10 codes to construct an indicator of SUID, which is defined as a death attributed to sudden infant death syndrome (SIDS), unknown cause, or accidental suffocation in bed (codes R95, R99, and W75, respectively). Deaths from these three causes are typically combined when studying trends in sudden infant death because of a diagnostic shift that has led to fewer reports of R95 and more reports of R99 and W75 over time (Shapiro-Mendoza et al. 2018).

## Results

Figure 1 shows infant mortality rates per 1,000 births for White non-Hispanics without a bachelor's degree and with a bachelor's degree, restricting attention to infants born to women at least 24 years old, when educational attainment is completed for most. The difference in the trends is not sensitive to using a different cutoff age within a few years of 24. Leading up to the turn of the century, both groups had experienced similar declines in the infant mortality rate. However, from 1999 to 2017, the ratio of the rates grew from 1.42 to 1.98. When considering maternal age-adjusted rates for the full population of births, including those to women younger than 24, the trends are similar and the ratio of the rates grew from 1.52 in 1999 to 2.10 in 2017. The ratio of the unadjusted rates for the full population of births grew from 1.62 to 2.10 over this period.

Figure 2 compares trends in the SUID rate for the same two groups from 1999 to 2017. Trends are shown beginning in 1999 because this is the first year in the data for which the infant's cause of death was coded using the ICD-10 rather than the ICD-9. While the SUID rate remained unchanged for White non-Hispanics with a bachelor's degree, it increased from 0.71 to 1.15 per 1,000 births for those without a bachelor's degree. The ratio of the rates grew from 3.1 to 6.6. The difference in the

<sup>3</sup> From 1989 to 2017, the average maternal age increased from 25.8 to 27.3 among White non-Hispanics without a bachelor's degree, from 30.7 to 32.0 among White non-Hispanics with a bachelor's degree, from 23.9 to 26.8 among Black non-Hispanics without a bachelor's degree, from 30.0 to 31.9 among Black non-Hispanics with a bachelor's degree, from 25.1 to 27.3 among Hispanics without a bachelor's degree, and from 29.8 to 31.8 among Hispanics with a bachelor's degree.

<sup>4</sup> One might also be concerned that changes in the distribution of birth order within demographic groups over time are partly responsible for any changes in the all-cause infant mortality rate or SUID rate. As I document in the appendix, the birth order distribution has shifted slightly away from first births and toward higher order births since 2010 for women with less than a bachelor's degree. Both all-cause infant mortality rates and SUID rates increase with birth order. To explore the sensitivity of my results to the change in the distribution of birth order over time, I calculated parity-adjusted all-cause infant mortality and SUID rates. Because there has only been a slight change in the distribution of birth order over time, the results are very similar to those presented here.

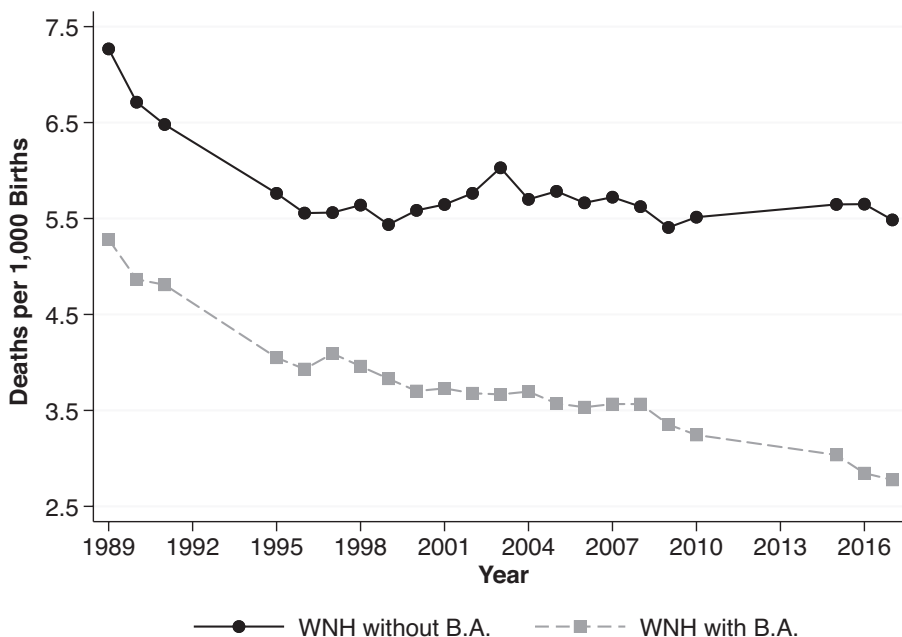


Fig. 1 Infant mortality rates for White non-Hispanics, 1989–2017 (infants born to women at least 24 years old)

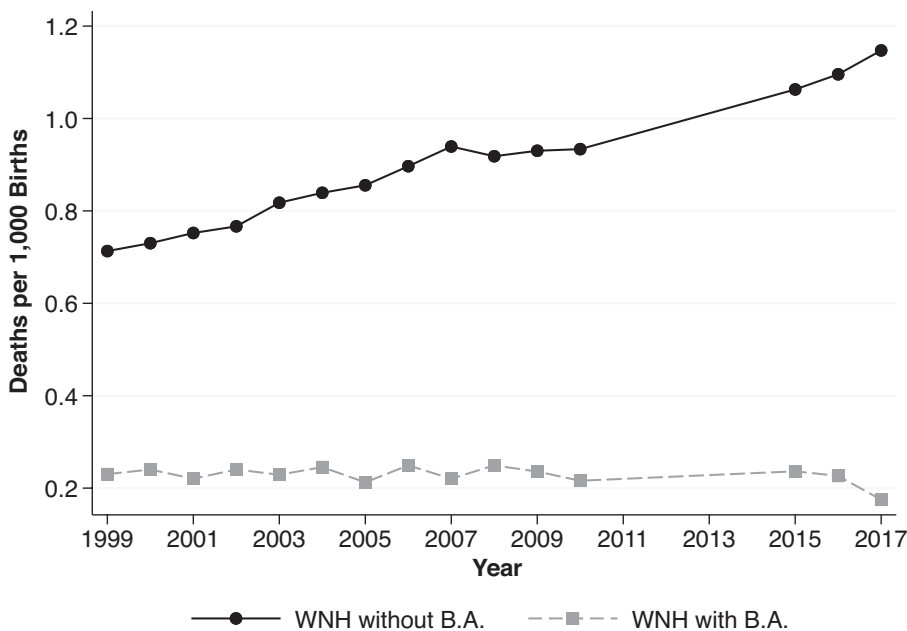


Fig. 2 SUID rates for White non-Hispanics, 1999–2017 (infants born to women at least 24 years old)

**Table 1** All-cause infant mortality rates (per 1,000 births) in 1999 and 2017 in the United States, and the absolute and percentage change

	White Non-Hispanic		Black Non-Hispanic		Hispanic	
	No B.A.	B.A.	No B.A.	B.A.	No B.A.	B.A.
<b>Maternal Age-Adjusted</b>						
1999	5.888	3.826	13.539	10.379	5.480	4.352
2017	5.847	2.781	11.324	6.817	5.150	3.464
Difference	-0.04	-1.05	-2.21	-3.56	-0.33	-0.89
% change	-0.7	-27.3	-16.4	-34.3	-6.0	-20.4
<b>Not Maternal Age-Adjusted</b>						
1999	6.231	3.842	13.653	10.090	5.531	4.154
2017	5.847	2.781	11.324	6.817	5.150	3.464
Difference	-0.38	-1.06	-2.33	-3.27	-0.38	-0.69
% change	-6.2	-27.6	-17.1	-32.4	-6.9	-16.6

Notes: Among infants born to women of any age. B.A. = bachelor's degree.

trends is similar for the full population of births; the maternal age-adjusted SUID rate was essentially unchanged for White non-Hispanics with a bachelor's degree but increased from 0.95 to 1.32 for those without a bachelor's degree.

Table 1 presents infant mortality rates in 1999 and 2017 for infants born to White non-Hispanics, Black non-Hispanics, and Hispanics, all either with or without a bachelor's degree.<sup>5</sup> When adjusted for changes in the maternal age distribution within groups, the all-cause infant mortality rate among White non-Hispanics without a bachelor's degree was roughly unchanged from 1999 to 2017, falling by 0.04 per 1,000 births. In contrast, the rate fell by 1.05 among White non-Hispanics with a bachelor's, by 2.21 among Black non-Hispanics without a bachelor's, by 3.56 among Black non-Hispanics with a bachelor's, by 0.33 among Hispanics without a bachelor's, and by 0.89 among Hispanics with a bachelor's.

The unadjusted rate for all-cause mortality showed a larger decline for White non-Hispanics without a bachelor's degree. Yet this decline was markedly lower than that for those born to White non-Hispanics with a bachelor's, Black non-Hispanics across education levels, and Hispanics with a bachelor's. The difference in the adjusted and unadjusted rates for White non-Hispanics without a bachelor's is largely due to declines in teenage births, for which infant mortality is relatively high.

Table 2 shows that the maternal age-adjusted SUID rate rose by 0.38 among White non-Hispanics without a bachelor's degree, while increasing by 0.34 for Black non-Hispanics without a bachelor's and by 0.14 for Hispanics without a bachelor's. However, the adjusted SUID rate for White non-Hispanics without a bachelor's increased consistently over the sample period, whereas the rate for Black non-Hispanics and Hispanics did not show a marked increase from 1999 to 2010.<sup>6</sup> Without the maternal

<sup>5</sup> See the online appendix for more information on the full time trends for Black non-Hispanics and Hispanics.

<sup>6</sup> In 2010, the maternal age-adjusted SUID rate for Black non-Hispanics was 1.841 (an increase of 0.03 from 1999) and for Hispanics was 0.506 (an increase of 0.04 from 1999). That the adjusted SUID rate

**Table 2** SUID rates (per 1,000 births) in 1999 and 2017 in the United States, and the absolute and percentage change

	White Non-Hispanic		Black Non-Hispanic		Hispanic	
	No B.A.	B.A.	No B.A.	B.A.	No B.A.	B.A.
<b>Maternal Age–Adjusted</b>						
1999	0.946	0.231	1.813	0.561	0.464	0.248
2017	1.325	0.180	2.156	0.558	0.600	0.187
Difference	0.38	−0.05	0.34	−0.00	0.14	−0.06
% change	40.1	−22.1	18.9	−0.5	29.3	−24.6
<b>Not Maternal Age–Adjusted</b>						
1999	1.067	0.223	1.997	0.608	0.551	0.215
2017	1.325	0.180	2.156	0.558	0.600	0.187
Difference	0.26	−0.04	0.16	−0.05	0.05	−0.03
% change	24.2	−19.3	9.1	−8.2	8.9	−13.0

*Notes:* Among infants born to women of any age. SUID=sudden unexpected infant death. B.A.=bachelor’s degree.

**Table 3** Non-SUID death rates (per 1,000 births) in 1999 and 2017 in the United States, and the absolute and percentage change

	White Non-Hispanic		Black Non-Hispanic		Hispanic	
	No B.A.	B.A.	No B.A.	B.A.	No B.A.	B.A.
<b>Maternal Age–Adjusted</b>						
1999	4.942	3.631	11.726	9.818	5.016	3.859
2017	4.522	2.601	9.168	6.260	4.550	3.277
Difference	−0.42	−1.03	−2.56	−3.56	−0.47	−0.58
% change	−8.5	−28.4	−21.8	−36.2	−9.2	−15.1
<b>Not Maternal Age–Adjusted</b>						
1999	5.165	3.609	11.675	9.482	4.980	3.939
2017	4.522	2.601	9.168	6.260	4.550	3.277
Difference	−0.64	−1.01	−2.51	−3.22	−0.43	−0.66
% change	−12.4	−27.9	−21.5	−34.0	−8.6	−16.8

*Notes:* Among infants born to women of any age. SUID=sudden unexpected infant death. B.A.=bachelor’s degree.

age adjustment, the rate increased by 0.26 for White non-Hispanics without a bachelor’s, while increasing by 0.16 for Black non-Hispanics and by 0.05 for Hispanics without a bachelor’s degree.

Table 3 illustrates that in addition to a larger increase in SUID rates, White non-Hispanics without a bachelor’s degree and Hispanics without a bachelor’s have experienced slower progress against other types of infant death than have the other groups.

has only recently shown a marked increase for Black non-Hispanics could be consistent with the recent evidence that the epidemic of despair is spreading outside of working-class Whites, with deaths by drug overdose increasing among Black non-Hispanics after 2015 (Case and Deaton 2020).

The differences in the trends for non-SUID deaths are driven by many different types of death. The online appendix shows the change in the mortality rate by cause for each of the six demographic groups and for each of the 130 causes of infant death that are monitored by the CDC's Division of Vital Statistics.

All of the trends presented could be influenced by selection into education and childbearing over time. Drawing from the Current Population Survey's March supplements, the percentage of White non-Hispanic women aged 15–40 who did not have a bachelor's degree fell from 76.6% in 1999 to 65.4% in 2017. The percentage of births among White non-Hispanic women without a bachelor's degree fell from 68.6% in 1999 to 58.2% in 2017. It should also be noted that selection via immigration could be playing an important role in the trends. For example, the number of births to Hispanic women in the United States increased by 69% between 1989 and 2017.

## Conclusion

There is evidence that White non-Hispanics with less than a bachelor's degree, including all women of childbearing age, have experienced an increase in death rates from suicide, drug overdose, and alcohol-related liver disease. The findings presented here are consistent with the possibility that an epidemic of despair is affecting infant health and mortality. While research has been conducted on the determinants of SUID risk, as summarized in Moon and Hauck (2018), my results suggest that future research should continue to investigate how SUID relates to socioeconomic status, despair, and the opioid epidemic. Further research should also explore how the epidemic of despair is impacting trends in maternal health and mortality, as well as the health and well-being of children through young adulthood. ■

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