Driving the Distance: How Abortion Access Affects Infant and Maternal Health

Lilly Springer
Department of Economics
University of Kansas

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Abstract

Abortion restrictions have been shown to significantly influence abortion and birth rates. These shifts may have downstream effects on infant and maternal health by increasing the continuation of high-risk, non-viable, and unintended pregnancies. In this paper, I study the impact of abortion access, proxied by driving distances to the nearest provider, on a range of birth outcomes. Using 2009-2019 U.S. national vital statistics and facility data from the Myers Abortion Facility Database, I find that a 100-mile increase in distance to the nearest abortion provider leads to a 5.2% increase in deliveries past 42 weeks of gestation, a 2.2% increase in high birth weight, and a 21.4% rise in congenital heart disease. Additionally, fetal and infant mortality due to developmental complications increase by 27.9% and 23%, respectively. Outside of an increase in vaginal tearing, I find no discernible effect on maternal health. A counterfactual exercise suggests that if all counties were within 50 miles of an abortion provider, approximately 793 fewer fetal deaths and 646 fewer infant deaths could have been prevented.

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JEL Codes: I12, I14, J13

1 Introduction

The 2022 Supreme Court's decision in *Dobbs v. Jackson Women's Health Organization* eliminated the federal constitutional right to abortion, allowing states to set their own laws and triggering immediate bans in several states. These bans, as well as other gestational limits that have been implemented in the wake of the *Dobbs* decision, have intensified the already fractured landscape of abortion access in the United States. Even without gestational bans, abortion access can be limited by policies such as mandatory waiting periods, parental notification requirements, and other Targeted Regulations of Abortion Providers (TRAP) laws. These policies can cause abortion clinics to close (Lindo et al. 2020; K. M. Jones and Pineda-Torres 2024), changing an individual's geographic proximity to an abortion provider and subsequently their level of abortion access.

As abortion access declines in some parts of the country, public concerns have grown about its impact on the health of infants and pregnant individuals (Presser et al. 2025; Belluck 2025; Edwards et al. 2024). The U.S. already has some of the worst infant and maternal health outcomes – including one of the highest infant mortality rates – among OECD countries (Gunja et al. 2023). The aggregate effects mask the large racial and income disparities in infant and maternal health in the U.S. with births to Black, AIAN, and Native Hawaiian or Pacific Islander women experiencing higher rates of pre-term delivery, low birth weight, and mortality (Hill et al. 2024). If reductions in abortion access adversely affect infant and maternal health, it is possible the U.S. will continue to experience elevated levels of poor infant and maternal health, and that those racial and income disparities will persist.

Given the concern of how changes in abortion access may impact infant and maternal health, I estimate how changes in the driving distance to the nearest abortion provider impacts infant and maternal health at birth. Using driving distance to the nearest abortion provider as a proxy for abortion access allows me to capture both within-state variation in access to abortion and cross-state travel, an increasingly common way to access abortion. Lindo et al. (2020), Fischer et al. (2018), and Quast et al. (2017) first identified that the travel distance to the nearest abortion provider impacts the abortion and birth rate in Texas. Myers (2024a) then showed this measure is externally valid nationwide. The driving distance gradient can be seen as an elasticity measure of abortion access.

Changes in distance to abortion providers can prevent some individuals from accessing desired abortions, leading to continued unplanned or non-viable pregnancies. These changes in access may harm infant and maternal health through selection, as more high-risk pregnancies may be carried to term, there may be delays in pregnancy-related behavioral changes, and infants may be born into worse living circumstances (Gruber et al. 1999). Further, the stress of carrying an unwanted or risky pregnancy could harm infant and maternal health, as maternal stress is strongly linked to negative birth outcomes (Currie et al. 2023; Persson and Rossin-Slater 2018; Almond and Currie 2011; Lauderdale 2006). These potential changes motivate an empirical investigation into whether changes in abortion access and specifically changes in the driving distance to the nearest abortion provider have a significant effect on infant and maternal health outcomes.

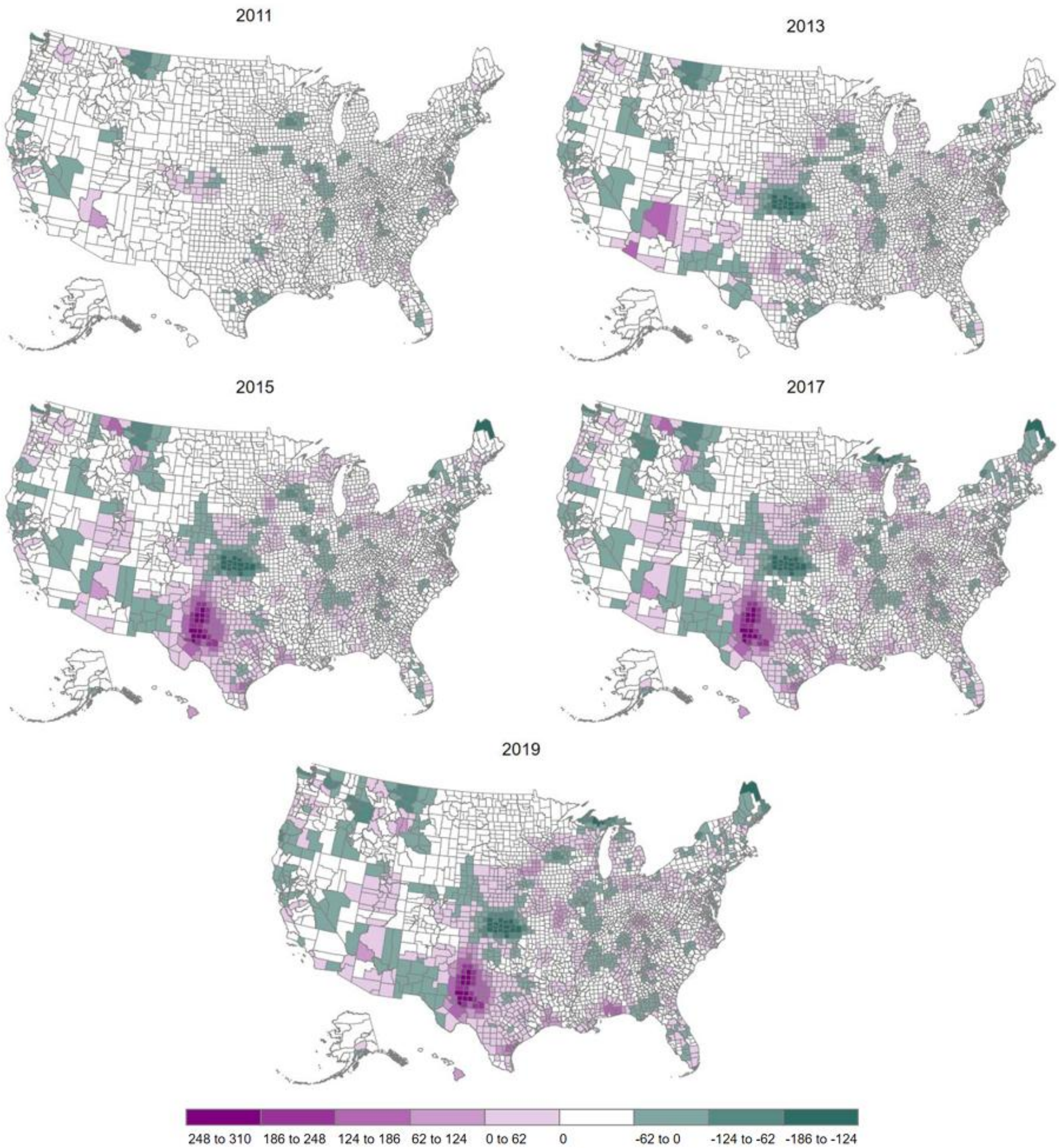
I use natality and infant/fetal mortality U.S. administrative data from 2009 to 2019 and a measure of distance to the nearest abortion provider from the Myers Abortion Facility Database. The Myers Abortion Facility Database is a county-by-month panel that tracks the distance between the population centroid of each county in the U.S. and the nearest abortion facility that publicly advertises providing abortions. Although my study predates the *Dobbs* decision, this period allows me to isolate the effect of provider proximity on infant and maternal health. I exploit substantial variation in driving distance across counties in the U.S. (**Figure 1**) using linear and Poisson fixed effects regression to estimate the impact of changes in abortion access on birth outcomes, maternal health, fetal mortality (deaths occurring after 20 weeks of gestation but prior to birth), and infant mortality (deaths occurring prior to the infants' first birthday).

I find that a 100-mile increase in the driving distance increases the incidence of post-term delivery (over 42 weeks of gestation) by 5.2% and high birth weight infant (> 4,000 grams) by 2.2%. Both outcomes can have long-term health implications including increased rates of childhood obesity, hypertension, and diabetes. I also find a 0.015 percentage point increase in congenital heart disease (a 21.4% increase relative to the mean). I find no effect on pre-term or low birth weight infants. I also find that a 100-mile increase in distance increases the fetal and infant mortality due to fetal development complications by 27.9% and 23% respectively and an 11.1% increase in infant mortality due to premature birth. Finally, I find that outside of a 11.5% increase in perineal laceration (vaginal tearing during labor) changes in the driving distance to the nearest abortion provider have no discernible impact on maternal health. A counterfactual exercise suggests that reducing the distance to an abortion facility to within 50 miles for each county would prevent 646 infant and 793 fetal deaths.

I next explore two potential mechanisms: selection and stress. I find evidence of changes in the composition of births as driving distance increases, though I do not find a pattern of changes in maternal characteristics that is consistent with the marginal child theory. [1] Further,

[1] The marginal child theory centers on the idea that pregnant individuals may use abortion access to avoid having an unwanted child who on average would have worse living circumstances than the average child. If this is the case, then abortion access would increase the living circumstances for those carried to term.

Figure 1: Difference from 2009 Distance to Nearest Abortion Provider



Note: Data comes from Myers Abortion Access Database. Differences in distance for each county is calculated as the difference between the July 2009 distance to the nearest abortion provider and the distance to the nearest abortion provider in July of the map year.

since a large share of fetuses with congenital heart disease diagnosed prenatally end in termination (Tomek et al. 2023; Waern et al. 2021; Bakker et al. 2019), the increase in congenital heart disease is likely due to changes in who could obtain an abortion. I also find that changes in the distance to the nearest abortion provider increase the likelihood that individuals will have a short interpregnancy interval (less than 18 months) by 2.9%, and since short interpregnancy intervals are associated with poor infant and maternal health (Beyene et al. 2025; Wang et al. 2022; Schummers et al. 2018), it is likely that this change in birth spacing is partially driving my results.

My findings contribute to the literature in a few ways. First, I add to our knowledge on how abortion access affects infant health. While prior studies using state-level bans have linked reduced abortion access to increased infant mortality (Gemmill et al. 2025; Caraher 2024; Gemmill et al. 2024; Singh and Gallo 2024; Pabayo et al. 2020), I leverage both within- and between-state variation to causally identify an effect on infant mortality and to my knowledge am the first to causally estimate the impact on fetal mortality. I also expand the relatively limited research on other birth outcomes (Gardner 2024; Caraher 2024) by using county-level data and treatments to evaluate the effect of abortion access on the full range of birth outcomes that are available in the natality data including being the first to highlight the effect of abortion access on incidence of post-term delivery and high birth weight infants.

I further contribute to research on how abortion access impacts maternal health. Within the U.S. abortion access has been shown to decrease mortality (Farin et al. 2024) and preventive care use (Ellison et al. 2021; Slusky 2017; Lu and Slusky 2016) and increase rates of hypertension (Gardner 2024) and sepsis (Presser et al. 2025). Internationally, abortion legalization improved maternal health in Mexico (Clarke and Mühlrad 2021) and Colombia

(Londoño-Vélez and Saravia 2025). I build on Gardner (2024), which evaluates the effect of driving distance to the nearest abortion provider on maternal hypertension, by evaluating the effect of driving distance on the additional maternal health outcomes recorded in the natality data.

Finally, my analysis of selection mechanisms adds to the marginal child literature, which finds abortion access improves children's short and long-term living circumstances and reduces poverty, welfare dependence, and child maltreatment and abuse (Gruber et al. 1999; Ananat et al. 2009; Bitler and Zavodny 2002a; 2002b; Sen 2007; Piette Durrance et al. 2025; Aslim et al. 2024)

The rest of the paper is as follows. Section 2 outlines how abortion access has changed over time in the U.S. and the downstream effects of those changes. Sections 3 and 4 provide details on the data and methodology. Section 5 presents the results followed by a mechanism analysis in Section 6. Results are discussed in Section 7 and Section 8 concludes.

2 Background

2.1 The Effects of Abortion Access

Changes in abortion access have been shown to have binding effects on both abortion and birth rates (C. K. Myers et al. 2025; Dench et al. 2024; C. Myers 2024a; K. M. Jones and Pineda-Torres 2024; Venator and Fletcher 2021; Lindo et al. 2020; Fischer et al. 2018; Quast et al. 2017; Lahey 2014; Joyce et al. 2013) with increasing attention being paid to the distance an individual has to travel to obtain an abortion. Increasing the driving distance to the nearest abortion facility has been found to reduce abortions between 10-31% (C. Myers 2024a; Venator and Fletcher 2021; Lindo et al. 2020; Fischer et al. 2018; Quast et al. 2017) with some evidence of a non-linear effect, meaning that the impact of increasing travel distance on abortions is smaller when the nearest clinic is already far away (C. Myers 2024a; Lindo et al. 2020). These distance changes and the subsequent reductions in abortion then translate into increases in the birth rate by 0.7%-3.2%(Fischer et al. 2018; C. Myers 2024a; Venator and Fletcher 2021). Myers, Dench, and Pineda Torres (2025) couple driving distance to the nearest abortion facility with the total abortion bans enacted post-*Dobbs* and find a total abortion ban that increase the driving distance by 100 miles increases births in the county by 1.8%.

Given the binding effect that changes in abortion access has on births, several studies have documented the downstream effects of restricting access to abortion. As previously mentioned, restricting abortion access increases infant mortality (Gemmill et al. 2025; Caraher 2024; Gemmill et al. 2024; Singh and Gallo 2024; Pabayo et al. 2020) and adversely affects maternal health (Gardner 2024; Farin et al. 2024; Clarke and Mühlrad 2021; Ellison et al. 2021; Slusky 2017; Lu and Slusky 2016). Evidence from the Turnaway study, which followed women who just made or just missed the gestational cutoff for receiving an abortion, found that women who were denied a wanted abortion were more likely to experience poverty and financial hardship (Foster, Biggs, Ralph, et al. 2018; Miller, Wherry, and Foster 2023; Foster, Biggs, Raifman, et al. 2018), and have worse mental health measures (Biggs et al. 2017) than women who obtained the wanted abortion. Reduced abortion access is also associated with higher rates of cases of child maltreatment and child welfare involvement (Aslim et al. 2024; Piette Durrance et al. 2025).[2]

[2] For a broad history of abortion policies over the last 50 years in the United States see Myers (2024b) and for a full literature review of the economics of abortion policy see (Clarke 2024).

3 Data

3.1 Natality Data

Birth and maternal health outcomes come from the CDC National Center for Health Statistics Restricted-Use Natality file which provides data for the population of births in the US. Crucially the restricted-use data include the mother's county of residence. I use data from 2009 to 2019, which corresponds to the beginning of the driving distance dataset and stops prior to the COVID-19 pandemic. I look at eight birth outcomes including indicators for very preterm (between 28 and 32 weeks of gestation), preterm (less than 37 weeks of gestation), and post-term (over 42 weeks of gestation), indicators for very low birth weight (< 1,500 grams), low birth weight (< 2,500 grams), and high birth weight (> 4,000 grams), an indicator for congenital anomalies.[3] I then examine measures of maternal health during both pregnancy and labor/delivery including if the mother has gestational hypertension and gestational diabetes and during if delivery there was perineal laceration (vaginal tearing), a ruptured uterus, or an unplanned hysterectomy.[4]

I also obtain several controls from the natality data. Control variables include the mother's race (non-Hispanic white, non-Hispanic Black, Asian, Hispanic, and American Indian/Native Alaskan), number of prior live births, and indicators for being diabetic or

[3] The congenital anomalies indicator includes down syndrome, suspected chromosomal disorder, hypospadias, limb reduction, cleft lip, cleft palate, anencephaly, spina bifida, congenital heart disease, congenital diaphragmatic hernia, omphalocele, and gastroschisis.

[4] Prior work has raised concerned about misreporting or mismeasurement in some of the birth data variables (summarized in Backes, Scrimshaw, and National Academies of Sciences (2020)). However, since these are dependent variables in my model, this mismeasurement would be classified as classical measurement error meaning that the estimation parameters would be unbiased, but the precision of the estimation would decrease as the standard errors increase. Therefore, concerns about mismeasurement should be focused on the statistical significance of the estimation not the estimations themselves.

hypertensive (either chronic or gestational), smoking during pregnancy, receiving prenatal care during the pregnancy, being born in the United States, and living in a city.

3.2 Fetal and Infant Mortality Data

I obtain the fetal and infant mortality from the restricted-use fetal deaths and linked birth/infant deaths data from the CDC National Center for Health Statistics. Fetal deaths are constituted as any spontaneous intrauterine death that occurs during pregnancy. As such, fetal deaths include stillbirths but do not include intentional terminations of pregnancy (i.e., abortions). The fetal death data is an aggregation of state's reported fetal deaths. Most states require reporting of deaths of fetuses that are 20+ weeks, 350+ grams at delivery, or a combination of both measures, though some states report fetal deaths regardless of the period of gestation.[5] I aggregate individual-level data into a panel of the number of fetal deaths in the mother's county of residence for the fetus' delivery month and year. To construct the fetal mortality rate, I divide the number of fetal deaths in the month by the sum of live births and fetal deaths in the month.

I obtain infant mortality data from the linked birth/infant death data set which links birth certificate information from live births to infant deaths, constituted as a death that occurred prior to the infant's first birthday. Linkage rates between the birth and death certificate vary by state, but in general are very high (over 95%). I construct the infant mortality variable in a manner analogous to the fetal mortality outcome by aggregating the individual-level data into a panel of the count of infant deaths in the mother's county of residence for the infant's birth month and

[5] My sample only include fetal deaths that have the "20 Weeks or more (include)" CDC-created flag checked. This indicator creates a sample of fetal deaths that are comparable across states.

year. Infant mortality rates are constructed by dividing the number of infant deaths by the number of live births in the month.

I also include several population controls in the fetal and infant mortality models including the share of the annual county female 15-44 population that is non-Hispanic White, non-Hispanic Black, Hispanic, Asian, and American Indian/Native American. The county population data is from the NIH National Cancer Institute SEER data.

3.3 Abortion Facility Driving Distance

Each county's distance to the nearest abortion facility comes from the public use Myers Abortion Facility Database. This county by month panel includes a measure of travel (driving) distance from the county to the nearest abortion facility. The driving distance is measured as the distance between the population center of the county, designated by the US Census Bureau, and the geocoordinates of the nearest abortion facility. To be constituted as an abortion facility, the facility either has to publicly advertise that it provides abortions or be easily identifiable a facility that provides abortions to general public.[6,7] The measure was first used in Lindo et al. (2020) which found that in Texas increasing the distance to the nearest abortion provider from 0-50 miles to 50-100 miles reduced the abortion rate by 16%. The measure was shown to be externally valid nationwide in Myers (2024a) which found that a 100-mile increase in driving distance reduced abortion by 19.4% and increased births rates by 2.2%. Using the driving

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[6] This dataset does not take into account the provision of medication abortion over telehealth. However, since the FDA lifted the in-person requirement for mifepristone (one of the drugs used in medication abortion) only in 2021 (Belluck 2021), telehealth medication abortion was not legal during the sample period. Further, while Jones and Friedrich-Karnik (2024) find that while medication abortion increased during from 17% in 2008 to 39% in 2017, medication abortion was not the predominant method of abortion during my sample period.

[7] The distance is calculated using Stata's georoute module which takes into account the road networks and traffic conditions. For states without an extensive road network (such as Alaska and Hawaii) the distance is calculated using Stata's geonear module. See (Myers 2024a) for a more detailed explanation of the calculation of the driving distances.

distance to the nearest abortion provider allows me to capture the within-state variation in abortion access as well as the possibility for cross-state travel to obtain an abortion. Similar to Myers (2024a) and Gardner (2024) I use a continuous distance variable that shows the effect of a 100-mile change in the distance as my treatment variable.[8]

Table 1 shows the summary statistics for both the individual level (**Panel A)** and the infant and fetal mortality panel data (**Panel B** and **Panel C** respectively). The average mother in the sample is 28.4 years old and has had 2 prior live births. 53% of the mothers in the sample are non-Hispanic white, 14% of mothers are non-Hispanic Black, and 22% of mothers are Hispanic. The vast majority of the mothers in the sample were born in the US and 34% live in a city. The average distance from a mother's county of residence to the nearest abortion provider is 25.71 miles. When considering the infant mortality panel data, each county is on average 77.46 miles from the nearest abortion provider. The average is similar for the fetal mortality panel data. The average distance for individuals is smaller than the average distance for each county since more individuals in my sample live in cities or suburbs, which tend to be closer to abortion facilities, than in rural areas which drives the average distance downwards. However, the county distance average is not affected by a similar pseudo-weighting effect. Further, these averages mask the wide heterogeneity in the driving distance to the nearest abortion provider in the United States with the closest abortion provider from the county's population centroid only 0.18 miles away (Duval County, Florida) while the farther provider is 776.68 miles away (Aleutians West Census Area, Alaska).

[8] One assumption that data set relies on is that individuals seeking an abortion choose to go to the nearest abortion clinic. While there is no way to specifically test this assumption, Card, Fenizia, and Silver (2023) show that pregnant individuals are most likely to choose to give birth at the nearest hospital. It is likely that a similar logic applies for abortions.

Table 1: Summary Statistics

	Observations	Mean	Std. Dev.	Minimum	Maximum
Panel A – Natality Data					
Distance to Nearest Provider (miles)	38,153,192	25.71	0.4063	0.18	776.68
Very Low Birth Weight	38,129,021	0.0132	0.1142	0	1
Low Birth Weight	38,129,021	0.0792	0.2700	0	1
High Birth Weight	38,129,021	0.0778	0.2679	0	1
Very Pre-Term Delivery	38,142,538	0.0115	0.1066	0	1
Pre-Term Delivery	38,142,538	0.1139	0.3177	0	1
Post-Term Delivery	38,142,538	0.0535	0.2251	0	1
Congenital Anomalies	34,930,789	0.003	0.0550	0	1
Gestational Hypertension	38,153,192	0.0522	0.2224	0	1
Gestational Diabetes	34,999,022	0.0577	0.2331	0	1
Perineal Laceration	34,961,066	0.0085	0.0921	0	1
Ruptured Uterus	34,934,297	0.0003	0.0170	0	1
Unplanned Hysterectomy	34,961,066	0.0004	0.0206	0	1
Mother's Age	38,153,192	28.3912	5.9288	12	50
White	38,153,192	0.5331	0.4989	0	1
Black	38,153,192	0.1391	0.3461	0	1
Hispanic	38,153,192	0.2225	0.4160	0	1
Asian	38,153,192	0.0635	0.2438	0	1
American Indian/Alaska Native	38,153,192	0.0088	0.0936	0	1
Diabetes	38,153,192	0.0605	0.2383	0	1
Mother Born in US	38,153,192	0.7715	0.4199	0	1
Prior Live Births (n)	38,153,192	2.1095	1.2611	1	8
Maternal Hypertension	38,153,192	0.0693	0.2540	0	1
Smoked Cigarettes during Pregnancy	38,153,192	0.0713	0.2574	0	1
Had Prenatal Care	38,153,192	0.9857	0.1188	0	1
Lives in City	38,153,192	0.3371	0.4727	0	1
Panel B – Infant Mortality					
Infant Mortality Rate	371,779	8.0433	41.2136	0	1000
Distance to Nearest Provider (miles)	391,380	77.46	0.6623	0.18	776.68
County Female Population Share: White	391,380	0.7531	0.2168	0.0208	1
County Female Population Share: Black	385,170	0.1000	0.1589	0.0002	0.9307
County Female Population Share: Hispanic	390,918	0.1058	0.1509	0.0012	0.9724
County Female Population Share: Asian	383,202	0.0203	0.0385	0.0003	0.7028
County Female Population Share: AIAN	383,034	0.0235	0.0841	0.0002	0.9142
County Female Population Share: 15-19	391,374	0.1835	0.0241	0.0273	0.5256
County Female Population Share: 20-24	391,380	0.1664	0.0394	0.0213	0.5006
County Female Population Share: 25-29	391,344	0.1591	0.0193	0.0571	0.3333
County Female Population Share: 30-34	391,380	0.1608	0.0176	0.0409	0.3016
County Female Population Share: 35-39	391,380	0.1624	0.0191	0.0376	0.3826
County Female Population Share: 40-44	391,380	0.1677	0.0241	0.0332	0.3800

Table 1: Summary Statistics Cont.

	Observations	Mean	Std. Dev.	Minimum	Maximum
Panel C – Fetal Mortality					
Fetal Mortality Rate	378,004	11.9546	73.3325	0	1000
Distance to Nearest Provider (miles)	397,408	77.52	0.6626	00.18	776.68
County Female Population Share: White	397,408	0.7534	0.2168	0.0208	1
County Female Population Share: Black	391,004	0.0999	0.1589	0.0002	0.9307
County Female Population Share: Hispanic	396,928	0.1056	0.1509	0.0012	0.9724
County Female Population Share: Asian	389,056	0.0202	0.0385	0.0003	0.7028
County Female Population Share: AIAN	388,888	0.0235	0.0842	0.0002	0.9142
County Female Population Share: 15-19	397,400	0.1836	0.0241	0.0273	0.5256
County Female Population Share: 20-24	397,408	0.1663	0.0395	0.0213	0.5006
County Female Population Share: 25-29	397,372	0.1591	0.0193	0.0571	0.3333
County Female Population Share: 30-34	397,408	0.1607	0.0176	0.0409	0.3016
County Female Population Share: 35-39	397,408	0.1625	0.0191	0.0376	0.3826
County Female Population Share: 40-44	397,408	0.1679	0.0242	0.0332	0.3800

Note: Very preterm is between 28 and 32 weeks of gestation. Preterm is less than 37 weeks of gestation. Post-term is greater than 42 weeks of gestation. Very low birth weight is less than 1,500 grams. Low birth weight is less than 2,500 grams. High birth weight is greater than 4,000 grams.

4 Methodology

To evaluate the effect that distance to the nearest abortion provider has on infant and maternal health, I estimate several fixed effects regressions similar to those in Gardner (2024), Myers (2024a), and Lindo et al. (2020). During my sample period, the supply of abortion providers changed as abortion facilities opened and closed across the country. These supply shocks changed the driving distance to the nearest abortion facility. Therefore, my causal identification strategy relies on the variation in the driving distance to the nearest abortion provider in the county over time. **Figure 1** maps the counties that experience changes in the driving distance. Each map estimates the difference in the driving distance from 2009 to the year shown in the map. Counties in white experienced no change while counties in purples had an increase in distance and counties in greens had a decrease in distance. Of the 3,142 counties included in Myers Abortion Facility Database, 1,733 counties experienced a change in the driving distance to the nearest abortion facilities between July 2009 and July 2019.

Since the vast majority of abortions occur prior to 15 weeks of gestation, around 96.2% in 2021 (Kortsmit 2023), I use the distance from six months prior to the month of birth as my treatment variable for the birth and maternal health outcomes and infant mortality. Six months prior to the birth month would translate to around 12 to 16 weeks of gestation. Since the fetal mortality results include fetal deaths at any gestational age between 20 weeks and birth, to use a measure of distance at a similar gestational age as the birth, maternal health and infant mortality outcomes I calculate the 95% confidence interval of the fetal gestational age. Since the confidence interval is [29.03, 29.09] I use the distance from four month prior to the fetal death as my treatment variable for fetal mortality.[9]

Using the individual-level natality data, I estimate the following specification to examine the impact of driving distance on birth outcomes and maternal health

$$Y_{ictm} = \beta distance_{ctm-6} + \delta \boldsymbol{X_i} + \alpha_t + \alpha_m + \alpha_c + \epsilon_{itmc} \tag{1}$$

where Y_{itmc} is the outcome variable, either the birth outcome or measure of maternal health, for mother's county of residence c, infant/mother i in year t and month m. $distance_{ctm-6}$ is the driving distance (per 100 miles) to the nearest abortion facility from the mother's county of residence six (four) months prior to month of delivery (fetal death). $\boldsymbol{X_i}$ is the set of control variables outlined in Section 3.1 and α_t, α_m, and α_c are year, month, and mother's county of residence fixed effects respectively.[10] Including both month and year fixed effects allows me to

[9]As a robustness check, **Appendix Figure A1** shows the results for 3 different prior distance measures: 6, 7, and 8 months prior to birth for birth outcomes, maternal health, and infant mortality and 4, 5, and 6 months prior to month of fetal death for fetal mortality. When using farther distance lags (e.g. 8 months prior to birth) some of the magnitudes of the estimates grow slightly larger likely reflecting that the majority of abortion occur in the first few months of pregnancy. However, overall, each distance measure returns approximately the same result. Since some abortions do occur later in the first trimester or early in the second trimester and since the estimates for 6 (4) months prior to birth (death) are the most conservative, I use those distance lags in my primary specifications.

[10] Results are robust to specification that include month-year fixed effects instead of month and year fixed effects.

control for the seasonality of births. Standard errors are clustered at the county level. The coefficient of interest is β which identifies the average treatment effect (ATE) that a 100-mile change in distance has on the outcomes.

When estimating the impact of the driving distance on fetal and infant mortality due to the number of zeros in the panel data, I follow Myers (2024a), Farin, Hoehn-Velasco, Pesko (2024), and Lindo et al. (2020) and estimate a fixed-effects Poisson regression.[11] Since Poisson models are discrete count models, estimating the effect of driving distance on the fetal and infant mortality rates outright would mechanically increase the effect magnitude. Instead, I include an exposure term for the standard denominator for the fetal and infant mortality rates, sum of live births and fetal deaths for fetal deaths and live births for infant deaths, and since the natural log of the coefficient for the exposure term is constrained to be 1, the effect can be interpreted as the effect on the fetal (infant) mortality rate.[12]

$$E[Y_{ctm} |\, distance_{ctm-4(6)},\, \boldsymbol{X}_{tc},\, \alpha_t,\, \alpha_m,\, \alpha_c] = \exp\,(\beta distance_{ctm-4(6)} + \theta \boldsymbol{X}_{tc} + \alpha_t + \alpha_m + \alpha_c) \quad (2)$$

where Y_{ctm} is either the fetal or infant mortality for mother's county of residence c in year t month m, $\boldsymbol{X}_{tc}$ is the vector of each county's annual female population share by race and age controls, and the fixed effects are as defined above. As mentioned above, the driving distance measure is 4 months prior to the month of death for the fetal mortality and is 6 months prior to the month of birth for infant mortality. β estimates the ATE of a 100-mile change in driving distance on the fetal (infant) mortality.

[11] The STATA command *xtpoisson* drops counties where the value of all observations for a county is zero. Therefore, the samples for the fetal (infant) mortality rate Poisson models include all counties that have had at least one fetal (infant) death during my sample period. The STATA command *ppmlhdfe* follows the same procedure.

[12] The number of live births is calculated by collapsing the natality data into a panel of live births in the mother's county of residence for each month and year.

A potential threat to my identification strategy is if other factors that may impact infant and maternal health at birth change while the driving distance changes. Likely the largest concern is that changes in driving distance proxy an overall change in access to healthcare. There is some evidence that increasing the distance or the travel time to the nearest women's health or family planning clinic reduces women's preventative care services such as breast exams, Pap test, and mammograms (Ellison et al. 2021; Slusky 2017; Lu and Slusky 2016). To understand if changes in driving distance to the nearest abortion facility are correlated to an overall reduction in healthcare services, I estimated the impact of the driving distance to the nearest abortion provider on several measures of access to care including three measures of prenatal care (an indicator of any prenatal care, an indicator of beginning prenatal care in the first trimester, and the number of prenatal visits) and an indicator that the county experienced a maternity ward closure (**Appendix Table A1**).[13,14] I find that as driving distance increases there is a small increase in the take-up of prenatal care (around a 0.3% increase for a 100-mile increase in driving distance), but there is a reduction in the likelihood of beginning prenatal care during the first trimester (around 5%). The reduction in prenatal care in the first trimester is potentially related to an increase in individuals carrying unplanned pregnancies since there is a chance those individuals do not recognize they are pregnant until later in the pregnancy. There is also a 0.7% reduction in the total number of prenatal visits, likely reflecting the small reduction in first

[13] The number of prenatal visits appears in the natality data starting in 2014, so this model only includes observations from 2014-2019.

[14] I follow the procedure outlined in Battaglia (2025) to estimate if a county experienced a maternity ward closure. I aggregate the number of hospitals births in the linked birth/infant deaths data to the county-year and calculate the three-year average of the number of births prior to year t (years included are $t-1$, $t-2$, $t-3$) and the three-year average of the number of births post year t (years included are t, $t+1$, and $t+2$). A county is considered to have a maternity ward closure if the three-year average prior to year t is greater than 15 births and the three-year average after year t is less than 5 births. Given the need to calculate three-year averages, the sample period in the maternity ward closure model is 2012-2017.

trimester visits. There is also no association between the maternity ward closures and increases in the driving distance. Therefore, there is some evidence that changes in the driving distance to the nearest abortion facility are correlated with changes in health services, but the effects are small in magnitude.

To further ensure that prior to the driving distance changing, the counties that experience a change mirror the counties that never experience a change, I estimate a series of event studies to evaluate the pre-trends for each outcome. For each county that experiences changes in driving distance, I identify the year that the county experienced its first change in driving distance during the sample period. Since the first driving distance change occurred in various years for my treated counties, I estimate county-level event studies based on Callaway and Sant'Anna (2021) for each outcome including the vector of controls from Equation (1). The Callaway and Sant'Anna (2021) event studies use the counties that never experienced a change in the driving distance as the comparison group avoiding the problem outlined in Goodman-Bacon (2021) of comparing later treated counties to earlier treated counties. **Appendix Figure A2** shows the Callaway and Sant'Anna event studies for the per-period for each outcome along with the p-value associated with the null hypothesis that all pretreatment group-time average treatment effect on the treated (ATTGT) are equal to zero. Each outcome's event study visually shows a lack of pre-trends, and I am unable to reject the null hypothesis that the pre-period ATTs are all equal to zero. Therefore, it is likely that conditional on the controls, prior to the first driving distance change counties that experienced a change were on the same path as counties that never experienced a driving distance change.

5 Results

5.1 Infant Health

I first estimate the impact of changes in the driving distance to the nearest abortion facility on different measures of infant health at birth. **Table 2** illustrates the impact on each birth outcome. I find that a 100-mile increase in the driving distance to the nearest abortion providers increases the likelihood that an infant will be post-term by 5.2% and high birth weight by 2.2% relative to the mean.[15] I find no effect for very preterm, preterm, very low birth weight, low birth weight, and the indicator for congenital defects.

To ensure that an effect on a specific congenital defect is not masked by the indicator variable, I estimate the impact of the change in driving distance on each congenital defect identified in the birth data. **Table 3** shows that the increase in congenital defects is driven primarily by an increase in congenital heart disease, a 100-mile increase in driving distance increases incidence of congenital heart disease by 0.015 percentage points or 21.4% relative to the mean. There is also suggestive evidence that the increase in driving distance also increases the likelihood of an infant being born with a cleft palate and reduces the likelihood of an infant being born with down syndrome.

Since prior work has found differential effects of abortion access on birth and abortion rates for different groups (C. Myers 2024a; Farin et al. 2024; Gardner 2024; Lindo et al. 2020; Quast et al. 2017), I estimate the impact of driving distance to the nearest abortion provider on

[15] The increase in high birth weight is robust to conditioning on infants that were not born post-term.

Table 2: Effect of Driving Distance on Infant Birth Outcomes

	Very Pre-Term (1)	Pre-Term (2)	Post-Term (3)	Very Low Birth Weight (4)	Low Birth Weight (5)	High Birth Weight (6)	Congenital Defects (7)
Distance to nearest provider (per 100 miles)	0.00008	0.00051	0.00279***	0.00023	-0.00022	0.00169**	0.00014
	(0.00015)	(0.0011)	(0.00101)	(0.00015)	(0.00088)	(0.00071)	(0.00011)
R-squared	0.00389	0.02127	0.00256	0.00819	0.02389	0.011	0.0001
Dependent Variable Mean	0 .0115	0.1142	0.0537	0.0132	0.0792	0.0778	0.003
Percent Change	0.70%	0.45%	5.20%	1.74%	-0.28%	2.17%	4.67%
Observations	38,142,538	38,142,538	38,142,538	38,129,021	38,129,021	38,129,021	34,930,789

Note: Distance is from the six months prior to birth month. Each model includes month, year, and mother's county of residence fixed effects and controls for mother's age, prior number of live births, race/ethnicity indicators for White, Black, Hispanic, Asian, AIAN, and indicators for living in a city, mother being born in the U.S., having prenatal care, smoking, being diabetic, and maternal hypertension. Very preterm is between 28 and 32 weeks of gestation. Preterm is less than 37 weeks of gestation. Post-term is greater than 42 weeks of gestation. Very low birth weight is less than 1,500 grams. Low birth weight is less than 2,500 grams. High birth weight is greater than 4,000 grams. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 3: Effect of Driving Distance on Congenital Defects

	Distance to nearest provider (per 100 miles)	Mean	Percent Change	Observations
Down Syndrome	-0.00002*	0.0002	-10%	34,919,841
	(0.00001)			
Suspected Chromosomal Disorder	0.00001	0.0001	10%	34,920,852
	(0.00001)			
Hypospadias	-0.00001	0.0006	-1.67%	34,930,789
	(0.00003)			
Limb Reduction Defect	0.000003	0.0001	3%	34,930,789
	(0.00001)			
Cleft Lip	-0.00001	0.0005	2%	34,930,789
	(0.00003)			
Cleft Palate	0.00003*	0.0002	15%	34,930,789
	(0.00002)			
Anencephaly	-0.00001	0.0001	-10%	34,930,789
	(0.00001)			
Spina Bifida	0.0000002	0.0001	0.2%	34,930,789
	(0.00001)			
Congenital Heart Disease	0.00015**	0.0007	21.43%	34,930,789
	(0.00006)			
Congenital Diaphragmatic Hernia	0.000004	0.0001	4%	34,930,789
	(0.00001)			
Omphalocele	-0.00001	0.0001	10%	34,930,789
	(0.00001)			
Gastroschisis	0.00002	0.0003	6.67%	34,930,789
	(0.00002)			

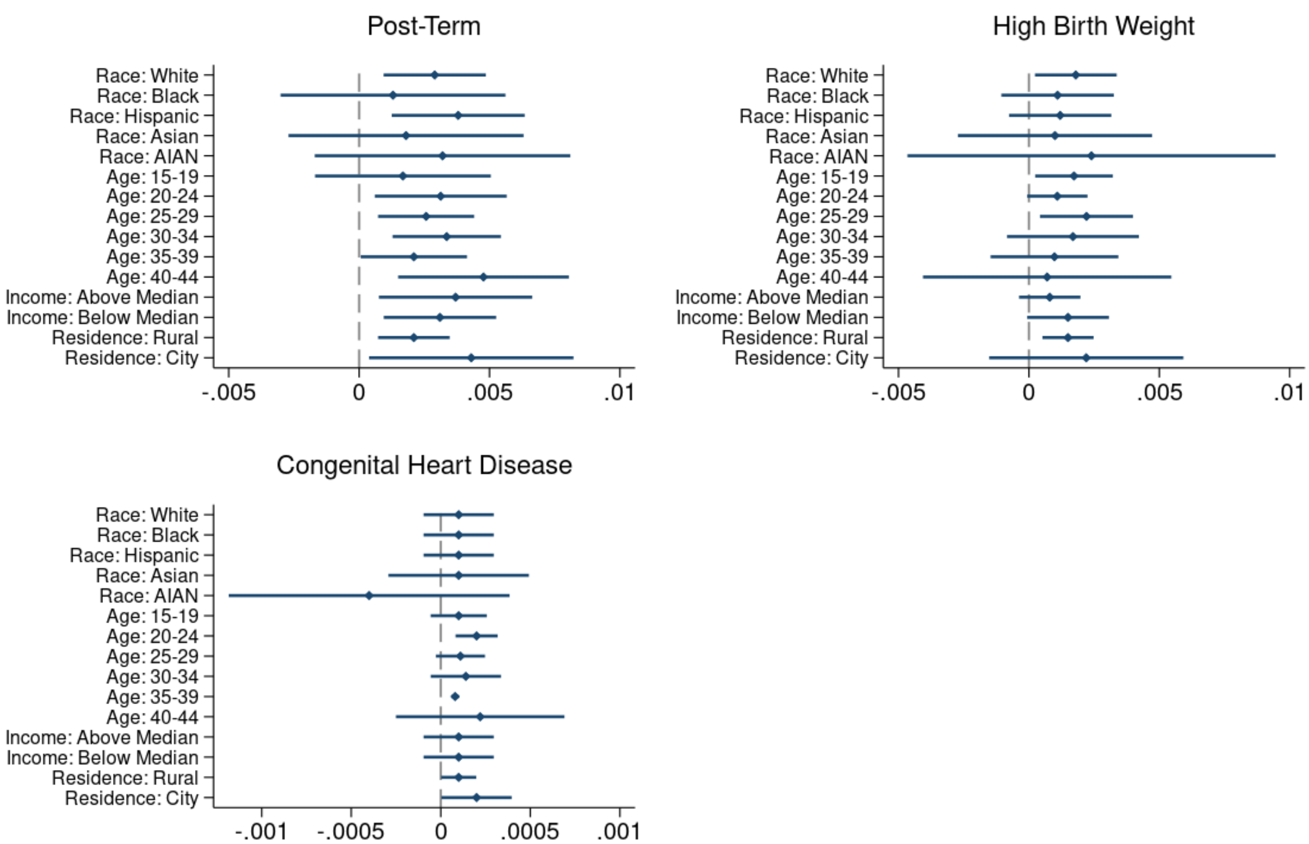
Note: Distance is from the six months prior to birth month. Each model includes month, year, and mother's county of residence fixed effects and controls for mother's age, prior number of live births, race/ethnicity indicators for White, Black, Hispanic, Asian, AIAN, and indicators for living in a city, mother being born in the U.S., having prenatal care, smoking, being diabetic, and maternal hypertension. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

the significantly affected birth outcomes from **Table 2** and **Table** 3 by several demographic and socioeconomic factors (**Figure 2**).[16] Infants born to white and Hispanic mothers appear to the driving the increase in post-term delivery while infants born to white mothers are more likely to be born with a birth weight over 4,000 grams, though the confidence interval overlaps those of the other groups. The increases in post-term delivery and high birth weight appear to equally

[16] **Appendix Figure A3** shows the heterogenous analysis for the remaining outcomes in **Table 2**. When disaggregated I find an increase in very pre-term delivery and very low birth weight infants for white mothers and in very pre-term delivery, pre-term delivery and low birth weight infants for AIAN mothers.

affect mothers between 15 and 39 years old. Mothers between 40 and 44 years old are more likely to have a post-term delivery but not a high birth weight infant. Mothers living in a county with an annual median household income below the national median are slightly more likely to have high birth weight infants than mothers living in counties with median household incomes above the national median household income and mothers living in a city are more likely to deliver post-term than mothers in rural counties. No one demographic group is driving the increase in congenital heart disease, though the increase is more prominent for mothers between 20-34 years old and mothers living in a city.

Figure 2: Heterogeneous Effect of Driving Distance on Birth Outcomes



Note: Estimates are the effect of a 100-mile increase in the driving distance to the nearest abortion facility and are from models that include includes month, year, and mother's county of residence fixed effects and controls for mother's age, prior number of live births, race/ethnicity indicators for White, Black, Hispanic, Asian, AIAN, and indicators for living in a city, mother being born in the U.S., having prenatal care, smoking, being diabetic, and maternal hypertension. When the control variable category is the category of interest, those variables are removed from the regression. Income is measured as the county median annual household income and is compared to the annual national median household income.

Turning to fetal and infant mortality panel data, **Table 4** shows that a 100-mile increase in driving distance from the mother's county of residence to the nearest abortion facility does not an effect on the all-cause fetal or infant mortality rate.[17] **Appendix Figure A4** shows the heterogenous effect of a 100-mile increase in the driving distance to the nearest abortion facility on fetal and infant mortality rates. I largely do not find any effect on all-cause fetal or infant mortality across maternal race and age groups outside of a slight reduction in fetal mortality for Hispanic mothers though the estimate is only just significant. In columns (2) – (4) of **Table 4** I show the fetal/infant mortality rate due to perinatal defects, congenital defects, and external causes of death. Perinatal conditions are those that develop or are diagnosed during the period from conception to about a month after birth. Congenital conditions are conditions that are present and thus diagnosed at the moment of birth. I find a 24.1% reduction in fetal deaths due to congenital defects. I do not find an effect on the other broadly grouped causes of deaths for either fetal or infant mortality.

To better understand what may be causing the reduction in fetal deaths due to congenital defects as well as to ensure that the effect on other major causes of death is not being masked, I estimate the effect of driving distance to the nearest abortion provider on the most common causes of fetal and infant death. **Table 5** shows those results as well as in which broad category from **Table 4** that each cause of death is included. In **Panel A** I find a 27.9% increase in fetal deaths due to developmental complications in the placenta, umbilical cord, and fetal membrane.

[17] Percent changes from the Poisson models are estimated using $(e^{\beta} - 1) \times 100$. Also, each percent change should be interpreted as the change to counties that have experienced at least one fetal (infant) death during the sample period. Counties that never experienced a fetal (infant) death during the sample period are not included estimations. This feature of the Poisson panel estimations is why the sample sizes vary across the columns of **Table 4** and **5**.

The reduction in fetal deaths due to congenital defects is driven by the 53.8% reduction in fetal deaths due to anencephaly, a genetic mutation where the neural tube needed to develop the fetus's brain, skull, backbones, and spinal cord does not develop properly. Developmental complications in the placenta, umbilical cord, and fetal membrane and anencephaly tend to be correlated (White et al. 2021; Chander et al. 2019). It is possible that some of the fetal deaths due to placenta, umbilical cord, and fetal membrane development complications would have been diagnosed with anencephaly but were instead coded as a death due to issues with placenta, umbilical cord, and fetal membrane development since it is a more common cause of death. Therefore, an increase in fetal deaths due to placenta, umbilical cord, and fetal membrane complications could mechanically lead to a reduction in fetal deaths due to anencephaly. To test if this is possible, I grouped the deaths due to anencephaly and placenta, umbilical cord, and fetal membrane complications and estimated the effect of driving distance to the nearest abortion provider on this group. As shown in **Appendix Table A2** there is a 24.2% increase in fetal deaths confirming the possibility of substitution between the cause of death codes.

In **Table 5 Panel B** I also find a 11.1% increase in infant mortality due to premature birth and a 23.0% increase in infant deaths due to placenta, umbilical cord, and membrane development complications.

Table 4: Effect of Driving Distance on Fetal and Infant Mortality

VARIABLES	All (1)	Perinatal Defects (2)	Congenital Defects (3)	External (4)
Panel A: Fetal Mortality				
Distance to nearest provider (per 100 miles)	0.0025	-0.0107	-0.2758**	-0.0216
	(0.0242)	(0.0444)	(0.1302)	(2.0065)
Observations	365,550	165,770	93,249	4,260
Number of MomCountyFIPS2	2,971	2,773	1,557	71
Panel B: Infant Mortality				
Distance to nearest provider (per 100 miles)	0.0148	0.0514	-0.0322	0.0887
	(0.0231)	(0.0369)	(0.0313)	(0.0656)
Observations	360,001	343,647	333,382	264,214
Number of MomCountyFIPS2	2,981	2,825	2,730	2,150

Note: Fetal mortality distance measure is from four months prior to month of fetal death. Infant mortality distance measure is from six months prior to month of birth. Each model includes year, month, and mother's county of residence fixed effects. Additional controls include each county’s female population race and age shares. Exposure variable is the sum of live births and fetal deaths for fetal mortality and number of live births for infant mortality. Congenital and perinatal deaths were identified as by either a Q (congenital) or P (perinatal) in the ICD-10 cause of the death code. External causes of death include V, W, X, and Y ICD-10 codes. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 5: Effect of Driving Distance on Fetal and Infant Mortality by Cause

VARIABLES	Heart Defects/ Disease (1)	Still Births (2)	Premature Birth (3)	Sepsis (4)	Placenta, Umbilical Cord, Membrane Complications (5)	Down Syndrome (6)	Suspected Chromosomal Disorder (7)	Anencephaly (8)
Panel A: Fetal Mortality								
Distance to nearest provider (100 miles)	-0.4134	-0.1600	0.3358		0.2460**	-0.5176	-0.7726	-0.7717**
	(0.4584)	(0.1017)	(0.3119)		(0.1015)	(0.4181)	(0.7779)	(0.3825)
Observations	23,518	140,086	31,435		133,336	18,718	9,120	24,516
Number of MomCountyFIPS2	392	2,340	524		2,227	312	152	409
Panel B: Infant Mortality								
Distance to nearest provider (100 miles)	0.0848		0.1054**	-0.0093	0.2074**	-0.2421	0.3231	-0.1389
	(0.0641)		(0.0533)	(0.0949)	(0.1027)	(0.2834)	(0.3201)	(0.1384)
Observations	236,617		287,278	179,168	198,398	49,409	31,821	136,918
Number of MomCountyFIPS2	1,920		2,344	1,451	1,609	400	255	1,105
Cause of Death Category	Congenital, Perinatal	Perinatal	Perinatal	Perinatal	Perinatal	Congenital	Congenital	Congenital

Note: Fetal mortality distance measure is from four months prior to month of fetal death. Infant mortality distance measure is from six months prior to month of birth. Each model includes year, month, and mother's county of residence fixed effects. Additional controls include each county's female population race and age shares. Exposure variable is the sum of live births and fetal deaths for fetal mortality and number of live births for infant mortality. The following ICD-10 codes were used to identify each cause of death: heart defects/disease (Q24 & P29), still births (P95), premature birth (P072 and P073), sepsis (P36 and A41), placenta, umbilical cord, and membranes complications (P02), down syndrome (Q90), suspected chromosomal disorder (Q97, Q98, and Q99), and anencephaly (Q00). Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

5.2 Maternal Health

Turning towards maternal health, **Table 6** shows the impact of increases in distance driving on each outcome included in the maternal health index. I find that a 100-mile increase in the driving distance to the nearest abortion provider leads to a statistically significant 11.5% increase in perineal laceration (vaginal tearing during labor and delivery). I do not find a statistically significant impact on any of the other maternal health outcomes. To identify if there is a differing effect for different subpopulations, I estimated the impact of driving distance changes across a variety of

Table 6: Effect of Driving Distance on Maternal Health

	Gestational Hypertension (1)	Gestational Diabetes (2)	Perineal Laceration (3)	Ruptured Uterus (4)	Unplanned Hysterectomy (5)
Distance to nearest provider (per 100 miles)	0.00142	0.00132	0.00099**	0.00002	0.00003
	(0.00165)	(0.00104)	(0.00049)	(0.00002)	(0.00003)
R-squared	0.01352	0.02219	0.00383	0.0001	0.00034
Dependent Variable Mean	0.051	0.0572	0.0086	0.0003	0.0004
Percent Change	2.78%	2.31%	11.51%	6.67%	7.5%
Observations	38,153,192	34,999,022	34,961,066	34,934,297	34,961,066

Note: Distance is from the six months prior to birth month. Each model includes month, year, and mother's county of residence fixed effects and controls for mother's age, prior number of live births, race/ethnicity indicators for White, Black, Hispanic, Asian, AIAN, and indicators for living in a city, mother being born in the U.S., having prenatal care, smoking, being diabetic, and maternal hypertension. Maternal hypertension control is dropped when gestational hypertension is the outcome of interest. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

demographic and socioeconomics characteristics. In **Appendix Figure A5** white mothers and mothers living in a city appear to be driving the increase in perineal laceration. There is also some evidence of heterogenous effects on the other maternal health measures. I find some evidence that there is a reduction in gestational hypertension and gestational diabetes for AIAN mothers. There is also suggestive evidence of an increase in gestational diabetes for mothers between 25 and 39 years old and mothers living in counties where the annual median household income is below the national median. I also find suggestive evidence that the likelihood of having an unplanned hysterectomy increases for mothers 15-19 years old. It should be noted though the confidence intervals for each group overlap.

5.3 Robustness Checks and Sensitivity Analyses

To establish if my results are reliant on a certain population, I estimated a series of sensitivity analyses (**Appendix Table A3**). Columns (1) and (2) of **Appendix Table A3** show the different effects for mothers based on birth parity. I find that both first births and repeated births experience similar effects for post-term delivery, high birth weight, and congenital heart disease. Mothers who are giving birth for the first time are more likely to experience perineal laceration than those who have previously given birth as driving distance to the nearest abortion provider increases.

To ensure that one county is not driving my results, I estimated a leave-one-out county analysis for the significantly affected infant health outcomes and for the fetal and infant mortality rates. **Appendix Figure A6** shows a scatter plot of the coefficients of the effect of a 100-mile increase in the driving distance for each regression in the leave-one-out analysis. Due to data privacy agreements, I do not identify the excluded counties. Each scatter plots shows that the results are robust to the leave-one-out analysis.

In a similar vein, in Column (3) of **Appendix Table A3** I estimate the infant health outcomes on a sample without the 100 largest counties by geographic area[18] and find that the results are largely unchanged.

[18] Counties areas were obtained from the 2010 Census Gazetteer File – Counties.

To ensure that my results are not explained by other demographic factors, I estimate the birth outcomes and maternal health model including several additional controls (**Appendix Table A4**). My results are largely unchanged when several controls for the mother's highest educational attainment (high school, some college, bachelor's, and graduate degree) or the maternal marital status are included.

Given that some prior work has found that measures of distance to the nearest abortion provider can exhibit non-linear effects on abortion and birth rates (C. Myers 2024a; Lindo et al. 2020; Quast et al. 2017), I estimated Equation (2) using distance indicators instead of the continuous measure (birth outcomes in **Appendix Table A5**, maternal health in **Appendix Table A6**, and fetal and infant mortality in **Appendix Table A7**). The results, while noisy, largely show a linear effect as distance increases similar to the effect found in Gardner (2024). There is some evidence of overall increases in fetal and infant mortality in this specification as well.

Similarly, even if individuals do not experience a change in driving distance to the nearest abortion facility, their nearest abortion facility may become more (less) congested as nearby facilities close (open) changing the number of individuals that are served by clinic. It may then become harder to obtain an appointment for an abortion effectively restricting access even without a distance change. To measure this congestion effect, I used the average service population variable from the Myers Abortion Facility database which calculates the ratio of the number of women 15-44 years old in the closest abortion facility's core-based statistical area (CBSA) to the number of abortion facilities in that CBSA.[19] Similar to the distance models, I use

[19] This congestion variable was first introduced in Lindo et al. (2020) which found that a 100,000 women/clinic increase in the average service population reduces abortion by 7 percent and was subsequently used in Hall (2024) which found that reduced clinic capacity reduced abortion in the first 8 weeks of gestation by about 20% but increased abortions in weeks 9-10 and weeks 11-12 by 22% and 30% respectively.

the average service population variable from 6 months prior to the birth month. As shown in **Appendix Table A8** a 100,000 women/facility increase alone increases incidence of post-term delivery and high birth weight and all-cause fetal and infant mortality. When included with driving distance (**Appendix Table A9**) the congestion measure appears less important for the birth outcomes (outside of high birth weight) but completely drives the increase in fetal and infant mortality. Therefore, the effect of clinic closures or openings appears to affect infant health through congestion as well as through the driving distance to the nearest clinic.

Since my birth outcomes and maternal health models are subject to a potential of an increased probability of false positives due to multiple hypothesis testing, I construct an index of birth outcomes and an index of maternal health. I follow Miller, Wherry, and Foster (2023) in the construction of the indices

$$Index_i = \frac{1}{N}\sum_{j=1}^{N}\frac{Y_{ij} - \mu_j}{\sigma_j} \tag{3}$$

where Y_{ij} is the value of outcome j for individual i, μ_j is the mean of outcome j, σ_j is the standard deviation of outcome j, and N is the number of outcomes in the index. The birth index includes all outcomes from **Table 2** except for the congenital defects indicator and each congenital defect from **Table 3**. The maternal index includes all outcomes from **Table 6**. As shown in **Table 7** both the birth outcome and maternal health indices show an increase in the driving distance to the nearest abortion provider reduces infant health at birth, further alleviating concerns of false positives due to multiple hypothesis testing.

Table 7: Impact of Driving Distance on Indices

	Birth Outcome Index (1)	Maternal Health Index (2)
Distance to nearest provider (per 100 miles)	-0.0013***	-0.0067**
	(0.0005)	(0.0029)
R-squared	0.0075	0.0067
Index Std. Dev.	0.4652	0.4654
Observations	34,880,358	34,934,297

Note: Distance is from the six months prior to birth month. The birth outcome index includes each outcome from Table 2 (except for the congenital defects indicator) and each congenital defect from Table 3. The maternal health index includes outcomes from Table 5. Each outcome was standardized. Each index is the average of the individual's standardized outcomes. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

6 Mechanisms

6.1 Selection

When abortion access is restricted, abortions in general tend to decrease (Myers 2024; Fischer, Royer, and White 2018), so it follows that as the distance to the nearest abortion facility increases the composition of who gives birth will change. These changes in the composition of births are one potential pathway to the adverse effects on infant health at birth that I have identified above.

Given that abortion restrictions have been found to differentially impact demographic groups (C. Myers 2024a; Farin et al. 2024; Gardner 2024; Lindo et al. 2020; Quast et al. 2017), I estimate the impact of driving distance on birth rates by race and age group to understand if there is a demographic shift in the composition of births. **Appendix Figure A7** shows the effect of a 100-mile increase on birth rates for each group from a Poisson model analogous to Equation (2) where the only difference is instead of year fixed effects, I include an interaction between the state and year to model the linear time trend in birth rates for each state. I find a 2.6% increase in the overall monthly county birth rate. I find a significant 14.8% increase in the birth rate to Hispanic mothers and smaller increases in the birth rate for white and Black mothers (2.1% and 3.6% respectively). There is no significant effect on the birth rate for mothers of other races/ethnicities. I also find across the board increases in the birth rate for mothers of all age groups. Given that infants born to Hispanic mothers tend to have health outcomes similar to those born to non-Hispanic white mothers (Rice et al. 2017; Osterman et al. 2015), it is unlikely that a change in the demographics of the birth composition is driving my results.

Restricting abortion access could adversely affect the living circumstances of children on average as pregnant people would use abortion to avoid having an unwanted child, increasing the overall living circumstances of infants (Gruber et al. 1999). To identify if this marginal child theory bares out in my study setting and is subsequently responsible for a significant change in the compositions of who gives birth as driving distance increases, I estimated a series of regression analogous to those from Equation (1) looking at a variety of maternal characteristics. As shown in **Appendix Table A10** I find mixed evidence that an increase in the driving distance leads to changes in maternal characteristics that could explain the change in health outcomes. A 100-mile increase in driving distance is associated with a reduction in the likelihood that the mother's highest level of education attainment is an advanced degree (suggestive evidence for a reduction in bachelor's degrees as well). Conversely, I find a suggestive positive association between an increase in driving distance and the likelihood of being married and a reduction in the likelihood of mothers participating in WIC and Medicaid. Given the lack of a clear pattern, it is unlikely that these changes in maternal characteristics are driving the changes in infant health.

Turning towards the individual results, the increase in congenital heart disease is likely due in part to a selection effect of pregnancies that would have been terminated had the pregnant person had greater access to abortion. The prevalence of prenatal diagnosis of congenital heart disease/defects (CHD) has grown over the last 25 years to the point where prenatal diagnosis rates are around 68% (Mattia et al. 2023; Landis et al. 2013) with prenatal detection even higher for more severe cases of CHD (Rossier et al. 2014). The increase in prenatal diagnosis is likely due to an increase in the use of fetal echocardiograms which are often performed around 18 to 20 weeks of gestation but can be performed as early as 11 to 14 weeks. Prior work has found that anywhere between 54 to 59% of CHD cases that are diagnosed prenatally are terminated with an increase in the prevalence of termination (around 73%) for cases diagnosed in the first trimester (Tomek et al. 2023; Waern et al. 2021). In countries where abortion access is limited there is a higher share of live births with CHD (Bakker et al. 2019). As such, the 25% increase in congenital heart disease that I find as driving distance to the nearest abortion clinic increases 100 miles likely reflects in part a reduction in abortions of fetuses that have been prenatally diagnosed with CHD.

As shown above, increases in the driving distance to the nearest abortion provider increase birth rates. Some of this increase could be due in part to individuals who are no longer able to space out their pregnancies as abortion access diminishes. The American College of Obstetricians and Gynecologists recommends at least 18 months between pregnancies with shorter pregnancy intervals, especially those less than 18 months, found to be associated with poor infant and maternal outcomes including low birth weight, pre-term delivery, congenital defects, perinatal mortality, and maternal anemia (Beyene et al. 2025; Wang et al. 2022; Schummers et al. 2018). Further, Gemmill and Lindberg (2013) find that short pregnancy intervals are more common among individuals experiencing an unintended pregnancy and show that preventing unintended pregnancies would reduce the percentage of short pregnancy intervals. To understand if changes in birth spacing are driving my results, I estimate an analogous equation to Equation (1) for three birth spacing outcomes: interval since last birth, interval since last pregnancy, and an indicator for a short (less than 18 months) interval since last pregnancy. In **Appendix Table A12** I show that a 100-mile increase in the driving distance to the nearest abortion facility decreases the interval between births and pregnancies by 0.6% and 1.2% respectively. I also find a 2.9% increase in the likelihood that individuals will have a short interval between pregnancies. Therefore, it is likely that the reductions in birth spacing is partially driving the increase in poor infant and maternal outcomes that accompanies the increase in driving distance to the nearest abortion provider.

I also find that a 100-mile increase in driving distance to the nearest abortion facility increases in fetal and infant mortality due to placenta, umbilical cord, and membrane developmental complications by 27.9% and 23.0% respectively. Since these complications are diagnosed prenatally, the period in which pregnant individuals who have access to abortion can decide to terminate a nonviable pregnancy, the increase in fetal and infant mortality due to placenta, umbilical cord, and membrane complications likely reflects a change in who has access to abortion. As the driving distance to the nearest abortion facility increases, there will be a group of pregnant individuals who are no longer able to obtain an abortion even if their fetus is diagnosed with a terminal condition. A subset of these pregnancies then either end in a spontaneous termination (i.e. a fetal death) or are brought to term and die prior to their first birthday, causing an increase in infant mortality.

While I find adverse health effects for infants as the driving distance to the nearest abortion facility increases, I do not find any effect on maternal health. However, because the data on maternal health only includes individuals that experienced a live birth, I am unable to evaluate the effect of an increase in driving distance to the nearest abortion facility on individuals who experienced a fetal death. It is possible that, like the compositional changes in births, the increase in driving distance changed the composition of individuals who experienced a fetal death such that the adverse effects on maternal health of that increase in driving distance are distributed primarily in the sample experiencing fetal deaths. In general, gestational hypertension and diabetes are associated with an increased risk of placenta, umbilical cord, and membrane developmental complications (Menter et al. 2024; Dubetskyi et al. 2023). If the increase in driving distance increased gestational hypertension and diabetes for individuals that experienced a fetal death due to placenta, umbilical cord, and membrane developmental complications, I am not able to capture that increase in my data. Thus, while I do not find adverse health effects for individuals who give birth, there may still be detrimental health effects of increases in driving distance for pregnant individuals.

6.2 Stress

Pregnant individuals who are carrying an unplanned or riskier pregnancy and who no longer have access to abortion services may experience higher levels of stress during their pregnancy. Individuals experiencing an unwanted pregnancy are at an increased risk of depression during pregnancy, post-partum depression, and interpersonal violence (Nelson et al. 2022). Given that prior work shows that stress experienced during pregnancy negatively impacts infant health (Currie et al. 2023; Persson and Rossin-Slater 2018; Almond and Currie 2011; Lauderdale 2006), increased stress during pregnancy could be a pathway for the adverse impact that increases in the distance to the nearest abortion provider has on infant health.

While I am unable to assess the mental health of pregnant individuals in my data, I can estimate the effect of changes in driving distance on a few symptomatic indicators of and behavioral responses to stress that appear in the natality data. In **Appendix Table A11**, I estimated a model analogous to Equation (1) several of these indicators including replicating results for gestational hypertension and including results for eclampsia, gestational weight gain, and smoking. While the coefficients on these estimates are positive, they are not statically significant.

However, an increase in stress can have behavioral responses that are not recorded in the natality data. If, due to higher stress level, pregnant individuals change their diet in such a way that it reduces that intake of key nutrients, they and their infants could be at an increased risk of certain health complications. For instance, low levels of folate (which is found naturally in foods like leafy greens and legumes or taken as a prenatal supplement in the form of folic acid) have been found to be associated with an increased risk of congenital heart disease (Qu et al. 2024). Further, increased stress levels may manifest in physical symptoms that are not recorded in the natality data or may not manifest as a physical symptom at all. Thus, while I am unable to measure an increase in pregnant individuals' stress level as driving distance to the nearest abortion facility increases, it is possible that this elevated level of stress is responsible for some of the adverse infant health effects.

7 Discussion

I find that changes in abortion access induced by increases in the driving distance to the nearest abortion provider leads to increases in post-term delivery and high birth weight infants. To my knowledge, I am the first to identify the impact of abortion access on the incidence of post-term delivery and high birth weight. Both birth outcomes carry consequences, both short- and long-term, for the infant and mother. Infants born with high birth weights are at an increased risk of childhood obesity, hypertension, and diabetes (Magnusson et al. 2021) and mothers may experience a more complicated labor and delivery process including issues like perineal laceration, prolonged labor, and unscheduled caesarean delivery. Infants delivered post-term have a higher risk of also being high birth weight (and are subject to the aforementioned effects) and have been found to have a higher risk of behavior problems later in life (El Marroun et al. 2012). Mothers that give birth post-term are at higher risk of perineal lacerations, unplanned caesarean deliveries, endomyometritis (inflammation of the inner and outer layers of the uterus), and postpartum hemorrhage (Caughey et al. 2007; Caughey and Bishop 2006). As such, the increase in both post-term delivery and high birth weight infants can have lasting implications for both infants and mothers.

Similarly, I find that a 100-mile increase in the driving distance to the nearest abortion provider increases instances of maternal perineal laceration (vaginal tearing) by 11.5%. Perineal laceration is separated into different degrees based on the severity of the tearing. While first and second-degree tears that are treated promptly often do not have lasting effects, third and fourth-degree tears can lead to incontinence and pelvic floor dysfunction (Ramar et al. 2025). Regardless of the severity of the tear, individuals that experience perineal laceration report adverse effects on their well-being and ability to care for their infant in the immediate weeks post-delivery. As such, given the increase in perineal laceration that comes with an increase in the distance to the nearest abortion provider additional support and preventive measures should be employed for individuals living in areas with restricted abortion access.

I also find that increase in the driving distance increases the incidence of congenital heart disease. Prior work has similarly found that gestational limit abortion bans increase the incidence of other congenital defects (Mellquist et al. 2024; Elmore et al. 2024). In a simulation of if abortion was completely banned throughout the United States, Miller et al. (2023) predicted that there would be a 53.7% increase in congenital heart disease. The 21.4% increase I find when driving distance increases 100 miles, while smaller, emphasizes that decreasing access to abortion drives up the number of infants born with congenital heart disease regardless of if the increase is due to a selection or stress mechanism.

The increase in the incidence of congenital heart disease has lasting public health implications. Given that today due to medical advancements most infants born with congenital heart disease survive into adulthood, an increase in infants born with congenital heart disease can place a heavier burden on the health care system if not planned for. Most infants born with congenital heart disease require some sort of medical intervention (ranging from cardiac surgery and catheterization to less invasive in-patient treatments) early in life. Pinto et al. (2018) put the median health care utilization cost through age 10 of a child born with critical congenital heart disease at around $75,000, which given current estimates of critical congenital heart disease incidence in the US population equals roughly $1 billion for one birth year cohort through age 10. This figure only estimates the impact of the most serious forms of congenital heart disease and is likely an underestimate of the full cost. Early in life medical treatments then turn congenital heart disease into a chronic condition which requires management for the rest of the individual's life. Therefore, as congenital heart disease prevalence increases more resources will need to be dedicated to later in life management of the condition, especially the crucial transition from pediatric to adult care.

Unlike prior work that evaluated the effect of abortion bans (Gemmill et al. 2025; Singh and Gallo 2024; Gemmill et al. 2024) I do not find that a change in driving distance to the nearest abortion provider increases all-cause infant mortality. The driving distance to the nearest abortion provider is likely to reflect a more realistic barrier to obtaining an abortion especially since women can (and do—in 2021, 10.9% of all abortions performed were performed on women living outside of the state where the abortion took place, per Diamant, Mohamed, and Leppert (2024) seek an abortion outside of their state of residence. As such, it is likely that abortion restrictions may not have as large of an effect on all-cause infant mortality when using this more realistic indicator of access. However, I do find a 23.0% increase in infant mortality due to placenta, umbilical cord, and membrane developmental complications. This percentage increase which is larger than the 12.7%, 7%, and 5.6% found by Gemmill et al. (2024), Singh and Gallo (2024), and Gemmill et al. (2025) respectively for all-cause infant mortality identifies the mortality effect on the infant population whose health is most likely to be affected by abortion restrictions. While I do not find a significant increase in the incidence of low birth weight infants or pre-term delivery I do find a 11.1% increase in infant mortality due to premature birth. Therefore, while increases in the driving distance to the nearest abortion facility do not increase the number of infants born prematurely, they seem to have a scarring effect on those born prematurely by increasing the share of those infants that do not survive to their first birthday. I also document that a 100-mile increase in driving distance increases fetal mortality due to placenta, umbilical cord, and membrane developmental complications by 27.9%. To my knowledge, any effect of abortion restrictions on fetal mortality has yet to be documented in the literature.

Regardless of whether the increase in infant and fetal mortality is due to the stress of carrying an unplanned/unwanted pregnancy or that more non-viable pregnancies are resulting in infant or fetal deaths instead of an abortion, an increase in fetal and infant mortality has lasting implications for the mothers' health. In the period directly following a fetal or infant death, parents report higher levels of psychological distress and overall worse health (Heazell et al.

2016; Song et al. 2010). Mothers with a prior poor pregnancy outcome, such as a fetal death, are at an increased likelihood of health challenges during future pregnancies. Armstrong (2004) reports that 88% of mothers that experienced a previous perinatal loss (fetal death) had elevated levels of stress related to that loss during a subsequent pregnancy. Therefore, there are downstream effects, some of which are lasting, on both the mental and physical health of mothers that experience a pregnancy that ends in an infant or fetal death.

Unlike prior work (Gardner 2024), outside of an increase in perineal laceration, I do not find a reduction in abortion access leads to declines in maternal health at birth. Though both estimates are statistically insignificant, the 2.8% increase in gestational hypertension that accompanies a 100-mile increase in driving distance is smaller than the 9% change per 100-mile increase found in Gardner (2024). The difference in the results likely follows from differences in the estimation models since I include a variety of demographic and behavioral controls as well as month fixed effects. As mentioned above, it is possible that an adverse effect on maternal health is concentrated among mothers that experience a fetal death and who are not measured in the natality data. Additionally, the measures of maternal health in the natality data tend to be underreported (Backes et al. 2020) which empirically could inhibit my ability to find statistically significant effects. Further research using electronic health records, which will also have a larger range of maternal health measures, is necessary to solidify the complete effect of changes in driving distance on maternal health. Finally, it is also possible that changes in driving distance to the nearest abortion provider alone may not be large enough change to affect maternal health. Models that use more recent data and that incorporate both the post-*Dobbs* abortion bans and changes in driving distance (like in Myers, Dench, and Pineda Torres (2025)) may be more suited to find the effect of mothers potentially carrying more risky pregnancies to term.

Several of my results either complement or influence each other. The increase in the incidence of infants born post-term naturally relates to the increase in high birth weight infants (though the effect remains when conditioned on not being born post-term) and maternal perineal laceration. The connections between these outcomes underscores the widespread effect that the increase in driving distance to the nearest abortion facility (and the subsequent reduction in abortion access) can have on infant and maternal health.

To state the effect that changes in driving distance have on these health measures in tangible terms, I employ a back of the envelope counterfactual exercise, where the counterfactual was if all individuals lived within 50 miles of an abortion facility. 50 miles would likely be the upper bound of the driving distance before driving to the nearest facility would be considered an undue burden, the standard at which abortion restrictions were judged under *Roe v. Wade*. I estimated the average distance reduction that would need to occur for all individuals/counties to be within 50 miles of an abortion facility for each data source and evaluated the effect on that data source's outcomes at that average distance. If the driving distance to the nearest abortion facility changed so that all counties were within 50 miles of a facility, 646 infant deaths (due to premature birth and placenta, umbilical cord, and membrane complications) and 793 fetal deaths (due to placenta, umbilical cord, and membrane complications) would have been avoided. Similarly, the average driving distance change required so each individual would live within 50 miles of an abortion facility would result in 10,031 fewer post-term deliveries, 5,372 fewer high birth weight infants, 404 fewer infants with congenital heart disease and 2,694 fewer cases of perineal laceration.

The health effects of changes in driving distance to the nearest abortion facility found here provide guidance for shaping public policy in the wake of the increasingly fragmented abortion access landscape in the United States. In response to the total abortion bans that have been implemented in 12 states as of April 2025, the healthcare infrastructure in those states should be expanded to ensure that they have the capacity to care for an increase in infants and mothers experiencing health challenges surrounding pregnancy and childbirth, some of which, like the increase in congenital heart disease, may require long-term care to manage. Further, to potentially mitigate some of the adverse health effects of increases in driving distance to the nearest abortion facility, states with abortion bans could ensure that there are exemptions for nonviable pregnancies or pregnancies that pose a serious health risk to the infant or mother.

8 Conclusion

As access to abortion becomes increasingly more varied across states, especially in the wake of the Supreme Court's decision in *Dobbs v. Jackson Women's Health Organization*, it is vital to understand how differences in access affect the health of both mothers and their infants. Using data from 2009 to 2019, I estimate the impact of the driving distance to the nearest abortion facility on infant health (including birth outcomes and infant and fetal mortality rates) and maternal health. I find that a 100-mile increase in the driving distance to the nearest abortion provider increases the incidence of post-term deliveries by 5.2%, high birth weight by 2.2%, and congenital heart disease by 21.4%. I show that a 100-mile increase in the driving distance leads to a 11.1% and 23.0% increase in infant mortality due to premature birth and placenta, umbilical cord, and membrane development complications respectively. I also find a 27.9% increase in fetal mortality due to placenta, umbilical cord, and membrane development complications. Finally, outside of an 11.5% increase in perineal laceration, I do not find that changes in the driving distance lead to any change in maternal health at birth. The average change in driving distance so that all individuals lived within 50 miles of an abortion facility would result in 646 and 793 fewer infant and fetal deaths, respectively.

Overall, increases in the driving distance to the nearest abortion provider, a proxy for abortion access, adversely impacts infant and maternal health at birth and increase the fetal and infant mortality rates. The period of this study ends prior to the overturning of *Roe v. Wade,* meaning that the effects found here were estimated during the period when there was federal protection for abortion. Given the increasingly fractured landscape of abortion access today, it is possible that these effects may have changed. Another potential limitation of this work is that national natality and mortality data has been shown to be subject to underreporting, specifically in regard to maternal mortality (MacDorman and Declercq 2018). Further work should be done using more recent state natality and mortality records and electronic health records, which can be more detailed and may not suffer from similar mortality underreporting, to confirm and further explore the ramifications of changes in the driving distance to the nearest abortion facility.

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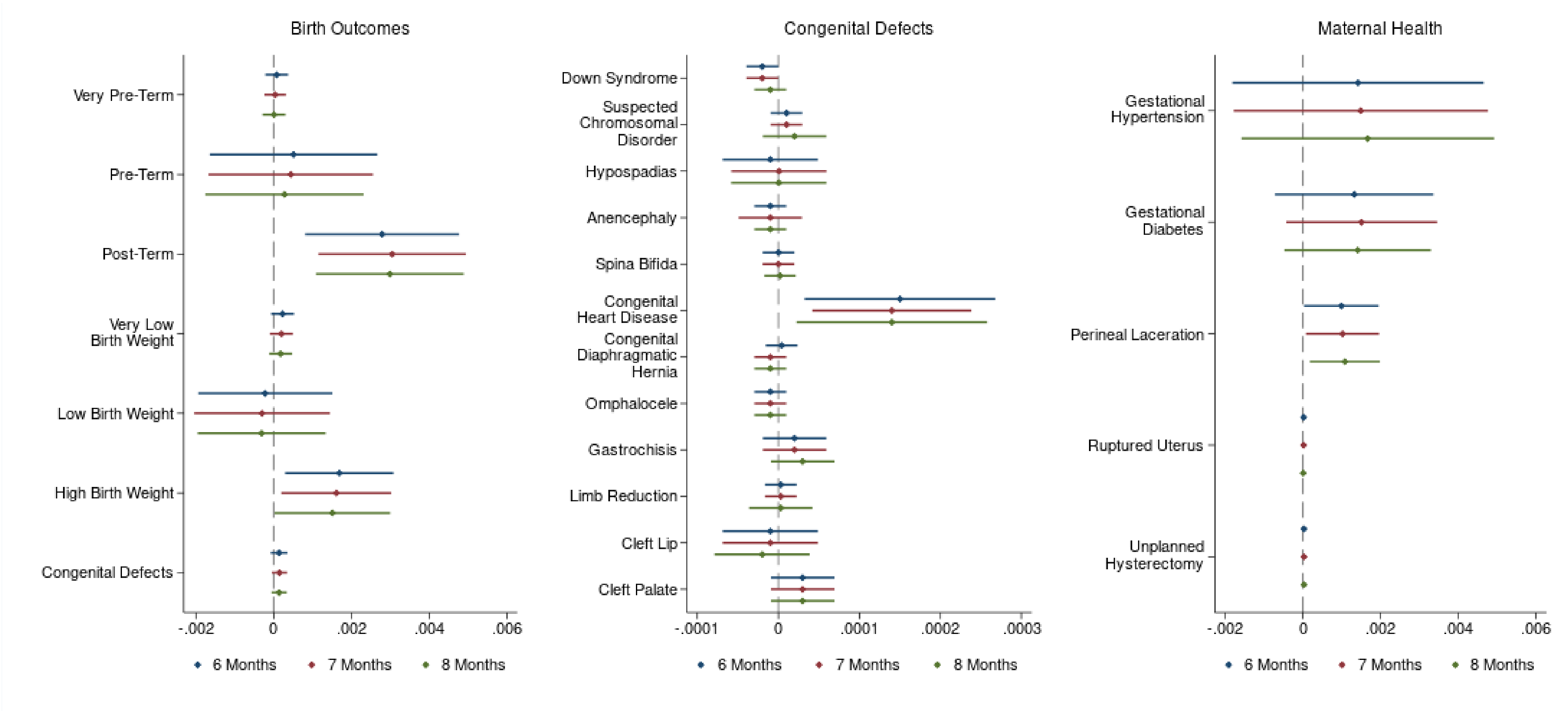
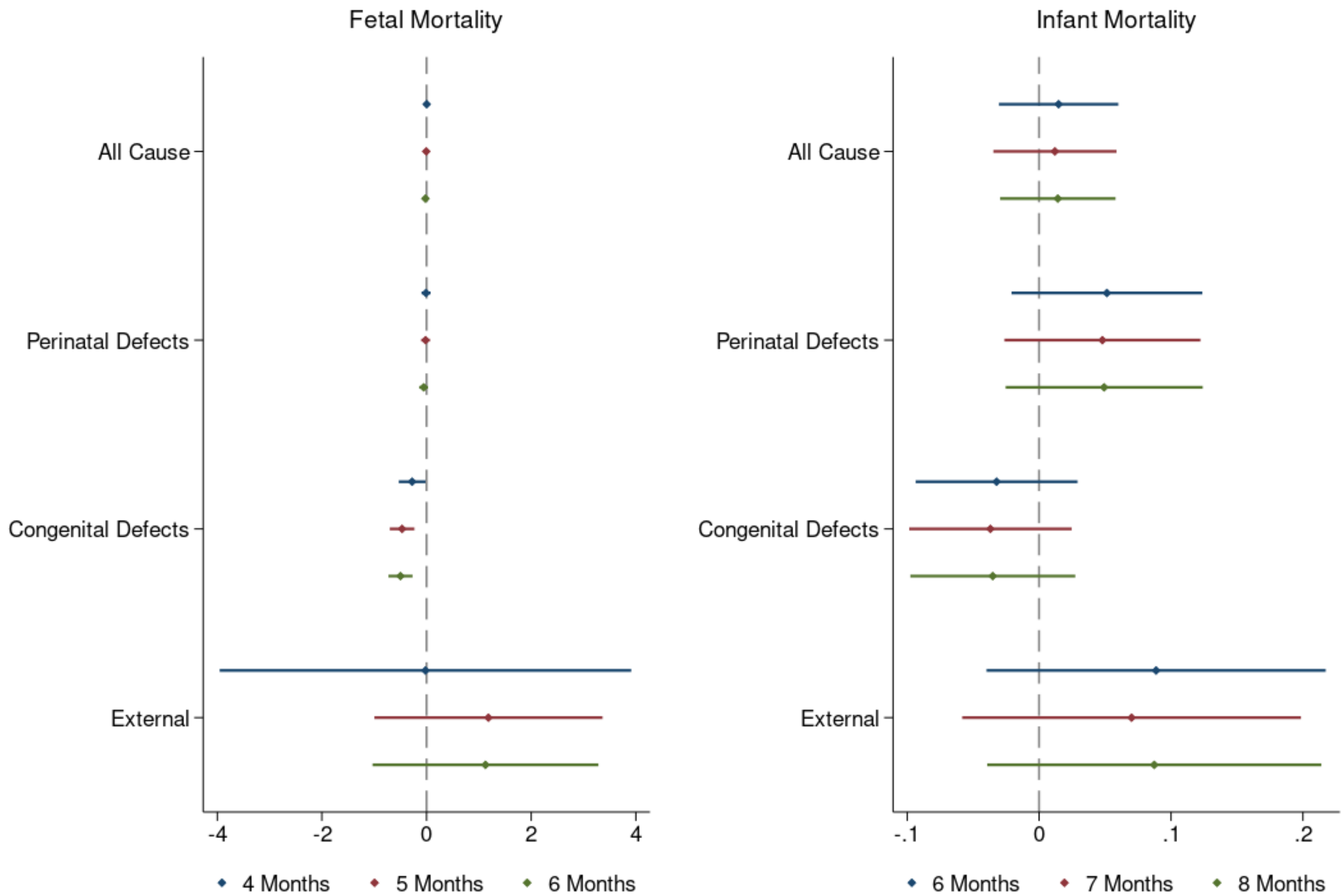
Appendix Figures

Figure A1: Effect of Driving Distance (Months Prior to Birth\Death)

Panel A: Individual-Level Outcomes

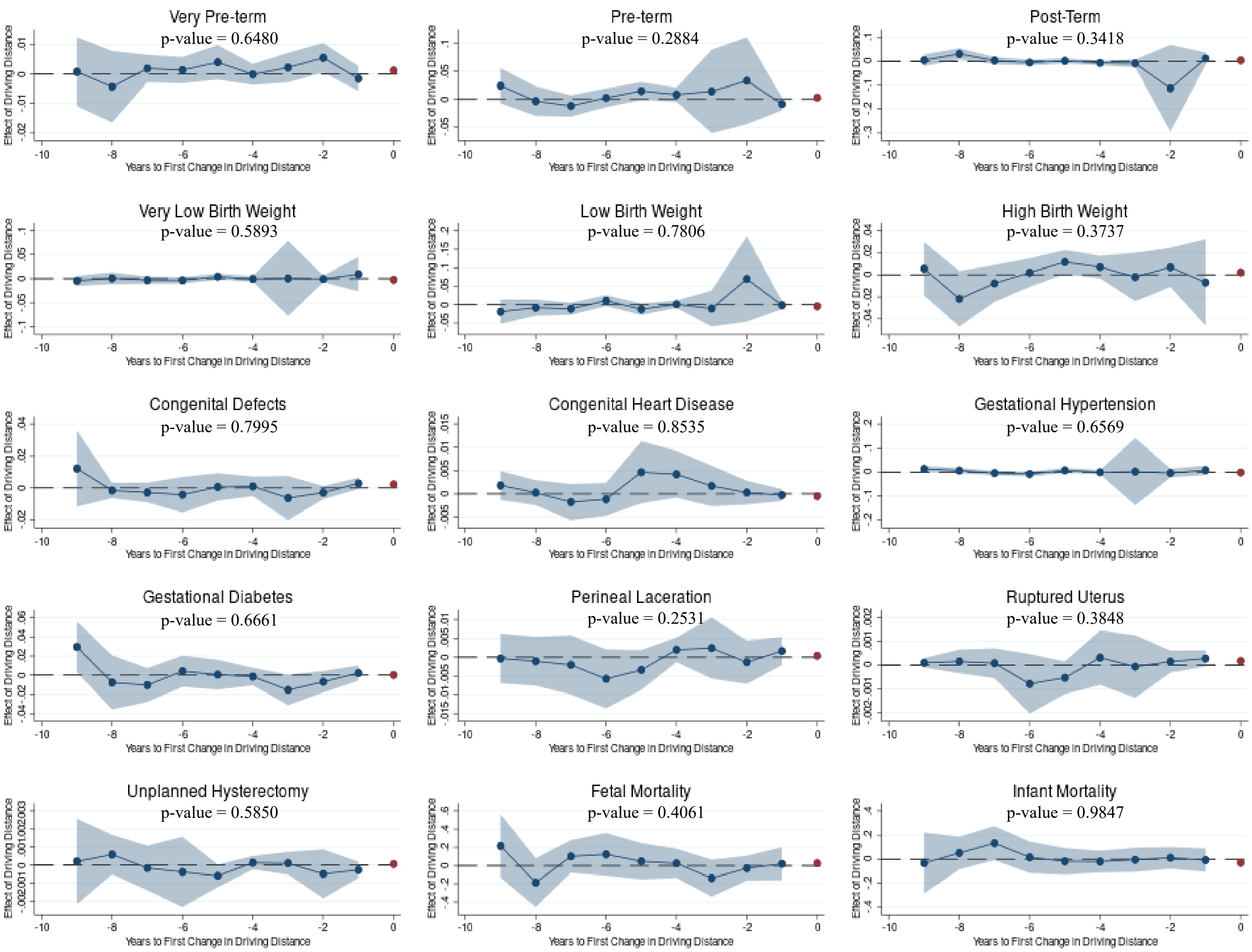


Panel B: County-Level Outcomes



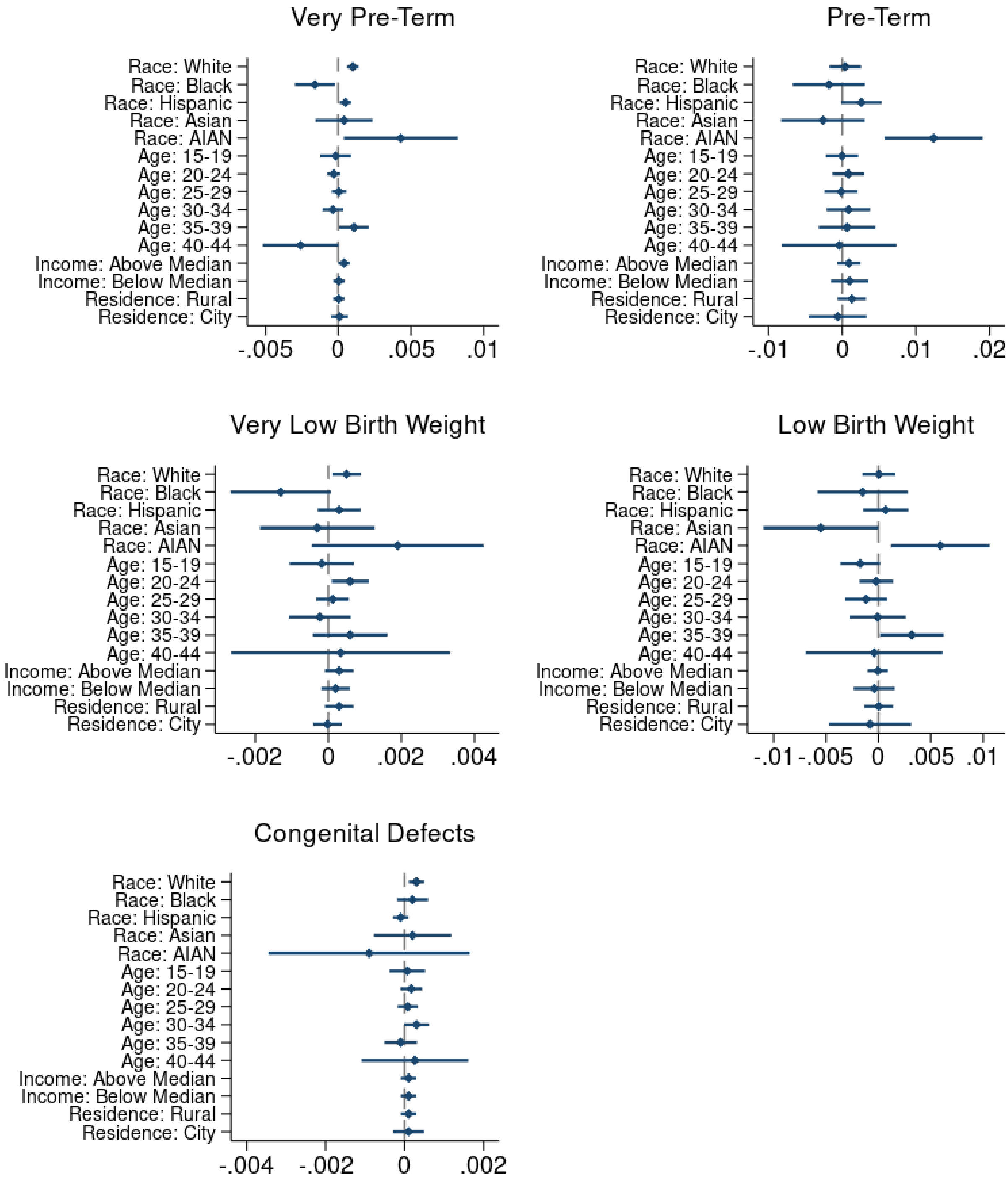
Note: Estimates are the effect of a 100-mile increase in the driving distance to the nearest abortion facility. Each model includes month, year, and mother's county of residence fixed effects. Individual-level model includes additional controls for mother's age, prior number of live births, race/ethnicity indicators for White, Black, Hispanic, Asian, AIAN, and indicators for living in a city, mother being born in the U.S., having prenatal care, smoking, being diabetic, and maternal hypertension and county-level models are from Poisson models that include includes controls for each county's annual female population race and age shares. Exposure variable the sum of live births and fetal deaths for fetal mortality and number of live births for infant mortality.

Figure A2: Pre-Period Event Studies



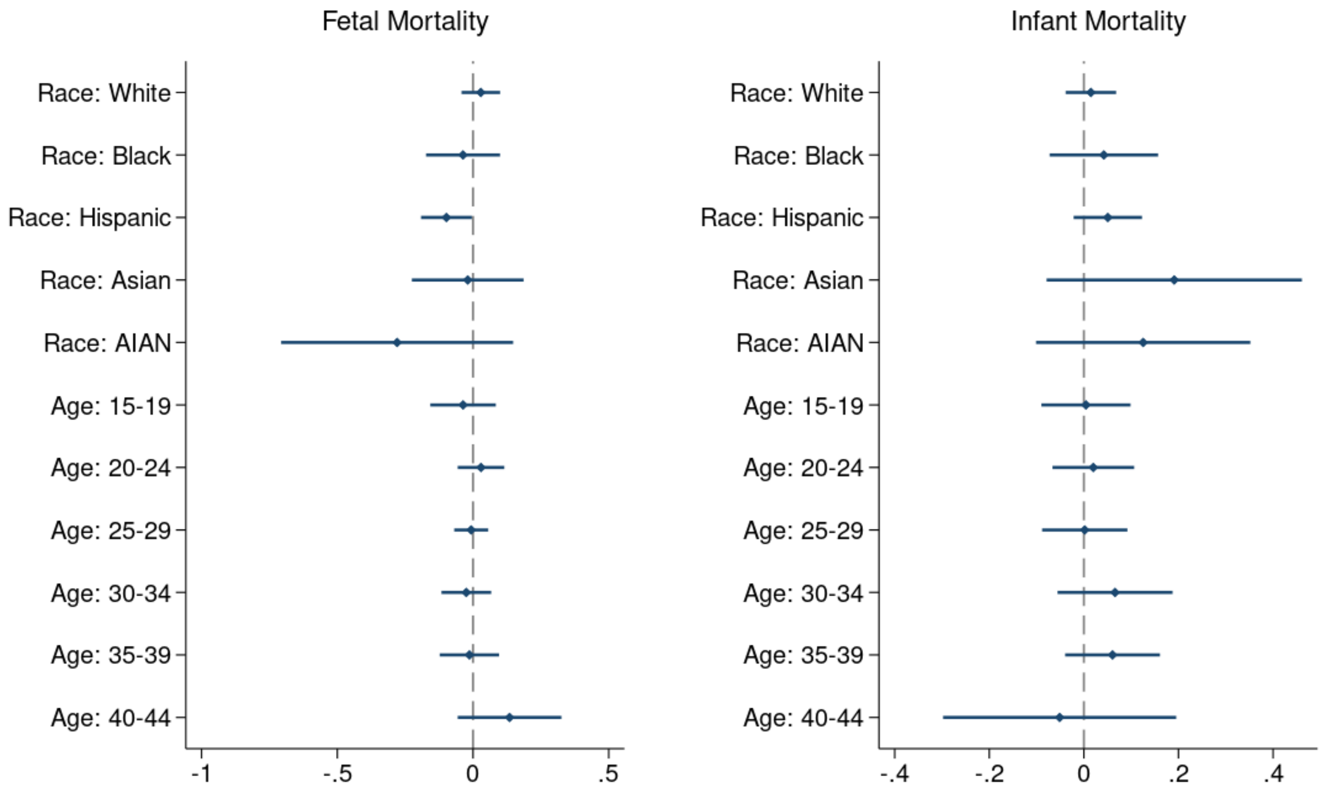
Note: Estimates are county-level Callaway and Sant'Anna event studies. Birth outcomes and maternal health event studies include controls for mother's age, prior number of live births, race/ethnicity indicators for White, Black, Hispanic, Asian, AIAN, and indicators for living in a city, mother being born in the U.S., having prenatal care, smoking, being diabetic, and maternal hypertension. When the control variable category is the category of interest, those variables are removed from the regression. Event studies for fetal and infant mortality include controls for share of county's annual population that is white, Black, Hispanic, Asian, and AIAN. p-value for null hypothesis that all the ATTs for the pre-treatment periods are equal to zero.

Figure A3: Heterogeneous Effect of Driving Distance on Remaining Birth Outcomes



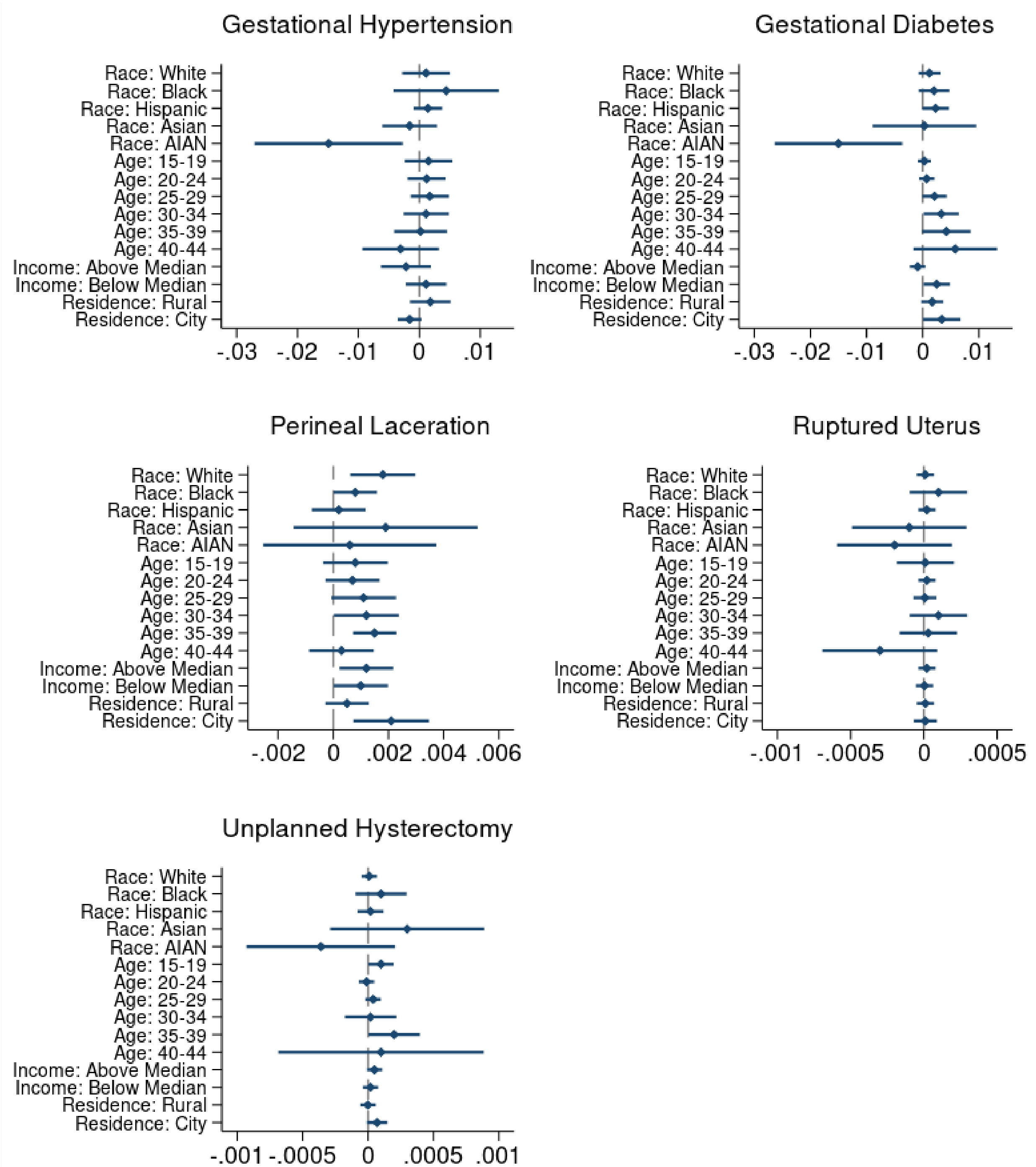
Note: Distance measure is from six months prior to the month of birth. Estimates are the effect of a 100-mile increase in the driving distance to the nearest abortion facility and are from models that include includes month, year, and mother's county of residence fixed effects and controls for mother's age, prior number of live births, race/ethnicity indicators for White, Black, Hispanic, Asian, AIAN, and indicators for living in a city, mother being born in the U.S., having prenatal care, smoking, being diabetic, and maternal hypertension. Income is measured as the county median annual household income and is compared to the annual national median household income.

Figure A4: Heterogeneous Effect of Driving Distance on Fetal and Infant Mortality



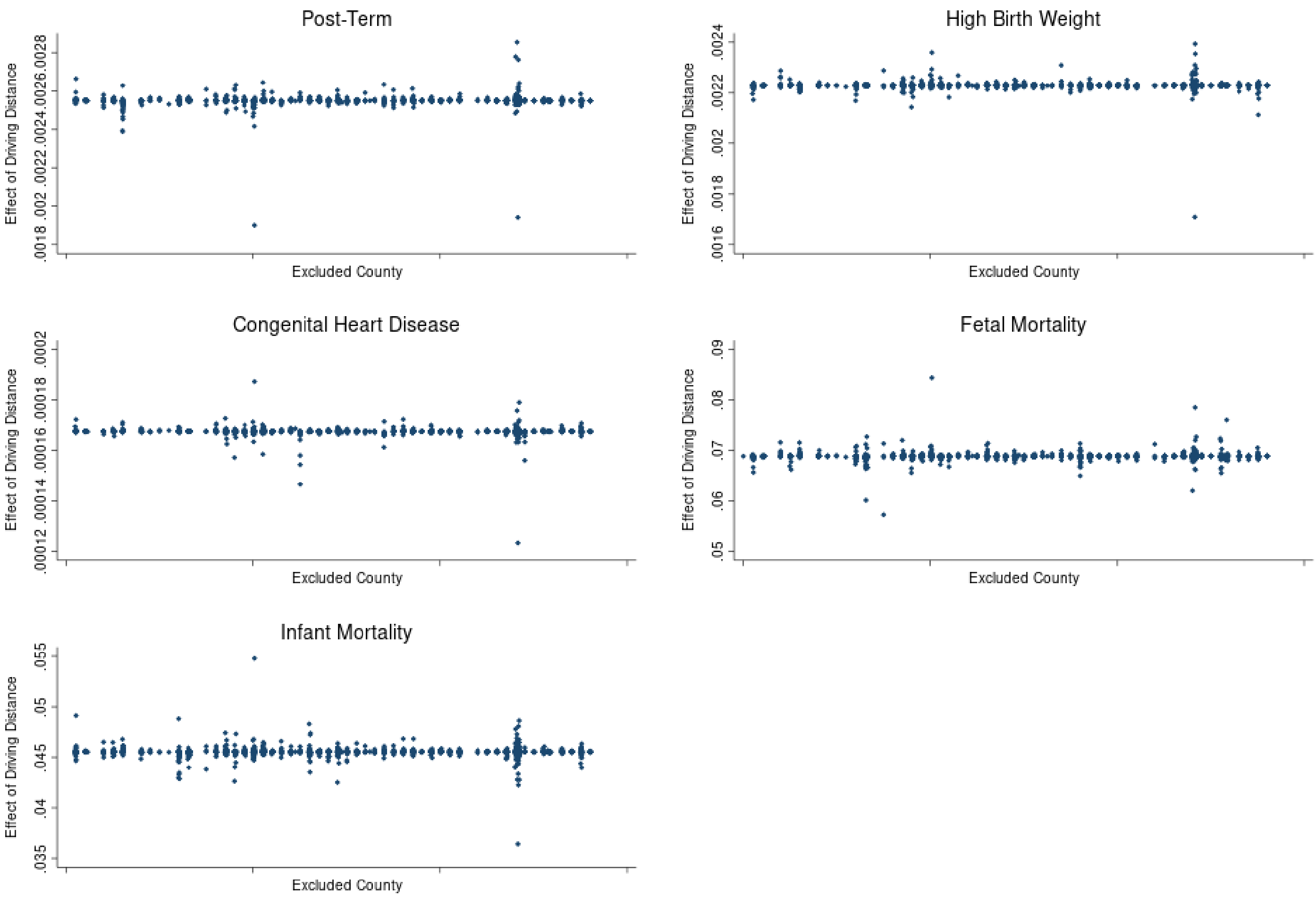
Note: Distance measure for fetal (infant) mortality is from 4 (6) months prior to month of death (birth). Estimates are the effect of a 100-mile increase in the driving distance to the nearest abortion facility and are from Poisson models that include includes month, year, and mother's county of residence fixed effects and controls for each county's annual female population race and age shares. Exposure variable is the sum of live births and fetal deaths for fetal mortality and number of live births for infant mortality.

Appendix Figure A5: Heterogenous Effect of Driving Distance on Maternal Health



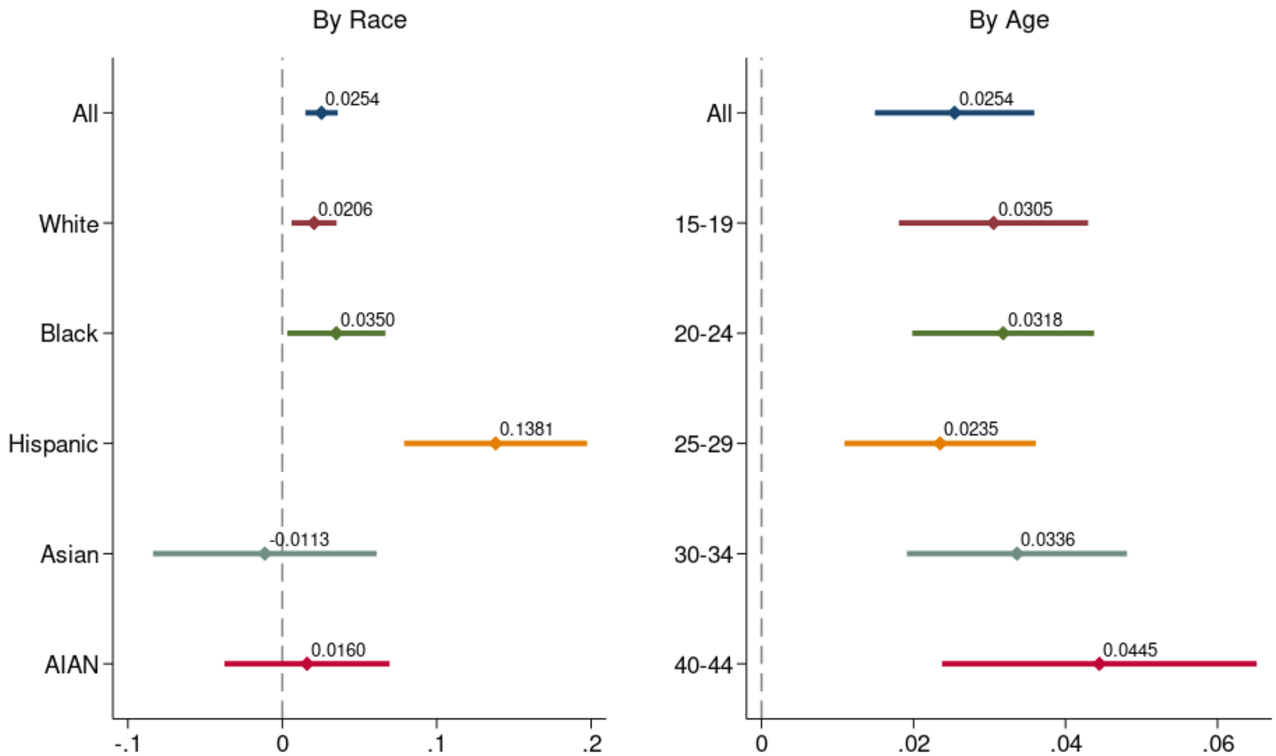
Note: Distance measure is from six months prior to birth month. Estimates are the effect of a 100-mile increase in the driving distance to the nearest abortion facility and are from models that include includes month, year, and mother's county of residence fixed effects and controls for mother's age, prior number of live births, race/ethnicity indicators for White, Black, Hispanic, Asian, AIAN, and indicators for living in a city, mother being born in the U.S., having prenatal care, smoking, being diabetic, and maternal hypertension. When the control variable category is the category of interest, those variables are removed from the regression. Income is measured as the county median annual household income and is compared to the annual national median household income.

Figure A6: Leave-One-Out County Robustness Check



Note: Estimates are the effect of a 100-mile increase in the driving distance to the nearest abortion facility and are from linear (birth outcomes) and Poisson (mortality outcome) models that include includes month, year, and mother's county of residence fixed effects. Birth outcomes models include controls for mother's age, prior number of live births, race/ethnicity indicators for White, Black, Hispanic, Asian, AIAN, and indicators for living in a city, mother being born in the U.S., having prenatal care, smoking, being diabetic, and maternal hypertension. Mortality outcome models include controls for share of county's annual population that is white, Black, Hispanic, Asian, and AIAN. Exposure variable is the sum of live births and fetal deaths for fetal mortality and number of live births for infant mortality.

Figure A7: Effect of Driving Distance on Birth Rates



Note: Estimates are the effect of a 100-mile increase in the driving distance to the nearest abortion facility and are from models that includes month, mother's county of residence, and state-year fixed effects and controls for each county’s annual female population race and age shares. Distance measure is from six months prior to the birth month.

Appendix Tables

Table A1: Impact of Driving Distance on Access to Other Healthcare

	Had Prenatal Care	Began Prenatal Care in 1st Trimester	Number of Prenatal Visits	Maternity Ward Closure
	(1)	(2)	(3)	(4)
Distance to nearest provider (per 100 miles)	0.0033**	-0.0322***	-0.0789**	0.0023
	(0.0016)	(0.0123)	(0.0384)	(0.0018)
R-squared	0.0078	0.0808	0.0415	0.0032
Dependent Variable Mean	0.9858	0.6960	11.4883	0.0037
Percent Change	0.33%	-4.63%	0.69%	62.16%
Observations	38,153,192	37,606,726	21,493,216	22,183,588

Note: Distance is from the six months prior to birth month. Each model includes month, year, and mother's county of residence fixed effects and controls for mother's age, prior number of live births, race/ethnicity indicators for White, Black, Hispanic, Asian, AIAN, and indicators for living in a city, mother being born in the U.S., smoking, being diabetic, and maternal hypertension. Maternity ward closure model only includes observations from 2012-2017. Robust standard errors are in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table A2: Impact of Driving Distance on Fetal Mortality – Anencephaly & Placenta, Umbilical Cord, and Membrane Complications

VARIABLES	Fetal Mortality (1)
Distance to nearest provider (100 miles)	0.2167**
	(0.1017)
Observations	134,520
Number of MomCountyFIPS2	2,247

Note: Distance measure is from four months prior to the month of death. Sample includes fetal deaths due to anencephaly (ICD-10 code Q00) and placenta, umbilical cord, and membrane complications (ICD-10 code P02). The model includes year, month, and mother's county of residence fixed effects. Additional controls include each county's female population race and age shares. Exposure variable is the sum of live births and fetal deaths. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table A3: Sensitivity Analyses

	First Birth	Repeat Births	Without Large Area Counties
	(1)	(2)	(3)
Post-Term	0.0025**	0.0029***	0.0025**
	(0.0012)	(0.001)	(0.0011)
High Birth Weight	0.0021***	0.0015**	0.0019***
	(0.0008)	(0.0007)	(0.0007)
Congenital Heart Disease	0.0002**	0.00014**	0.00015**
	(0.0001)	(0.00007)	(0.00007)
Perineal Laceration	0.0018*	0.0006**	0.001**
	(0.001)	(0.0003)	(0.0005)

Note: Distance is from the six months prior to birth month. Each model includes month, year, and mother's county of residence fixed effects and controls for mother's age, prior number of live births, race/ethnicity indicators for White, Black, Hispanic, Asian, AIAN, and indicators for living in a city, mother being born in the U.S., having prenatal care, smoking, being diabetic, and maternal hypertension. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A4: Robustness Checks – Additional Controls

	Education	Marital Status
	(1)	(2)
Post-Term	0.00262**	0.00283***
	(0.00104)	(0.00101)
High Birth Weight	0.00193**	0.00154**
	(0.00075)	(0.0007)
Congenital Heart Disease	0.00015**	0.00015**
	(0.00006)	(0.00006)
Perineal Laceration	0.00098**	0.00095*
	(0.00049)	(0.00049)

Note: Distance is from the six months prior to birth month. Each model includes month, year, and mother's county of residence fixed effects and controls for mother's age, prior number of live births, race/ethnicity indicators for White, Black, Hispanic, Asian, AIAN, and indicators for living in a city, mother being born in the U.S., having prenatal care, smoking, being diabetic, and maternal hypertension. Education controls include indicators for highest educational attainment (high school, some college, bachelor's degree, graduate degree). Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A5: Effect of Driving Distance on Infant Birth Outcomes – Distance Indicators

	Very Pre-Term	Pre- Term	Post-Term	Very Low Birth Weight	Low Birth Weight	High Birth Weight	Congenital Defects	Congenital Heart Disease
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Distance 50-100 miles	0.00002	0.00047	0.0001	-0.00002	-0.00045	0.00192***	0.00008	0.00012**
	(0.00025)	(0.00127)	(0.00082)	(0.00026)	(0.00079)	(0.00052)	(0.00012)	(0.00006)
Distance 100-150 miles	0.00016	0.00195	-0.00046	0.00012	0.00044	0.00366***	-0.00016	0.00004
	(0.00028)	(0.00119)	(0.00103)	(0.00026)	(0.00083)	(0.00081)	(0.00022)	(0.00009)
Distance 150-200 miles	0.00018	0.00535***	0.00514*	-0.00018	0.00221**	0.00136	-0.00013	-0.00004
	(0.00044)	(0.00166)	(0.00264)	(0.00034)	(0.00098)	(0.00098)	(0.00022)	(0.00008)
Distance over 200 miles	0.00014	0.00188***	0.00007	0.00008	-0.0003	0.00102***	0.00008	0.00016***
	(0.00014)	(0.00056)	(0.00056)	(0.00016)	(0.00044)	(0.00037)	(0.0001)	(0.00006)
R-squared	0.00383	0.02088	0.00257	0.00808	0.0235	0.01092	0.0001	0.00009
Dependent Variable Mean	0.0115	0.1142	0.0537	0.0132	0.0792	0.0778	0.003	0.0007
Observations	39,869,419	39,869,419	39,869,419	39,855,900	39,855,900	39,855,900	35,992,639	35,992,639

Note: Distance 0-50 miles is the reference, and distance is from the six months prior to birth month. Each model includes month, year, and mother's county of residence fixed effects and controls for mother's age, prior number of live births, race/ethnicity indicators for White, Black, Hispanic, Asian, AIAN, and indicators for living in a city, mother being born in the U.S., having prenatal care, smoking, being diabetic, and maternal hypertension. Very preterm is between 28 and 32 weeks of gestation. Preterm is less than 37 weeks of gestation. Post-term is greater than 42 weeks of gestation. Very low birth weight is less than 1,500 grams. Low birth weight is less than 2,500 grams. High birth weight is greater than 4,000 grams. Robust standard errors are in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table A6: Effect of Driving Distance on Maternal Health – Distance Indicators

	Gestational Hypertension (1)	Gestational Diabetes (2)	Perineal Laceration (3)	Ruptured Uterus (4)	Unplanned Hysterectomy (5)
Distance 50-100 miles	0.00232	-0.00076	0.00101**	-0.00001	0.00004
	(0.00192)	(0.00128)	(0.00047)	(0.00003)	(0.00004)
Distance 100-150 miles	0.00148	-0.00083	-0.0003	-0.00006	-0.00001
	(0.00208)	(0.00149)	(0.00046)	(0.00004)	(0.00005)
Distance 150-200 miles	-0.0026	-0.00256**	0.0001	-0.00007	0.00004
	(0.00217)	(0.00111)	(0.00067)	(0.00004)	(0.00007)
Distance over 200 miles	0.00005	0.00043	0.00051*	-0.00003	-0.00001
	(0.0006)	(0.0006)	(0.0003)	(0.00002)	(0.00003)
R-squared	0.01396	0.02223	0.00346	0.00009	0.00032
Dependent Variable Mean	0.051	0.057	0.009	0.0003	0.0004
Observations	39,880,908	36,066,074	36,026,883	35,987,254	36,026,883

Note: Distance 0-50 is the reference, and distance is from the six months prior to birth month. Each model includes month, year, and mother's county of residence fixed effects and controls for mother's age, prior number of live births, race/ethnicity indicators for White, Black, Hispanic, Asian, AIAN, and indicators for living in a city, mother being born in the U.S., having prenatal care, smoking, being diabetic, and maternal hypertension. Maternal hypertension control is dropped when gestational hypertension is the outcome of interest. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A7: Effect of Driving Distance on Fetal and Infant Mortality – Distance Indicators

VARIABLES	All (1)	Perinatal Defects (2)	Congenital Defects (3)	External (4)	Placenta, Umbilical Cord, Membrane Complications (5)	Anencephaly (6)	Premature (7)
Panel A: Fetal Mortality							
Distance 50-100 miles	0.0618**	-0.0062	-0.1836	-2.0147**	0.1446	-0.5241*	
	(0.0289)	(0.0383)	(0.1341)	(1.0015)	(0.0885)	(0.2927)	
Distance 100-150 miles	0.1245***	-0.0522	-0.2151	-0.2784	0.2134	-0.9642	
	(0.0397)	(0.0550)	(0.1533)	(1.1700)	(0.1448)	(0.6899)	
Distance 150-200 miles	0.0085	-0.0568	-0.1519		0.2386	-2.1122***	
	(0.0719)	(0.1143)	(0.2601)		(0.1797)	(0.7166)	
Distance over 200 miles	0.0213	0.0882	-13.0079***		0.3530	-10.1930***	
	(0.0157)	(0.2043)	(0.5066)		(0.4944)	(0.7810)	
Observations	376,262	165,770	93,249	4,260	133,336	24,516	
Number of MomCountyFIPS2	2,971	2,773	1,557	71	2,227	409	
Panel B: Infant Morality							
Distance 50-100 miles	0.0488**	0.0439	0.0372	-0.0103	0.0736		0.0951*
	(0.0243)	(0.0311)	(0.0417)	(0.0615)	(0.0959)		(0.0515)
Distance 100-150 miles	0.1119***	0.1211***	0.1092**	0.0715	0.3533**		0.1719**
	(0.0308)	(0.0466)	(0.0527)	(0.0935)	(0.1503)		(0.0831)
Distance 150-200 miles	-0.0130	0.0300	-0.0830	0.0950	-0.0333		-0.0636
	(0.0464)	(0.0586)	(0.0965)	(0.1430)	(0.2122)		(0.1170)
Distance over 200 miles	0.0328**	0.0486**	0.0279	0.0530	0.0513		0.0242
	(0.0152)	(0.0238)	(0.0283)	(0.0561)	(0.0778)		(0.0371)
Observations	376,115	360,682	350,509	279,449	211,681		303,213
Number of MomCountyFIPS2	2,983	2,839	2,748	2,176	1,642		2,368

Note: Distance 0-50 is the reference. Distance for fetal mortality is from four months prior to birth month. Distance for infant mortality is from six months prior to birth month. Each model includes year, month, and mother's county of residence fixed effects. Additional controls include each county's annual female population race and age shares. Exposure variable is the sum of live births and fetal deaths for fetal mortality and number of live births for infant mortality. Congenital and perinatal deaths were identified as by either a Q (congenital) or P (perinatal) in the ICD-10 cause of the death code. External cause of deaths includes V, W, X, and Y ICD-10 codes. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table A8: Effect of Congestion on Infant Outcomes

	Post-Term	High Birth Weight	Congenital Heart Disease	Perineal Laceration	Fetal Mortality	Infant Mortality
	(1)	(2)	(3)	(4)	(5)	(6)
Average Service Population (100,000s)	0.00093**	0.00076***	0.00001	0.00026	0.02835**	0.01717**
	(0.00042)	(0.00018)	(0.00008)	(0.00025)	(0.01159)	(0.00848)
R-squared	0.00256	0.011	0.00009	0.00383		
Dependent Variable Mean	0.054	0.078	0.001	0.009		
Observations	37,874,684	37,861,189	34,783,560	34,814,406	362,698	356,885
Number of MomCountyFIPS2	3,107	3,107	3,107	3,107	2,948	2,954

Note: Congestion measure is from the six months prior to birth month. Each model includes month, year, and mother's county of residence fixed effects. Birth outcomes models include controls for mother's age, prior number of live births, race/ethnicity indicators for White, Black, Hispanic, Asian, AIAN, and indicators for living in a city, mother being born in the U.S., having prenatal care, smoking, being diabetic, and maternal hypertension. Mortality outcomes are estimated in Poisson models and include controls for each county's annual female population race and age shares. Exposure variable is the sum of live births and fetal deaths for fetal mortality and number of live births for infant mortality. Post-term is greater than 42 weeks of gestation. High birth weight is greater than 4,000 grams. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A9: Effect of Driving Distance and Congestion on Infant Outcomes

	Post-Term	High Birth Weight	Congenital Heart Disease	Perineal Laceration	Fetal Mortality	Infant Mortality
	(1)	(2)	(3)	(4)	(5)	(6)
Distance to nearest provider (per 100 miles)	0.00217**	0.00115	0.00016*	0.00082*	-0.0284	-0.0024
	(0.00105)	(0.00074)	(0.00009)	(0.00048)	(0.0254)	(0.0241)
Average Service Population (100,000s)	0.00074*	0.00066***	-0.00001	0.00019	0.0307**	0.0174**
	(0.00044)	(0.00018)	(0.00008)	(0.00025)	(0.0120)	(0.0088)
R-squared	0.00257	0.011	0.00009	0.00383		
Dependent Variable Mean	0.0537	0.0778	0.0007	0.0086		
Observations	37,874,684	37,861,189	34,783,560	34,814,406	362,698	356,885
Number of MomCountyFIPS2	3,107	3,107	3,107	3,107	2,948	2,954

Note: Congestion and distance measures are from six months prior to birth month for birth outcomes, maternal health, and infant mortality. Congestion and distance measure is from four months prior to the birth month for fetal mortality. Each model includes month, year, and mother's county of residence fixed effects. Birth outcomes models include controls for mother's age, prior number of live births, race/ethnicity indicators for White, Black, Hispanic, Asian, AIAN, and indicators for living in a city, mother being born in the U.S., having prenatal care, smoking, being diabetic, and maternal hypertension. Mortality outcomes are estimated in Poisson models and include controls for the share of county's annual population that is white, Black, Hispanic, Asian, and AIAN. Exposure variable is the sum of live births and fetal deaths for fetal mortality and number of live births for infant mortality. Post-term is greater than 42 weeks of gestation. High birth weight is greater than 4,000 grams. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A10: Effect of Driving Distance on Maternal Characteristics

	Effect	Mean	Observations
Mother's Age	0.0039	28.354	38,153,192
	(0.0278)		
Mother's Age at 1st Birth	-0.0226	26.192	14,885,984
	(0.0349)		
Living in a City	0.0183	0.337	38,153,192
	(0.0198)		
Married	0.0151*	0.315	38,153,192
	(0.0083)		
WIC	-0.0182***	0.419	34,584,596
	(0.0039)		
Educational Attainment			
High School Diploma/GED	-0.0039	0.227	37,902,535
	(0.005)		
Bachelor's Degree	-0.0067*	0.176	37,902,535
	(0.0035)		
Advanced Degree	-0.0065***	0.101	37,902,535
	(0.0023)		
Birth Payment Source			
Medicaid	-0.0182**	0.389	37,861,329
	(0.0089)		
Private Insurance	-0.0079	0.439	37,861,329
	(0.0084)		
Self-Pay	-0.002	0.037	37,861,329
	(0.0017)		

Note: Distance measures are from six months prior to birth month. Each model includes month, year, and mother's county of residence fixed effects and controls for mother's age, prior number of live births, race/ethnicity indicators for White, Black, Hispanic, Asian, AIAN, and indicators for living in a city, mother being born in the U.S., having prenatal care, smoking, being diabetic, and maternal hypertension. When control variable is the outcome, it is excluded from the control vector. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A11: Impact of Driving Distance on Maternal Stress Indicators

	Gestational Hypertension (1)	Eclampsia (2)	Gestational Weight Gain (3)	Smoking (4)
Distance to nearest provider (per 100 miles)	0.0014	0.0001	0.1196	-0.0003
	(0.0017)	(0.0002)	(0.119)	(0.0021)
R-squared	.0135	.0004	.0305	.0234
Observations	38,153,192	34,999,022	36,963,805	38,153,192
Dependent Variable Mean	0.051	0.0024	30.1189	0.0708

Note: Distance is from the six months prior to birth month. Each model includes month, year, and mother's county of residence fixed effects and controls for mother's age, prior number of live births, race/ethnicity indicators for White, Black, Hispanic, Asian, AIAN, and indicators for living in a city, mother being born in the U.S., having prenatal care, smoking, being diabetic, and maternal hypertension. Maternal hypertension (smoking) control is dropped when gestational hypertension and eclampsia (smoking) is the outcome of interest. Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A12: Effect of Driving Distance on Birth and Pregnancy Intervals

	Birth Interval (1)	Pregnancy Interval (2)	Short Pregnancy Interval (3)
Distance to nearest provider (100 miles)	-0.30889***	-0.5025***	0.0055***
	(0.11046)	(0.11306)	(0.00109)
R-squared	0.1779	0.1170	0.0170
Observations	19,744,659	19,330,930	19,330,930
Percent Change	-0.62%	-1.16%	2.92%
Dependent Variable Mean	49.8878	43.451	0.1882

Note: Distance measures are from six months prior to birth month. Each model includes month, year, and mother's county of residence fixed effects and controls for mother's age, prior number of live births, race/ethnicity indicators for White, Black, Hispanic, Asian, AIAN, and indicators for living in a city, mother being born in the U.S., having prenatal care, smoking, being diabetic, and maternal hypertension. Short pregnancy interval is an indicator for less than 18 months between pregnancies. Robust standard errors are in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$