

The Association of Childbirth with Medical Debt in the USA, 2019–2020



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ABSTRACT

BACKGROUND: Medical debt affects one in five adults in the USA and may disproportionately burden postpartum women due to pregnancy-related medical costs.

OBJECTIVE: To evaluate the association between childbirth and medical debt, and the correlates of medical debt among postpartum women, in the USA.

DESIGN: Cross-sectional.

PARTICIPANTS: We analyzed female “sample adults” 18–49 years old in the 2019–2020 National Health Interview Survey, a nationally representative household survey.

MAIN MEASURES: Our primary exposure was whether the subject gave birth in the past year. We had two family-level debt outcomes: problems paying medical bills and inability to pay medical bills. We examined the association between live birth and medical debt outcomes, unadjusted and adjusted for potential confounders in multivariable logistic regressions. Among postpartum women, we also examined the association between medical debt with maternal asthma, hypertension, and gestational diabetes and several sociodemographic factors.

KEY RESULTS: Our sample included $n = 12,163$ women, $n = 645$ with a live birth in the past year. Postpartum women were younger, more likely to have Medicaid, and lived in larger families than those not postpartum. 19.8% of postpartum women faced difficulty with medical bills versus 15.1% who were not; in multivariable regression, postpartum women had 48% higher adjusted odds of medical debt problems (95% CI 1.13, 1.92). Results were similar when examining inability to pay medical bills, and similar differences were seen for privately insured women. Among postpartum women, those with lower incomes and with asthma or gestational diabetes, but not hypertension, had significantly higher adjusted odds of medical debt problems.

CONCLUSIONS: Postpartum women experience higher levels of medical debt than other women; poorer women and those with common chronic diseases may have an even higher burden. Policies to expand and improve health coverage for this population are needed to improve maternal health and the welfare of young families.

KEY WORDS: asthma; childbirth; cost; debt; family debt; gestational diabetes; hypertension; insurance; maternal health; medical bills; medical debt; pregnancy; postpartum

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INTRODUCTION

Medical debt affects one in five adults in the USA¹ and disproportionately affects people who have low incomes, are uninsured, are of non-White race, or reside in Medicaid non-expansion states.^{2–5} Medical debt is also particularly common among patients with chronic medical conditions and may lead some to forego or delay essential medical care and basic necessities like food and medications.^{3,6} However, the effect of having a child on family medical debt has not been previously studied.

A recent analysis found that 60% of women face financial hardship in the peripartum period, although it is unknown whether that is a higher rate than that faced by women who have not had a child.⁷ The medical costs of childbirth suggest that women who have delivered a baby could face particularly high rates of debt.^{8,9} Mean facility charges per maternity stay ranged from \$1189 to \$11,986 in one study.⁸ Moreover, one in five privately insured families report receiving potential surprise medical bills after delivery.¹⁰ Due to such burdens, some families may postpone having another child.¹¹ These accumulated costs could also have wide-ranging adverse effects on the growth, development, health outcomes, and food security of children.^{12–14}

Medical debt does not affect all peripartum individuals equally. For instance, out-of-pocket costs may increase when Cesarean section or neonatal ICU services are needed during childbirth.¹⁵ The rates of these outcomes are higher in pregnant individuals with pre-existing conditions such as diabetes mellitus and hypertension; the cost of pregnancy is also significantly higher among women with gestational diabetes.^{16,17} Non-White patients have an increased incidence of chronic health conditions and associated rates of complications during childbirth, which may lead to a disproportionate burden of out-of-pocket costs.^{18,19}

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The association between childbirth and medical debt, particularly for individuals with chronic medical conditions, has not been previously addressed. Moreover, the extent to which private insurance protects against medical debt in this population is unclear. Using national data, we examined the association between childbirth in the last year and medical debt, overall and among the privately insured; we also examined correlates of medical debt among postpartum women, including gestational diabetes, hypertension, and asthma.

METHODS

Data and Population

We analyzed the 2019 and 2020 National Health Interview Survey (NHIS), conducted annually by the National Center for Health Statistics (NCHS). The NHIS is a cross-sectional, nationally representative, household-based survey of the civilian, non-institutionalized population, typically conducted face-to-face in participants' homes and by telephone. For each household surveyed, basic demographic data are gathered about all individuals and then one "sample adult" is selected at random and asked a more extensive list of questions. NHIS uses a multistage sampling approach by selecting households in nested, geographically defined strata and clusters.²⁰

The 2019 sample adult response rate was 59.1%.²¹ During 2020, the COVID-19 pandemic necessitated a shift from in-person to telephone-based interviewing and response rates dropped. To account for the decreased response rates seen in 2020, NHIS re-contacted a group of survey respondents from 2019 and created a longitudinal 2019–2020 sample to bolster the original 2020 "partial sample."²⁰ Following NHIS recommendations, we excluded the 2020 longitudinal sample to analyze 2019–2020 as a single combined national data set with no repeated interviews.²⁰

Our study population included female "sample adults" ages 18 to 49 years of age. Of note, our primary exposure (giving birth in the last year), discussed below, was only ascertained by the NHIS among individuals in this subgroup; i.e., it excluded older adults and those who did not self-report female gender, precluding inclusion of postpartum individuals of other genders in our study. For this paper, we use the term "women," as utilized in the NHIS survey; however, we want to acknowledge that not all individuals who birth identify as women. Additionally, our data addressed live births only.

Study Outcomes

The primary exposure of interest was whether our study subjects gave birth in the past year, ascertained with the question: "During the past 12 months, did you have a pregnancy that ended in a live birth?"

We had two outcomes of interest: (1) problems with medical debt, and (2) inability to pay medical debt. The first was ascertained with the question, "In the past 12 months did you / anyone in the family have problems paying or were unable to pay any medical bills?" The second was ascertained with the question, "Do you / does anyone in your family currently have any medical bills that you are unable to pay at all?" The second question was only asked of those who had problems with medical debt (or who did not answer that question), although we constructed our outcome using the full study population denominator.

Analysis Plan

We first tabulated the characteristics of the study population and compared baseline characteristics stratified by the exposure of birth status (gave birth in last year or not).

Next, we tabulated the proportion of individuals having each outcome stratified by birth status. We calculated unadjusted odds ratio examining the association between birth status and each debt outcome using univariate logistic regressions. We then performed multivariable logistic regression with adjustment for the following: age (ages 18–24; 25–34; 35–49), region (Northeast, Midwest, South, West), self-reported health status (good/very good health; fair/poor health), education (< high school, high school/GED, some college, BA, > BA), family income (\$0 to \$34,999; \$35,000 to \$49,999; \$50,000 to \$74,999; \$75,000 to \$99,999; \$100,000 or greater), and marital status (married vs. unmarried [includes widowed, divorced, separated, never married, living with a partner but not married]). We repeated these analyses restricted to the subgroup of women with private health insurance, which might offer greater protection against healthcare cost burdens.

Next, within the subgroup of women who had a live birth in the past year, we examined correlates between three sociodemographic characteristics (income, race/ethnicity, and insurance) and three chronic diseases common among pregnant women (asthma, hypertension, and gestational diabetes)^{22,23} with each medical debt outcome. Multivariable models included adjustment for the covariates used in our aforementioned multivariable models in addition to health insurance (private; Medicaid and other public; other coverage; or uninsured) and one chronic disease indicator (however, all three chronic indicators were included in models examining the association between sociodemographic variables and debt outcomes). Additionally, for a supplementary analysis, to examine whether insurance status or chronic diseases modified the effect of live birth on debt outcomes, we examined the full study cohort and interacted insurance status (or one of the chronic disease indicators) with the live birth indicator; these models included covariates used in the other multivariable models as well as main effects.

Of our total study population of $n = 12,163$, 2.6% ($n = 321$) had missing data on one or more covariate, and were

excluded from complete case adjusted analyses (Appendix Fig. 1).

We used Stata/SE 16.1 (StataCorp LLC) for all analyses. Using the Stata *svy* procedure and NCHS weights, primary sampling units, and strata, we calculated nationally representative estimates that accounted for the NHIS's complex design. We used Stata's *margins* commands after models including interaction terms to calculate predicted probabilities and statistical significance of potential effect modification. Our study was deemed exempt from review by the Cambridge Health Alliance Institutional Review Board.

RESULTS

Our sample included 12,163 women ages 18–49, including $n=645$ with a live birth in the past year (Appendix Fig. 1 diagrams the formation of the study cohort).

Table 1 provides characteristics of the population stratified by live birth status. Nearly half (47%) of women without a live birth were aged 35–49 years whereas the majority (57.1%) of women with a live birth were aged 25–34 years. Family income and educational attainment were similar between the two groups. Relative to women without a live birth, a higher proportion of those with a live birth were Hispanic or Latino (26.9% vs. 21.1%) and a lower proportion were White (52.7% vs. 55.4%). Women with a live birth, on average, lived in larger families, were more likely to be married, and were less likely to be working compared to women without a live birth ($p < 0.01$). They were also more likely to have Medicaid insurance (28.5% vs. 16.5%), less likely to be privately insured (51.9% vs. 65.7%), and had slightly higher uninsurance rates (16.4% vs. 15.0%). Self-reported health status was similar between the groups.

The unadjusted and adjusted association between having a live birth and study outcomes is presented in Table 2. 19.8% of women with a live birth had problems paying medical bills compared to 15.1% of women without a live birth; the corresponding percentages of those unable to pay medical bills were 13.4% and 9.9%. These differences were significant in univariate models. In the multivariable models, relative to women without a live birth, women with a live birth had 48% higher adjusted odds of problems paying medical bills (95% CI 1.13 to 1.92) and 44% higher adjusted odds of being unable to pay medical bills (95% CI 1.04 to 2.00).

Table 2 also presents outcomes of the subgroup with private health insurance. Among privately insured women, 17.5% with a live birth had problems paying medical bills compared to 12.5% in those without a live birth, and 8.8% were unable to pay medical bills compared to 6.8% among those without a live birth. Women with a live birth had 90% higher adjusted odds of having problems paying medical bills (95% CI 1.34, 2.69) and 70% higher adjusted odds of being unable to pay medical bills (95% CI 1.02, 2.83) relative to women who did not have a live birth.

Table 1 Characteristics of the Study Population Stratified by Live Birth Status, Women 18–49 Years, NHIS 2019–2020 ($n = 12,163$)

	No live birth ($n = 11,518$) %	Live birth ($N = 645$) %	P-value
Age			<0.01
18–24 years ($n = 1721$)	21.5	19.7	
25–34 years ($n = 4155$)	31.5	57.1	
35–49 years ($n = 6287$)	47.0	23.2	
Family income			0.12
\$0 to \$34,999 ($n = 3129$)	24.1	30.1	
\$35,000 to \$49,999 ($n = 1536$)	12.9	13.1	
\$50,000 to \$74,999 ($n = 2210$)	18.3	16.6	
\$75,000 to \$99,999 ($n = 1597$)	13.3	12.3	
\$100,000 or greater ($n = 3691$)	31.4	28.0	
Race/ethnicity			0.04
Hispanic ($n = 2268$)	21.1	26.9	
Non-Hispanic White ($n = 7069$)	55.4	52.7	
Non-Hispanic Black ($n = 1581$)	13.9	13.0	
Non-Hispanic other ($n = 1245$)	9.6	7.3	
Education			0.05
< HS ($n = 824$)	10.1	12.1	
HS/GED ($n = 2521$)	24.2	27.2	
Some college ($n = 3593$)	33.2	26.1	
BA ($n = 3209$)	21.1	20.7	
> BA ($n = 1969$)	11.4	13.9	
Family size			<0.01
< 4 ($n = 7842$)	61.2	32.8	
≥ 4 ($n = 4276$)	38.8	67.2	
Marital status			<0.01
Unmarried ($n = 6413$)	55.1	36.0	
Married ($n = 5479$)	44.9	64.0	
Household region			0.83
Northeast ($n = 1942$)	16.5	18.1	
Midwest ($n = 2636$)	20.8	19.7	
South ($n = 4464$)	38.7	37.6	
West ($n = 3121$)	23.9	24.6	
Health insurance			<0.01
Private ($n = 8231$)	65.7	51.9	
Medicaid and other public ($n = 1931$)	16.5	28.5	
Other coverage ($n = 452$)	2.8	3.2	
Uninsured ($n = 1522$)	15.0	16.4	
Worked last week			<0.01
Yes ($n = 9108$)	74.2	58.6	
No ($n = 2798$)	25.8	41.4	
Health status			0.05
Good/excellent health ($n = 11,074$)	90.4	93.3	
Fair/poor health ($n = 1084$)	9.6	6.7	

Number with missing: $N=47$ (education); $n=45$ (family size); $n=271$ (marital status); $n=27$ (health insurance); $n=257$ (employment); $n=5$ (health status). Income is singly imputed by NHIS

Sociodemographic characteristics that are associated with debt outcomes among women with a live birth in the past year are presented in Table 3. 17.8% of White women, 23.4% of Hispanic/Latino women, and 28.4% of Black women had problems paying medical bills; however, these differences were not statistically significant. The odds of experiencing problems paying medical bills were greater in families earning less than \$34,999 (OR 3.73; 95% CI 1.96 to 7.10),

Table 2 Association of Live Birth in Past 12 Months with Medical Debt (n = 12,163)

	Live birth past 12 months, women ages 18–49 years			Adjusted OR* (95% CI)
	No live birth (%)	Live birth (%)	Unadjusted OR (95% CI)	
Overall population (n = 12,163)				
Problems paying medical bills	15.1	19.8	1.40 (1.09, 1.79)	1.48 (1.13, 1.92)
Unable to pay medical bills	9.9	13.4	1.40 (1.03, 1.92)	1.44 (1.04, 2.00)
Privately insured (n = 8231)				
Problems paying medical bills	12.5	17.5	1.49 (1.06, 2.07)	1.90 (1.34, 2.69)
Unable to pay medical bills	6.8	8.8	1.32 (0.85, 2.04)	1.70 (1.02, 2.83)

*Adjusted for age (ages 18–24; 25–34; 35–49), region (Northeast, Midwest, South, West), self-reported health status (fair/poor health), education (<HS, HS/GED, some college, BA, >BA), family income (\$0 to \$34,999; \$35,000 to \$49,999; \$50,000 to \$74,999; \$75,000 to \$99,999; \$100,000 or greater), and marital status (unmarried vs. married). Number analyzed after exclusion of those with missing data for covariates: N = 11,842 for overall population and N = 8051 for private insured subgroup

Statistically significant odds ratios are bolded

families earning \$50,000–74,999 (OR 3.52; 95% CI 1.60 to 7.74), and families earning \$75,000–99,999 (OR 2.93; 95% CI 1.22 to 7.03) relative to those earning \$100,000 or more in unadjusted analyses. Only one of these differences was significant after multivariable adjustment. However, individuals in lower income brackets had greater odds of being unable to pay medical bills when compared to families earning \$100,000 or greater; all but one pairwise comparison were statistically significant across unadjusted and adjusted models. Uninsured women had higher unadjusted rates of having problems paying medical bills (30.0%) compared to privately insured women (17.5%), although the difference

was not significant in multivariable models. Similar results were obtained when examining inability to pay medical debt by insurance status. Models that included the full cohort and interaction terms between each insurance status and the live birth indicator did not find statistically significant effect modification ($p > 0.05$ for each analysis; data not shown).

Table 4 provides associations between three chronic illnesses common in pregnant women (gestational diabetes, hypertension, and asthma) and medical debt among women with a live birth in the last year. Women with each illness had higher rates of each medical debt outcome, although not all differences were statistically significant. For instance,

Table 3 Association of Race/Ethnicity, Income, and Health Insurance with Medical Debt Among Women with a Live Birth Within the Last Year, 2019–2020 (n = 645)

	Problems paying medical bills			Unable to pay medical bills		
	%	Unadjusted OR	Adjusted OR*	%	Unadjusted OR	Adjusted OR*
Race/ethnicity						
Hispanic (n = 140)	23.4	1.41 (0.79, 2.52)	1.33 (0.67, 2.67)	18.0	1.80 (0.93, 3.45)	1.44 (0.61, 3.41)
White (n = 369)	17.8	Reference	Reference	10.9	Reference	Reference
Black (n = 77)	28.4	1.83 (0.96, 3.49)	1.69 (0.71, 4.04)	17.7	1.75 (0.86, 3.56)	1.15 (0.41, 3.19)
Other (n = 59)	5.9	0.29 (0.06, 1.33)	0.30 (0.10, 0.95)	5.9	0.51 (0.11, 2.38)	0.57 (0.18, 1.78)
Family income						
\$0 to \$34,999 (n = 176)	28.0	3.73 (1.96, 7.10)	1.84 (0.63, 5.36)	24.2	27.29 (8.00, 93.10)	13.43 (3.09, 58.28)
\$35,000 to \$49,999 (n = 75)	11.1	1.19 (0.49, 2.90)	0.64 (0.19, 2.19)	6.7	6.12 (1.41, 26.51)	3.37 (0.63, 18.00)
\$50,000 to \$74,999 (n = 94)	26.9	3.52 (1.60, 7.74)	2.76 (1.12, 6.80)	18.5	19.42 (5.14, 73.37)	15.98 (3.79, 67.42)
\$75,000 to \$99,999 (n = 82)	23.4	2.93 (1.22, 7.03)	2.44 (1.00, 5.97)	14.8	14.87 (3.65, 60.58)	13.47 (3.08, 58.82)
\$100,000 or greater (n = 218)	9.4	Reference	Reference	1.2	Reference	Reference
Health insurance						
Private (n = 377)	17.5	Reference		8.8	Reference	Reference
Medicaid and other public (n = 156)	19.6	1.15 (0.66, 2.01)	0.73 (0.31, 1.70)	15.0	1.83 (0.98, 3.44)	0.90 (0.36, 2.25)
Other coverage (n = 33)	8.2	0.42 (0.12, 1.53)	0.45 (0.11, 1.81)	8.2	0.93 (0.25, 3.46)	1.01 (0.25, 4.11)
Uninsured (n = 79)	30.0	2.02 (1.01, 4.03)	1.40 (0.52, 3.80)	26.0	3.64 (1.82, 7.28)	1.93 (0.68, 5.45)

*Adjusted for age (ages 18–24; 25–34; 35–49), region (Northeast, Midwest, South, West), self-reported health status (fair/poor health), education (<HS, HS/GED, some college, BA, >BA), family income (\$0 to \$34,999; \$35,000 to \$49,999; \$50,000 to \$74,999; \$75,000 to \$99,999; \$100,000 or greater); marital status (married; unmarried); race/ethnicity (Hispanic, non-Hispanic White, non-Hispanic Black, non-Hispanic other); health insurance (private; Medicaid and other public; other coverage; uninsured); gestational diabetes (yes/no); asthma (yes/no); and hypertension (yes/no). Number analyzed after exclusion of those with missing data for covariates: n = 634 in adjusted analyses

Statistically significant odds ratios are bolded

Table 4 Association of Gestational Diabetes, Hypertension, and Asthma with Medical Debt Among Women with a Live Birth Within the Last Year, 2019–2020

	Problems paying medical bills			Unable to pay medical bills		
	%	Unadjusted OR	Adjusted OR*	%	Unadjusted OR	Adjusted OR*
Gestational diabetes (<i>n</i> = 645)						
No	18.3	<i>Reference</i>	<i>Reference</i>	12.1	<i>Reference</i>	<i>Reference</i>
Yes	31.9	2.09 (1.05, 4.18)	1.94 (0.97, 3.85)	22.6	2.11 (0.91, 4.87)	2.27 (1.02, 5.04)
Asthma (<i>n</i> = 644)						
No	18.6	<i>Reference</i>	<i>Reference</i>	12.1	<i>Reference</i>	<i>Reference</i>
Yes	32.3	2.09 (1.09, 3.99)	2.15 (1.07, 4.31)	26.3	2.60 (1.26, 5.36)	2.71 (1.19, 6.17)
Hypertension (<i>n</i> = 645)						
No	19.3	<i>Reference</i>	<i>Reference</i>	12.9	<i>Reference</i>	<i>Reference</i>
Yes	23.2	1.27 (0.65, 2.47)	1.26 (0.59, 2.68)	16.1	1.29 (0.62, 2.69)	1.37 (0.56, 3.32)

* Adjusted for age (ages 18–24; 25–34; 35–49), region (Northeast, Midwest, South, West), self-reported health status (fair/poor health), education (<HS, HS/GED, some college, BA, >BA), family income (\$0 to \$34,999; \$35,000 to \$49,999; \$50,000 to \$74,999; \$75,000 to \$99,999; \$100,000 or greater); health insurance (private; Medicaid and other public; other coverage; uninsured); and one of the three chronic disease indicators (gestational diabetes, asthma, or hypertension: yes/no). Number analyzed after exclusion of those with missing data for covariates: *n* = 635 in adjusted analyses for gestational diabetes and hypertension, and *n* = 634 in adjusted analysis examining asthma effects

Statistically significant odds ratios are bolded

31.9% of women with gestational diabetes had problems paying medical bills as opposed to 18.3% of women without gestational diabetes (AOR 1.94; 95% CI 0.97, 3.85); similarly, 22.6% of women with gestational diabetes were unable to pay medical bills versus 12.1% of those without gestational diabetes (AOR 2.27; 95% CI 1.02, 5.04). Among women with asthma, 32.3% had problems paying medical bills, versus 18.6% among those without asthma (AOR 2.15; 95% CI 1.07, 4.31), with similar results when examining inability to pay medical bills. Differences were directionally consistent but not statistically significant, however, by hypertension status. Additionally, we did not find evidence of significant effect modification when including the full study cohort and interacting disease indicators with live birth status ($p > 0.05$ for each analysis; data not shown).

DISCUSSION

Relative to women without a recent live birth, women who gave birth in the past year have nearly 50% higher adjusted odds of unpaid medical debt, a disparity also present among those with private health insurance. Moreover, among women who recently gave birth, those with lower income, gestational diabetes, and asthma face higher apparent rates of family medical debt. These findings suggest that health coverage is neither adequate nor equitable for pregnant/postpartum women and present a concerning picture of women's health coverage and family financial wellbeing in the USA.

Medical debt is a growing problem in the USA. In 2020, 14% of fully insured individuals reported problems paying medical bills in comparison to 34% of the underinsured and 38% of the uninsured.²⁴ By 2020, medical debt exceeded all other types of debt sent to collections.² Among reproductive-aged women, pregnancy is a major cause of medical costs.

From 2008 to 2015, out-of-pocket spending for maternity care among women with employer-sponsored health insurance rose from \$3069 to \$4569.²⁵ Hence, while concerning, our finding of higher family medical debt burden among postpartum women is unsurprising. Our results extend a previous study that lacked a comparator group⁷ and demonstrate, uniquely, that childbirth in the USA is associated with medical debt. Our results also suggest that coverage expansion following the Affordable Care Act has been insufficient in relieving the costs of medical care for peripartum women.

These findings have implications for both postpartum individuals and their children. Kalousova and Burgard found that in three Michigan counties, individuals with medical debt and higher degrees of debt were more likely to forgo medical care.⁶ Wiltshire et al. showed that among non-elderly adults having problems paying medical bills is associated with an increased likelihood of having one or more days of psychiatric symptoms in the last month.²⁶ Another study found that medical financial hardship is a predictor of worse physical and mental health among US children.¹² While the detrimental effects of unpaid debt on families' financial welfare are clear, further research on its downstream impact on maternal and child health is needed.

A potential contributor to our findings is lack of health coverage. Notably, uninsured women had higher rates of medical bill problems relative to insured women, although the differences were not significant after multivariable adjustment. While Medicaid provides an important source of coverage for women in the peripartum period, "enrollment churn" (e.g., frequent cycling of gaining and losing coverage) before and after birth remains a problem. This could contribute to substantial rates of debt even among women with Medicaid coverage. For instance, approximately 1 in 5 women with Medicaid-covered prenatal care were uninsured

by 6 months postpartum in one post-ACA study.²⁷ However, we also observed a significant association between live birth and medical debt outcomes among privately insured women. For this group, high copays, deductibles, or out-of-network bills are likely explanations for the accrual of debt. This may become a worsening problem in coming years as deductibles continue to rise, although recent legislation protecting patients against surprise medical bills may assist some families.

In addition to finding of higher rates of medical debt among postpartum women, our study identified the novel and concerning finding that women with gestational diabetes or asthma and a live birth within the last year had higher rates of medical debt than women without these conditions. Both conditions are relatively common^{22,23} among pregnant women and medical treatment of each condition is necessary to prevent health impacts for mothers and fetuses. Further studies are needed to evaluate whether the high medical debt burden among women with these conditions leads to forgone care and worsened maternal/fetal outcomes. Additional data is also needed to investigate the association between medical debt and other medical comorbidities; in this study, we were limited by a relatively young cohort and sample size.

Our study is subject to limitations. Like all observational studies, causality cannot be proven and we were unable to identify the timing of debt with regards to childbirth; medical debt could arise from the costs of prenatal care, delivery, as well as postnatal and pediatric care. However, we adjusted for demographic characteristics, socioeconomic status, and self-reported health to reduce the likelihood of confounding by controlling for other factors likely linked with pre-existing medical debt burden. Moreover, the relatively younger age of women with a recent live birth compared to those without a live birth could suggest fewer health problems and medical needs in this group (apart from child-birth related expenses), which would be expected to bias our results towards the null. Our outcome was family financial debt, so we cannot conclude which medical costs are responsible for accrued debt; additionally, our data source did not allow us to quantify the debt burden, or the impact of pregnancy that did not end in a live birth, e.g. due to miscarriage. Our sample size was limited, especially in subgroups, which likely limited our power and contributed to the lack of statistical significance in differences between race/ethnicity subgroups and in models examining effect modification through inclusion of interaction terms. Finally, our data source did not allow us to examine individuals who did not self-identify as female.

Our study has particular relevance to practicing general internists, who frequently care for patients considering pregnancy, currently pregnant, or who have recently given birth; the associated family financial burdens, as seen in our study, could have consequences not only for these patients' general welfare but for their ability to afford care for other medical conditions. Our study also has important policy

implications. While federal law requires that states provide Medicaid coverage for only 60 days postpartum, the 2021 American Recovery Act gave states the option of extending that pregnancy-related Medicaid coverage to 1 year.²⁸ Universal uptake of this option by states could substantively reduce the number of uninsured women,²⁹ although the pathway is set to expire in 5 years and is not mandatory. Making this extension the federal standard would further help reduce insurance "churn" after childbirth,³⁰ although additional reform is needed to expand coverage to undocumented parents, who are ineligible for most forms of coverage in many states, or those with private coverage and onerous cost-sharing. The results of our study also have particular salience in the context of the Supreme Court's recent *Dobbs* decision, which ended a constitutional right to an abortion — building on previous evidence showing adverse financial consequences of forced continuation of pregnancy.³¹ Finally, they underscore the benefits of federally guaranteed parental leave — a policy ultimately excluded from the 2022 Inflation Reduction Act — and of universal healthcare reform that could secure greater financial protection for all new families.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s11606-023-08214-3>.

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Declarations

Conflict of Interest Adam Gaffney is a past president of Physicians for a National Health Program, a non-profit organization that favors coverage expansion through a single payer program. He does not receive compensation from that group, although some travel on behalf of the organization was previously reimbursed. The spouse of Dr. Gaffney is an employee of Treatment Action Group, a non-profit think tank focused on HIV, TB, and hepatitis C treatment. The other authors report no conflicts of interest.

REFERENCES

1. US Census Bureau. 19% of U.S. Households Could Not Afford to Pay for Medical Care Right Away. Census.gov. <https://www.census.gov/library/stories/2021/04/who-had-medical-debt-in-united-states.html>. Accessed 16 Feb 2022.
2. Kluender R, Mahoney N, Wong F, Yin W. Medical Debt in the US, 2009-2020. *JAMA*. 2021;326(3):250-256. <https://doi.org/10.1001/jama.2021.8694>.
3. Choi S. Experiencing Financial Hardship Associated With Medical Bills and Its Effects on Health Care Behavior: A 2-Year Panel Study. *Health Educ Behav*. 2018;45(4):616-624. <https://doi.org/10.1177/1090198117739671>.
4. Yabroff KR, Zhao J, Han X, Zheng Z. Prevalence and Correlates of Medical Financial Hardship in the USA. *J Gen Intern Med*. 2019;34(8):1494-1502. <https://doi.org/10.1007/s11606-019-05002-w>.
5. Wiltshire JC, Elder K, Kiefe C, Allison JJ. Medical Debt and Related Financial Consequences Among Older African American and White Adults. *Am J Public Health*. 2016;106(6):1086-1091. <https://doi.org/10.2105/AJPH.2016.303137>.

6. **Kalousova L, Burgard SA.** Debt and Foregone Medical Care. *J Health Soc Behav.* 2013;54(2):204-220. <https://doi.org/10.1177/0022146513483772>.
7. **Taylor K, Compton S, Kolenic GE, et al.** Financial Hardship Among Pregnant and Postpartum Women in the United States, 2013 to 2018. *JAMA Network Open.* 2021;4(10):e2132103. <https://doi.org/10.1001/jamanetworkopen.2021.32103>.
8. **Xu X, Gariepy A, Lundsberg LS, et al.** Wide Variation Found In Hospital Facility Costs For Maternity Stays Involving Low-Risk Childbirth. *Health Aff (Millwood).* 2015;34(7):1212-1219. <https://doi.org/10.1377/hlthaff.2014.1088>.
9. **Xu X, Lee HC, Lin H, et al.** Hospital variation in cost of childbirth and contributing factors: a cross-sectional study. *BJOG.* 2018;125(7):829-839. <https://doi.org/10.1111/1471-0528.15007>.
10. **Chua KP, Fendrick AM, Conti RM, Moniz MH.** Prevalence and Magnitude of Potential Surprise Bills for Childbirth. *JAMA Health Forum.* 2021;2(7):e211460. <https://doi.org/10.1001/jamahealthforum.2021.1460>.
11. **Acharya Y, Hillemeier MM, Sznajder KK, Kjerulff KH.** Out-of-Pocket Medical Bills from First Childbirth and Subsequent Childbearing. *Womens Health Issues.* 2021;31(1):17-23. <https://doi.org/10.1016/j.whi.2020.07.007>.
12. **Sarathy B, Morris H, Tumin D, Buckman C.** The Impact of Medical Financial Hardship on Children's Health. *Clin Pediatr (Phila).* 2020;59(14):1252-1257. <https://doi.org/10.1177/0009922820941644>.
13. **Brewer M.** Household Debt and Children's Risk of Food Insecurity. *Social Problems.* 2020;67(3):565-584. <https://doi.org/10.1093/socpro/spz027>.
14. **Seifert RW, Rukavina M.** Bankruptcy Is The Tip Of A Medical-Debt Iceberg. *Health Affairs.* 2006;25(Supplement 1):W89-W92. <https://doi.org/10.1377/hlthaff.25.w89>.
15. **Chua KP, Fendrick AM, Conti RM, Moniz MH.** Out-of-Pocket Spending for Deliveries and Newborn Hospitalizations Among the Privately Insured. *Pediatrics.* 2021;148(1):e2021050552. <https://doi.org/10.1542/peds.2021-050552>.
16. **Chen Y, Quick WW, Yang W, et al.** Cost of Gestational Diabetes Mellitus in the United States in 2007. *Popul Health Manag.* 2009;12(3):165-174. <https://doi.org/10.1089/pop.2009.12303>.
17. **Statistical Brief #102.** Healthcare Cost and Utilization Project (HCUP). April 2018. Agency for Healthcare Research and Quality, Rockville, MD. Available at: <https://www.hcup-us.ahrq.gov/reports/statbriefs/sb102.jsp>. Accessed 15 April 2022.
18. **Howland RE, Angley M, Won SH, Wilcox W, Searing H, Tsao TY.** Estimating the Hospital Delivery Costs Associated With Severe Maternal Morbidity in New York City, 2008-2012. *Obstet Gynecol.* 2018;131(2):242-252. <https://doi.org/10.1097/AOG.0000000000002432>.
19. **Admon LK.** Obstetric Outcomes and Delivery-Related Health Care Utilization and Costs Among Pregnant Women With Multiple Chronic Conditions. *Prev Chronic Dis.* 2018;15. <https://doi.org/10.5888/pcd15.170397>.
20. **Centers for Disease Control and Prevention.** Survey Description, National Health Interview Survey, 2020. Available at: https://ftp.cdc.gov/pub/Health_Statistics/NCHS/Dataset_Documentation/NHIS/2020/srvydesc-508.pdf. Accessed 27 Apr 2023
21. **Centers for Disease Control and Prevention.** Survey Description, National Health Interview Survey, 2019. September 2020. Available at: https://ftp.cdc.gov/pub/Health_Statistics/NCHS/Dataset_Documentation/NHIS/2019/srvydesc-508.pdf. Accessed 27 Apr 2023
22. **Kwon HL, Triche EW, Belanger K, Bracken MB.** The epidemiology of asthma during pregnancy: prevalence, diagnosis, and symptoms. *Immunol Allergy Clin North Am.* 2006;26(1):29-62. <https://doi.org/10.1016/j.iac.2005.11.002>.
23. **Casagrande SS, Linder B, Cowie CC.** Prevalence of gestational diabetes and subsequent Type 2 diabetes among U.S. women. *Diabetes Res Clin Pract.* 2018;141:200-208. <https://doi.org/10.1016/j.diabres.2018.05.010>.
24. **Collins S, Gunja MZ, Aboulaifa G.** U.S. Health Insurance Coverage in 2020: A Looming Crisis in Affordability — Findings from the Commonwealth Fund Biennial Health Insurance Survey, 2020. Published online 2020. https://www.commonwealthfund.org/sites/default/files/2020-08/Collins_looming_crisis_affordability_biennial_2020_sb.pdf. Accessed 22 Nov 2020.
25. **Moniz MH, Fendrick AM, Kolenic GE, Tilea A, Admon LK, Dalton VK.** Out-Of-Pocket Spending For Maternity Care Among Women With Employer-Based Insurance, 2008–15. *Health Affairs.* 2020;39(1):18-23. <https://doi.org/10.1377/hlthaff.2019.00296>.
26. **Wiltshire JC, Enard KR, Colato EG, Orban BL.** Problems paying medical bills and mental health symptoms post-Affordable Care Act. *AIMS Public Health.* 2020;7(2):274-286. <https://doi.org/10.3934/publichealth.2020023>.
27. **Johnston EM, McMorrow S, Alvarez Caraveo C, Dubay L.** Post-ACA, More Than One-Third Of Women With Prenatal Medicaid Remained Uninsured Before Or After Pregnancy. *Health Affairs.* 2021;40(4):571-578. <https://doi.org/10.1377/hlthaff.2020.01678>.
28. **Medicaid Postpartum Coverage Extension Tracker.** Kaiser Family Foundation. Published April 15, 2022. <https://www.kff.org/medicaid/issue-brief/medicaid-postpartum-coverage-extension-tracker/>. Accessed 15 April 2022.
29. **Gordon S, Sugar S, Chen L, Peters C, Lew ND, Sommers BD.** Medicaid After Pregnancy: State-Level Implications of Extending Postpartum Coverage. *ASPE Issue Brief.* Office of the Assistant Secretary for Planning and Evaluation. Published December 7, 2021.
30. **Maternal Health in the Build Back Better Act.** Kaiser Family Foundation. Published December 16, 2021. <https://www.kff.org/policy-watch/maternal-health-in-the-build-back-better-act>. Accessed 15 April 2022.
31. **Foster DG, Biggs MA, Ralph L, Gerdtts C, Roberts S, Glymour MM.** Socioeconomic Outcomes of Women Who Receive and Women Who Are Denied Wanted Abortions in the United States. *Am J Public Health.* 2022;112(9):1290-6.

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