The Impact of Women's Health Clinic Closures on Fertility

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Abstract

The government of Texas recently enacted multiple restrictions and funding limitations on women's health organizations that provide abortion services or are associated with those that do. These policies have caused numerous clinic closures throughout the state, drastically reducing access to care. We use quarterly snapshots of health center addresses from a network of women's health centers to calculate the driving distance to the nearest clinic for each ZIP code. Matching this with restricted geotagged data of all birth certicates for Texas for 2007-2013, we find that an increase of 100 miles to the nearest clinic results in a 1.1% increase in the birth rate.

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Keywords: Women's Health; Family Planning; Abortion; Contraception; Birth Rate; Fertility Rate; Access; Restriction; Law; Texas

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I. Introduction

How does ease of access to women's health and family planning clinics affect fertility? These clinics typically provide a wide range of health services, including contraception and abortion. Therefore, we hypothesize that clinic closures and the resulting increases in driving distance lead to a higher fertility rate.

We test this hypothesis using a recent series of politically motivated public policy changes in Texas. In 2011, Texas cut its two-year family planning budget from $111 MM to $38 MM, and gave funding priority to primary care. Consequently, by 2012, 146 clinics had lost state funds, 53 clinics had closed, and 38 clinics had reduced their hours of operation (White et al. 2012). As a result, there were almost 50% fewer organizations to help poor women plan their pregnancies,[1] with many basic contraceptive services now out of reach.[2]

Furthermore, in 2013, Texas excluded provider networks affiliated with abortion providers from the Women's Health Program. This program was largely Medicaid funded, with the federal government contributing about $30 million per year, or 90% of program costs. Due to Texas's action, Texas lost substantial federal funding at the end of 2012.[3]

These cuts and the resulting clinic closures allow us to test the impact of ease of access on fertility rates. We follow the approach of our previous work (Lu and Slusky 2016) by using health center addresses from network of women's health centers to calculate the driving distance

[1] Culp-Ressler, Tara. 2012. "Attacks On Planned Parenthood In Texas Forced At Least 50 Unaffiliated Health Clinics To Close." Think Progress, August 16. http://thinkprogress.org/health/2012/08/16/699031/attacks-on-planned-parenthood-in-texas-forced-at-least-50-unaffiliated-health-clinics-to-close/.

[2] Jones, Carolyn. 2012. "One Year Later, Cuts to Women's Health Have Hurt More Than Just Planned Parenthood." Texas Observer, August 15. http://www.texasobserver.org/one-year-later-cuts-to-womens-health-have-hurt-more-than-just-planned-parenthood/.

[3] Smith, Jordan. 2013. "Fewer Women Served Under Texas Women's Health Program." Austin Chronicle, July 31. http://www.austinchronicle.com/daily/news/2013-07-31/number-of-women-served-under-texas-womens-health-program-drops/.

to the nearest clinic for each ZIP code. This measure is merged with fertility rates by ZIP code, and, using a within-estimator, we estimate the impact of a relative change in driving distance on the relative fertility rate. We find that an increase in driving distance to the nearest clinic leads to a statistically significant increase in fertility rates.[4]

Our paper contributes to and draws on a well-established literature that investigates the impact of proximity to health care providers (or other entities) on health and health care outcomes (e.g., Goodman et al. 1997, Buchmueller et al. 2006, Currie et al. 2010, Anderson and Matsa 2011, Currie et al. 2011, Currie and Walker 2011, Hill 2013, Rossin-Slater 2013, Hill 2014, Lu and Slusky 2016). This literature validates our methodological approach of estimating the impact of geographic access to a women's health care provider on local behavior, while controlling for time-invariant differences across granular regions.

We also contribute to a literature on family planning programs and fertility. Focusing on increases rather than decreases in access to care, Bailey (2012) finds that the introduction of U.S. family planning programs in the 1960s and 1970s was associated with "significant and persistent reductions in fertility" at the county level. Our paper complements these findings by suggesting that decreases in these programs lead to increases in fertility. More specifically, our results are consistent with Coleman and Joyce (2011) and Grossman et al. (2014), who find that new stringent abortion requirements and restrictions in 2004 and 2013-2014, respectively, reduced abortions in Texas.

Finally, this paper complements recent work by Stevenson et al. (2016) studying the impact of Texas funding restrictions on contraception and childbirth covered by Medicaid, as well as work by Packham (2016) on teen birth rates. While our results are consistent with their

[4] We plan to further examine the potentially differential effects of clinic closures by race/ethnicity.

findings of reduced contraceptive use and increased fertility, our empirical approach is different. For instance, Stevenson et al. (2016) focus on the extensive margin by defining a binary "treatment" based on the presence of a clinic in a county since the funding restrictions more strongly affected these counties compared to those without a clinic. Our approach, on the other hand, is more concerned with the intensive margin, and is substantially more granular because we look at the relative changes in driving distance to the nearest clinic at the ZIP code level.

Clinic closures could affect fertility rates through two primary mechanisms. First, lack of access to women's health and family planning clinics could increase the fertility rate due to lack of access to abortion. Some women who otherwise would have sought out abortion services now are unable to do so, and then deliver children that are recorded in the vital statistics records.

The other mechanism is that lack of access to contraception could also have increased the fertility rate, with more women having unplanned pregnancies, due to using a less effective method or no method of contraception. For our policy environment of interest, we expect these two mechanisms to push fertility rates in the same direction, i.e., simultaneous decreased access to contraception and abortion lead to higher fertility rates, and the lack of contraception mechanism is more likely to have an effect on fertility when interacted with the lack of abortion mechanism.

While we cannot separate these two mechanisms in this paper, the results will still be informative about the combined effect of clinic closures on fertility. Given that the funding cuts were implemented in part as a way to reduce state spending, our finding of increases in fertility rates suggests that medium-term spending could in fact increase (e.g., due to the public expense of educating additional children).

II. Data

This paper uses two primary data sources: (1) quarterly snapshots of clinic addresses from a network of women's health and family planning clinics, and (2) birth certificates from Texas. These data sets are supplemented with a handful of other sources, including the coordinates of ZIP code centroids, a ZIP code to ZIP Code Tabulation Area (ZCTA) mapping, population by ZCTA, and quarterly snapshots of funded facility locations from Texas's Department of State Health Services (DSHS).

The primary exogenous variable (the driving distance to the nearest clinic) is calculated from end-of-quarter snapshots of clinic locations from 2007-2013 from a network of women's health and family planning clinics. This network was one of the largest recipients of funding from both the DSHS's Family Planning Program and the Women's Health Program. As described below, we can use these end-of-quarter snapshots to calculate the driving distance at the end of each quarter to the clinic nearest to each ZIP code centroid. These driving distances can then be assigned to the period of time 9-12 months before each birth to approximate a mother's access to care before and in the early phases of her pregnancy.

The primary outcome variables (the birth and fertility rates in each quarter in each ZIP code) is calculated from a restricted version of all administrative birth certificates from the DSHS's Vital Statistics office for 2007-2013. The restricted version contains two variables essential to our analysis: the mother's ZIP code and the child's birthdate, a combination which allows each birth to be matched to the appropriate driving distance to the nearest clinic.

We supplement limitations of these two data sets with four other data sets. To calculate the distance from each ZIP code to the nearest clinic, we use ZIP code centroids coordinates from SAS. To adjust the fertility rate in each ZIP code in each quarter for population, we first map the mother's ZIP code to a ZCTA (because some ZIP codes such as post office boxes have official populations of 0) using the crosswalk for 2011 (i.e., the midpoint of our dataset) from UDS Mapper,[5] and then match each ZCTA with its five-year average population from 2008-2013 from the U.S. Census.

Finally, we also incorporate data on the locations of clinics funded by the DSHS Family Planning Program that were not affiliated with the network of clinics which provided our primary data source (we refer to clinics from this primary data source as being "in-network"). This addresses the potential concern that in-network clinics closed at the same time as (or were replaced by) clinics of other networks in the Family Planning Program, and ignoring the distance to those out-of-network clinics could bias our results.[6]

III. Methodology

The methodology in this paper is analogous to that of Lu and Slusky (2016), which studies the relationship between relative changes in the driving distance to the nearest clinic and the incidence of preventive care.

We calculate the geodesic (i.e., crow-flies) distance from each Texas ZIP code centroid to each clinic in each quarter in our primary clinic location data set using the Haversine formula. Then, for the clinic that has the shortest crow-fly distance, we calculate the driving distance, using the "traveltime3" program which uses Google Maps.

[5] The U.S. Census does not provide a formal crosswalk.
[6] Note that the DSHS data indicate out-of-network clinic funding end and start dates, which are not necessarily the same as clinic closure/opening dates.

We map each mother's ZIP code of residence to the corresponding ZCTA because some ZIP codes have no official population. We then aggregate the number of births by ZCTA by quarter, and merge in the 5-year average population count to calculate the quarterly crude birth rate and fertility rate for each ZCTA (i.e., per 1,000 individuals in the population). Our measures are generally consistent with the literature,[7] and using the 5-year average population count is a reasonable proxy for mid-period population since the population remains relatively stable between 2008-2013.

For each ZCTA we then use the driving distance data from the ZIP code of the same name. This is partly out of convenience and partly because ZIP codes always map to ZCTAs of the same name if those ZCTAs exist.[8] We average the driving distance as follows: first we assign it to the end-of-quarter date (e.g., February 12 is assigned to March 31), and then we average the driving distance 3 quarters before (e.g., June 30) and 4 quarters before (e.g., March 31). This provides a reasonable estimate of the average driving distance during the period shortly before (e.g., when a woman may be seeking contraceptives) and after conception (e.g., when a woman may be seeking an abortion).

The econometric specification is within-ZIP-code, over-time:

$$y_{zt} = \beta_0 + \beta_1 dist_{zt} + \beta_2 \zeta_z + \beta_3 \boldsymbol{\tau}_t + \varepsilon_{zt}$$

where the unit of analysis is ZCTA z in quarter-year t. y is a measure of the birth or fertility rate, and *dist* is the driving distance from a ZCTA the previous year, averaged as described above. ζ and $\boldsymbol{\tau}$ are ZCTA, quarter, and year fixed effects. We cluster standard errors by county, which is

[7] The World Bank defines crude birth rate as the number of live births occurring during the year, per 1,000 population estimated at midyear (see: http://data.worldbank.org/indicator/SP.DYN.CBRT.IN). Note that our birth rate is currently calculated at the quarterly rather than yearly level, and so on average has one quarter the magnitude.

[8] I.e., there's never a case where X -> Y but Y->A. If X -> Y then Y->Y.

more conservative than clustering by ZCTA and because there are likely across-ZCTA, within-county correlations that should be accounted for. Our sample is all ZCTAs with a population greater than 0.

As an alternative measure of the birth rate, we look at the log of the count of births, and ignore population. This has the advantage of considering relative changes in the birth rate instead of absolute ones, but forces us to limit the sample to those ZCTAs that have at least 1 birth in each quarter.

IV. Results

Table 1 shows summary statistics at the ZCTA-quarter level.

Table 1: Summary Statistics

	(1) N	(2) Mean	(3) Standard Deviation	(4) Minimum	(5) Maximum
Births (count)	41,844	51.0	71.1	0	634
Distance (miles)	41,844	43.2	45.0	0.278	289.9
Population	41,844	13,214	16,377	2	115,538
Crude Birth Rate (births/quarter/1000 people)	41,844	3.95	11.97	0	1,000
Fertility Rate (births/quarter/1000 women aged 15-44)	40,854	21.6	43.5	0	2,000
Distance to DSHS out of network (miles)	41,844	24.4	24.1	0.00186	268.6

The average distance from a ZIP code centroid to the nearest in-network clinic is approximately 43 miles; across all ZCTA-quarters, the minimum distance is close to 0 and the maximum distance is nearly 300 miles. On average, out-of-network DSHS-funded clinics are closer in distance, with an average distance of 24 miles from a ZIP code centroid to the nearest out-of-network funded clinic. The mean quarterly birth rate, per 1,000 individuals in the total population, is 3.952 across all ZCTA-quarters.

Table 2 presents our main regression results, which restrict the sample to observations with a non-zero population count.

Table 2: Impact of Driving Distance on Crude Birth Rate

	(1)	(2)
	Crude birth rate (quarterly)	Crude birth rate (quarterly)
Driving distance – 100 mi	0.0449***	0.0449***
	(0.0144)	(0.0143)
Driving distance to DSHS – 100 mi		0.0120
		(0.0897)
Observations	41,844	41,844
R-squared	0.755	0.755
Birth Year FE	YES	YES
Birth Quarter FE	YES	YES
ZIP FE	YES	YES
Weighted by	Population	Population

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The first column shows that an increase in distance of 100 miles to the nearest clinic leads to a statistically significant increase in the birth rate of 0.045 births per 1,000 individuals in the population. In relative terms, this is an increase of approximately 1.1 percent, off of a sample mean birth rate of 3.952. The second column additionally controls for distance to the nearest out-of-network DSHS-funded family planning clinic. While the coefficient on this additional variable is positive, it is statistically insignificant, with much larger standard errors than the main "driving distance" coefficient of interest, which remains unchanged. One potential explanation for the different effects of in-network versus out-of-network clinics is the relative popularity of in-network clinics, which are specialized and more easily recognizable as women's health

providers. This is consistent with Lu and Slusky (2016), which also finds minimal impact adding this control.

V. Robustness checks

Table 3 calculates instead the fertility rate using births to women aged 15-44 per 1,000 women aged 15-44 in the population, and finds substantively similar results.

Table 3: Impact of Driving Distance on Fertility Rates

	(1)	(2)
	Crude birth rate (quarterly)	Fertility rate (quarterly)
Driving distance – 100 mi	0.0449***	0.214***
	(0.0144)	(0.0648)
Observations	41,844	40,854
R-squared	0.755	0.725
Birth Year FE	YES	YES
Birth Quarter FE	YES	YES
ZIP FE	YES	YES
Weighted by	Population	Population – women 15-44

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Column (1) repeats the main result from Table 2 for comparison. In column (2), not surprisingly, the coefficient on "driving distance" is statistically significant, positive, and larger in magnitude than our main results presented in column (1). The relative impact of increased driving distance on birth rates is comparable between our main specification and this specification; in relative terms, Table 3 shows an increase of approximately 1.0 percent, off of a sample mean birth rate of 21.6. The primary reason that the magnitude is roughly five times larger is that while the numerator of the fertility rate is very close to that of the crude birth rate (as the vast majority of births are to mothers aged 15-44), the denominator is roughly one-fifth the size because it excludes men and women under 15 and over 44.

Table 4 repeats our analysis using an alternative measure of distance, specifically the log of the count of births.

Table 4: Impact of Driving Distance on Log Births

	(1)	(2)	(3)
	Crude birth rate (quarterly)	Crude birth rate (quarterly)	Ln(births)
Driving distance – 100 mi	0.0449***	0.0531***	0.0138***
	(0.0144)	(0.0148)	(0.00340)
Observations	41,844	29,876	29,876
R-squared	0.755	0.804	0.976
Birth Year FE	YES	YES	YES
Birth Quarter FE	YES	YES	YES
ZIP FE	YES	YES	YES
Weight	Population	Population	Births
Sample limitation	Pop > 0	Min(births) > 0	Min(births) > 0

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Column (1) repeats the main result from above for comparison, whereas column (2) is the primary specification for ZCTAs that have at least one birth in each quarter. This restriction is necessary for using the log of birth rate (since the log of zero is negative infinity). Instead of only using the quarters with positive births for each zip code, this analysis only uses ZCTAs with at least one birth in each quarter to ensure a balanced panel.

The results in both columns (2) and (3) are entirely consistent with our main findings. The sample limitation for column (2) does not have a substantial impact on the result, and the result in column (3) corresponds to the same approximately 1% increase in the birth rate found above.

Additional robustness checks, which may be included in a subsequent draft, include the following: assessing the robustness of our results to the length of the time window for calculating distance and/or the particular distance metric chosen; including additional controls, such as local

area unemployment rates; and separately assessing the impacts of distance to the nearest in-network clinic providing abortion services versus distance to the nearest in-network clinic *not* providing abortion services.[9]

VI. Limitations

Clinic closures could lead to increased fertility rates through two mechanisms: decreased access to contraception and decreased access to abortion. Our current analysis does not allow us to distinguish between these channels, so we focus on the combined effect in this paper. Additional data, such as on clinic services and on out-of-network clinics providing abortion services, could help us identify the separate effects of these two mechanisms.

Conclusion

In recent years, a primary cause of women's health clinic closures is the loss of public funding. Funding-related clinic closures, such as those in Texas, decrease women's ease of access to care—in the current analysis, we focus on increases in their driving distance to the nearest clinic, but closures could have indirect effects as well, such as overcrowding or increased fees at remaining clinics. Our analysis shows that these clinic closures lead to higher birth rates, likely through the combined effects of reduced access to contraception and abortion services.

This paper expands on Lu and Slusky (2016) by using comprehensive administrative data that cover all ZIP codes in Texas during 2007-2013, and by focusing on a direct consequence of family planning clinic closures, namely birth rates. Furthermore, our analysis complements and corroborates recent work by Stevenson et al. (2016) and Packham (2016), which show that funding cuts are associated with reduced contraceptive use and increases in the rate of childbirth covered by Medicaid as well as in the teen birth rate.

[9] Note that our information on the provision of abortion services for each in-network clinic is limited to only one quarter, so that these would be imprecise measurements of distance to the nearest in-network clinic providing abortion services and distance to the nearest in-network clinic not providing abortion services, over time.

An increase in birth rates resulting from decreased access to contraception and abortion services can be interpreted as an increase in the number of unplanned pregnancies. When considering the impact of funding cuts, it is important to consider the effects of an increase in the number of unplanned pregnancies. Furthermore, funding cuts may actually lead to increases in future state outlays from decreased tax revenues (e.g., unplanned pregnancies may affect women's educational investments and subsequent earnings) and increased public expenditures (e.g., education and health care spending) on the additional children born.

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