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Original research article

Trends in nonresident abortion rates in New York City from 2005 to 2015: a time series analysis☆,☆☆,★

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ABSTRACT

Objectives: To examine trends and utilization patterns of NYC abortion services by nonresidents since growing abortion restrictions across many states could drive women to seek care in less restrictive jurisdictions including NYC.
Study design: We used data from Induced Termination of Pregnancy certificates filed with the NYC Department of Health and Mental Hygiene in 2005–2015. An autoregressive integrated moving average (ARIMA) model was fit to the monthly nonresident abortion rate time series. Pearson's χ^2 tests determined associations between women's residence and other variables.
Results: During 2005–2015, 885,816 abortions were reported in NYC, with 76,990 (8.7%) among nonresidents; 50,211 (65.2%) nonresidents lived in other New York State counties. The NYC abortion rate declined from 49.4 per 1000 women 15–44 in 2005 to 32.7 in 2015, while the nonresident rate showed minimal change from 0.12 per 1000 US women 15–44 in 2005 to 0.10 in 2015. ARIMA$(0,1,1)(0,0,1)_{[12]}$ fit the time series indicating minimal monthly changes in nonresident rates reflecting seasonal patterns and shorter-term dependencies between successive observations. Nonresidents differed from residents in all investigated variables including terminating at 20+ weeks (9.0% vs. 2.5%, p<.001) and having procedural methods (87.2% vs. 82.2%, p<.001).
Conclusions: Nonresidents constituted few abortion patients in NYC with minimal change in nonresident rates in 2005–2015. Nonresidents more often sought later-term abortions and more complicated procedures posing greater associated costs/risks. Monitoring nonresident abortion trends and utilization patterns is valuable for planning local service delivery particularly in jurisdictions committed to providing comprehensive women's healthcare where nonresidents may increasingly seek abortions.
Implications: While we found limited change in nonresident abortion rates in NYC in 2005–2015, other jurisdictions bordering more restrictive states could show different results and should consider conducting similar research. Such analyses are important in jurisdictions committed to providing comprehensive women's healthcare where nonresidents may increasingly seek abortions in the future.

1. Introduction

In 1973, *Roe v. Wade* recognized that a woman's constitutional right to privacy extends to her personal medical decisions including pregnancy termination. Yet the standards by which states may regulate abortions have changed since this decision [1], and many states have enacted increasingly restrictive regulations over the past few decades [2,3]. In 2011–2015, more abortion restrictions were enacted across the United States than in any previous 5-year period since this constitutional right was recognized [4,5].

Limits on abortion provision have been shown to delay women in obtaining care [6,7] or to drive women to seek abortions in other states or cities [8,9], both of which increase the likelihood of later-term abortions with greater associated costs and procedural risk [10,11]. Increasing the distances women must travel further disadvantages young and poor women from terminating pregnancies [12,13].

The New York City (NYC) experience in 1970–1973 also underscores the potential for state-level restrictions to drive women to seek care in other jurisdictions with few or no burdensome regulations [14]. This

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was the period between New York State's abortion legalization and the *Roe v. Wade* decision when NYC was among the few American cities where women could obtain safe and legal abortions. During this period, nonresidents accounted for nearly two thirds of NYC abortion patients [15], and nonresidents also differed from residents in terms of race/ethnicity, income and educational level as well as gestational weeks at the time of pregnancy termination [16].

Yet, during this most recent decade marked by growing abortion restrictions across many states, there has been no similar analysis of trends and utilization patterns of local abortion services by nonresidents in NYC or other states/jurisdictions. While national surveillance data suggest variation across states in nonresident abortion patterns [17], further analysis for research purposes has been limited at the national, state and local levels despite anecdotal stories [18,19]. In this paper, we analyzed trends and utilization patterns of NYC abortion services by nonresidents between 2005 and 2015 to determine if the NYC nonresident abortion rate increased over time consistent with growing abortion restrictions across other states.

2. Material and methods

We conducted a time series analysis of monthly nonresident abortion rates in NYC from January 1, 2005, to December 31, 2015, based on data from the Induced Termination of Pregnancy (ITOP) certificates filed with the NYC Department of Health and Mental Hygiene (DOHMH). The DOHMH Institutional Review Board approved the study protocol (17-025).

2.1. Data source

Article 203 of the city health code mandates that all vital events occurring within NYC (including pregnancy terminations) be reported to DOHMH within 5 days of the event [20]. A total of 80 hospitals, clinics and medical practices provided abortions services in NYC in 2015. Since 2011, ITOP certificates have been submitted via the Electronic Vital Events Registration System, although low-volume facilities may submit paper forms [21]. No individual patient identifiers are recorded on the certificate, although select demographic and clinical information is collected.

2.2. Patient's residence and other variables

We used patient's borough of usual residence to define residency status in this study. Nonresidents included patients residing outside the five NYC boroughs in other New York State counties, other states or other countries. In cases where the patient's borough and zip code of usual residence conflicted, we recoded the borough of residence to match the valid five-digit zip code. No changes were made to borough of residence in cases with invalid zip codes. Since 2011, the ITOP certificate included the Federal Information Processing Standard (FIPS) state and country codes to further delineate patient's county (for New York State residents), state and country of usual residence. Therefore, trend analysis of nonresident abortion rates by home state of residence could only be conducted from 2011 onwards.

ITOP certificates collect select demographic and clinical information that was compared for residents and nonresidents. This included patient's age, race/ethnicity, education level, birthplace, primary payment method (Medicaid or other), gestational weeks, previous pregnancy outcomes (number of previous live births, spontaneous or induced abortions), borough of procedure, abortion method and facility type visited. We categorized primary ITOP procedure as procedural (suction curettage, sharp curettage, dilation and evacuation, intrauterine instillation or hysterectomy/hysterotomy) or medication (misoprostol, mifepristone and misoprostol, methotrexate and misoprostol, or other nonsurgical procedure) abortion. We categorized facility type as public hospital, private hospital, high-volume private clinic (1000 or more abortions performed and reported in 2015) or low-volume private clinic (<1000 abortions performed and reported in 2015).

2.3. Data analysis

We tabulated abortion rates for NYC residents and nonresidents using US Census Bureau American Community Survey annual estimates for the NYC and US female populations 15–44 years, respectively [22]. We used Pearson's χ^2 tests to determine associations between women's residence and key demographic and clinical variables.

We derived state-specific abortion rates using annual state-specific population denominators for women 15–44 years [22]. We grouped home state of residence in two ways for this analysis. First, home states were grouped by abortion service availability in the year 2011 (% state's women 15–44 years living in counties with no abortion-providing clinic) to examine changing nonresident rates by very low (76%–100% of women 15–44 years live in a county with no abortion-providing clinic), low (51%–75%), moderate (26%–50%) and high (0%–25%) availability in home states during 2011–2015 [23]. This is a standard indicator of abortion accessibility available for all states, and limited accessibility has been shown to increase distances women travel to terminate pregnancies [8,9,12,24]. Second, home states were grouped by US geographic region [25]. We used the Cochrane–Armitage test for trends to determine the presence of a linear trend in annual abortion rates for both state groupings.

We used the Box–Jenkins approach to fit an autoregressive integrated moving average (ARIMA) model to the monthly time series of nonresident abortion rates in NYC from January 1, 2005, to December 31, 2015 [26]. ARIMA models are best suited to describe the magnitude and composition of time series data that contain numerous observations over a long time period with repeated collection at relatively short intervals as occurred in this study [27].

ARIMA modeling accounts for associations in sequential relationships that may occur in time series data such that the present value is related to previous values, past prediction errors or other repeating patterns including seasonal fluctuations [27]. ARIMA $(p,d,q) \times (P,D,Q)_{[S]}$ refers to the composition of the monthly time series potentially including autocorrelation over a maximum period of p months (and/or P seasonal periods of S length), differencing of d months (and/or D seasonal periods) and moving averages for periods of q months (and/or Q seasonal periods). ARIMA modeling consists of three iterative steps: model identification, parameter estimation and diagnostic checking.

Based on this method, we initially plotted and decomposed the monthly time series to estimate its trend, seasonal and irregular component parts. We seasonally adjusted and differenced this additive time series to obtain a stationary series as determined by the Augmented Dickey–Fuller (ADF) test. We plotted the autocorrelation (ACF) and partial autocorrelation (PACF) functions of the transformed time series to identify the moving average (MA) and autoregressive (AR) terms of candidate ARIMA models. We compared ACF and PACF plots with an automatically selected ARIMA model using the auto.arima function. This automatic selection process uses unit root tests to determine the number of differences and a stepwise procedure to minimize the corrected Akaike information criteria to choose p and q values for the AR and MA terms, respectively. We evaluated ARIMA model diagnostics using ACF plots of the residuals and the Ljung–Box test to check significance of model residuals. We computed model parameters using maximum likelihood estimation methods. The level of statistical significance was set to .05. R version 3.2.2 and the "forecast" package were used for analyses [28,29].

3. Results

3.1. Trends in nonresident abortion rates

Between January 1, 2005, and December 31, 2015, a total of 885,816 abortions were performed in NYC and reported to the NYC DOHMH (Table 1), of which 76,990 (8.7%) were among nonresidents.

Table 1
Annual distribution of abortion patients in New York City, by residence, 2005–2015

	N [%] abortion patients											
	All years	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
All patients	885,816 [100.0]	88,891 [100.0]	90,157 [100.0]	90,870 [100.0]	89,469 [100.0]	87,273 [100.0]	83,750 [100.0]	80,485 [100.0]	73,815 [100.0]	69,840 [100.0]	67,620 [100.0]	63,646 [100.0]
NYC resident	806,421 [91.0]	80,919 [91.0]	81,622 [90.5]	81,653 [89.9]	80,818 [90.3]	79,158 [90.7]	76,119 [90.9]	73,843 [91.7]	68,152 [92.3]	64,342 [92.1]	62,285 [92.1]	57,510 [90.4]
Manhattan	132,149	12,774	12,245	12,687	13,170	12,177	11,268	12,503	11,718	11,917	11,469	10,221
Bronx	203,644	20,480	20,557	20,045	20,113	20,048	19,312	18,867	17,471	16,477	15,818	14,456
Brooklyn	268,756	28,376	28,214	28,879	27,622	27,081	25,840	24,109	21,690	19,957	19,054	17,934
Queens	175,806	16,665	17,909	17,175	17,140	17,149	17,095	16,011	15,130	14,076	14,185	13,271
Staten Island	26,066	2624	2697	2867	2773	2703	2604	2353	2143	1915	1759	1628
Nonresident	76,990 [8.7]	7363 [8.3]	8224 [9.1]	8920 [9.8]	8325 [9.3]	7773 [8.9]	7111 [8.5]	6642 [8.3]	5663 [7.7]	5498 [7.9]	5335 [7.9]	6136 [9.6]
NYS non-NYC	50,211	4486	5144	5290	5199	5179	4731	4261	4005	3811	3632	4473
Outside NYS	26,779	2877	3080	3630	3126	2594	2380	2381	1658	1687	1703	1663
Unknown	2405	609	311	297	326	342	520	0	0	0	0	0

The overall NYC abortion rate declined from 49.4 abortions per 1000 NYC women 15–44 years in 2005 to 32.7 in 2015 (Table 2). Among NYC residents, the abortion rate similarly declined from 44.9 in 2005 to 29.6 in 2015. In contrast, among nonresidents, the abortion rate showed minimal change from 0.12 in 2005 to 0.10 in 2015.

We plotted and decomposed the monthly time series into its trend, seasonal and irregular component parts (Fig. 1). The time series had an oscillation suggestive of a seasonal component with highest and lowest rates in March and November, respectively. We seasonally adjusted and differenced the time series one time in order to stabilize the variance and remove the trend. The resulting time series was found to be stationary using the ADF test ($p=.01$). PACF and ACF plots of the transformed time series indicated a moving average model consistent with ARIMA model $(0,1,1)\ (0,0,1)_{[12]}$ (Supplementary Fig. 1), which was also the model automatically generated using the "auto.fit" function. We found no autocorrelation in model residuals (Ljung–Box test, $p=.114$), further indicating its appropriateness to describe the time series.

ARIMA model $(0,1,1)\ (0,0,1)_{[12]}$ was selected and fitted to the time series. This final model is characterized as having a seasonal component and exhibited minimal monthly changes in nonresident abortion rates with shorter-term dependencies between successive observations. This suggests that any given rate is best predicted by the moving average of its immediate past values while also accounting for seasonality. The small coefficients for nonseasonal (−0.6834, SE 0.070) and seasonal moving average coefficients (0.2700, SE 0.078) indicate that little smoothing was needed to estimate the current rate from the moving average of past values (Supplementary Table 1).

3.2. Trends in state-specific abortion rates

During 2011–2015, women living outside New York State sought 7254 abortions in NYC. A total of 6320 (87%) of these women lived in the Northeast including 5005 (69%) from New Jersey. Table 3 shows abortions obtained in NYC by women's home state of residence grouped by geographic region or abortion service availability in 2011. We found an increasing linear trend in abortion rates in NYC among women residing in states with moderate service availability ($p=.012$) but not for other availability groupings. We found a linear increase in abortion rates in NYC among women residing in the Northeast ($p=.032$) but not for other regional groupings.

3.3. Nonresident versus resident characteristics

We compared clinical and demographic characteristics of nonresidents and residents for the latest data year (Table 4). In 2015, a total of 63,646 abortions were performed in NYC, with 57,510 (90.3%) among residents and 6136 (9.6%) among nonresidents. Nonresidents differed from residents in all investigated variables. Demographic differences included being 35+ years (18.4% for nonresidents vs. 15.2% for NYC residents, $p<.001$), having at least a college degree (17.5% vs. 11.8%, $p<.001$), being

Table 2
Abortion rates in New York City, by residence, 2005–2015

	NYC residents			Non-NYC residents		
	Abortion rate per 1000 NYC women 15–44 years	Abortions	NYC females 15–44 years	Abortion rate per 1000 US women 15–44 years	Abortions	US females 15–44 years
		N	*N*		*N*	*N*
All years	38.6	806,421	20,865,337	0.11	76,990	686,999,326
2005	44.9	80,919	1,800,732	0.12	7363	60,459,404
2006	43.8	81,622	1,861,826	0.13	8224	62,305,053
2007	43.4	81,653	1,881,345	0.14	8920	62,110,666
2008	43.0	80,818	1,878,569	0.13	8325	61,986,890
2009	41.7	79,158	1,897,942	0.13	7773	62,096,863
2010	39.8	76,119	1,912,430	0.11	7111	62,432,315
2011	38.8	73,843	1,904,952	0.11	6642	62,538,003
2012	35.5	68,152	1,920,719	0.09	5663	62,834,252
2013	33.4	64,342	1,925,052	0.09	5498	63,076,948
2014	32.1	62,285	1,937,883	0.08	5335	63,491,046
2015	29.6	57,510	1,943,888	0.10	6136	63,667,885

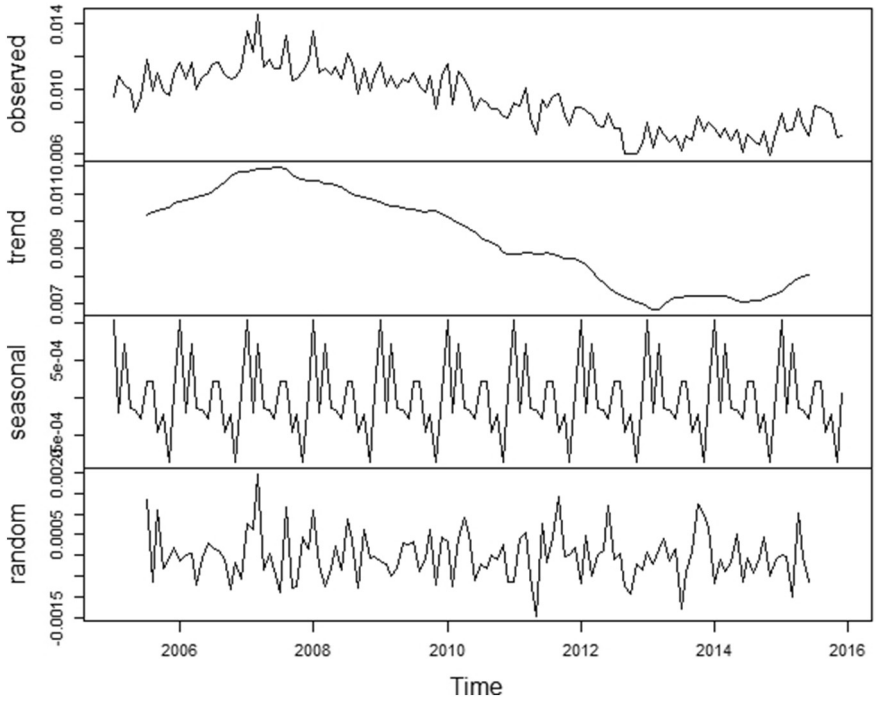

Fig. 1. Time series of monthly nonresident abortion rates in New York City from January 1, 2005, to December 31, 2015 decomposed into trend, seasonal and irregular components.

white non-Latina (22.6% vs. 14.6%, p<.001) or having non-Medicaid primary payment (51.3% vs. 39.3%, p<.001). Clinical differences included attending a Manhattan facility (52.7% vs. 40.9%, p<.001), attending a private hospital (7.0% vs. 4.9%, p<.001), obtaining an abortion at 20+ weeks (9.0% vs. 2.5%, p<.001), having procedural methods (87.2% vs. 82.2%, p<.001) and having had no prior abortions (55.7% vs. 47.6%, p<.001).

Table 3
Nonresident abortion rates in New York City, by geographic region of and abortion clinic availability in home states of residence, 2011–2015

(a) Geographic region*

	2011		2012		2013		2014		2015		p value
	Rate per 1000 females 15–44 years	*N* abortions	Rate per 1000 females 15–44 years	*N* abortions	Rate per 1000 females 15–44 years	*N* abortions	Rate per 1000 females 15–44 years	*N* abortions	Rate per 1000 females 15–44 years	*N* abortions	
Northeast	0.166	1166	0.178	1248	0.180	1260	0.197	1376	0.182	1270	.032
South	0.005	114	0.005	111	0.006	136	0.006	151	0.007	169	.746
Midwest	0.001	15	0.002	21	0.002	27	0.002	26	0.002	30	.878
West	0.002	24	0.001	22	0.002	28	0.002	28	0.002	32	.927

*Geographic region refers to US census bureau regions including Northeast (Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, Pennsylvania Rhode Island and Vermont, excludes New York State in this analysis); South (Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, Washington DC and West Virginia); Midwest (Indiana, Illinois, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota and Wisconsin); West (Arizona, Alaska, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington and Wyoming).

(b) Abortion clinic availability**

	2011		2012		2013		2014		2015		p value
	Rate per 1000 females 15–44 years	*N* abortions	Rate per 1000 females 15–44 years	*N* abortions	Rate per 1000 females 15–44 years	*N* abortions	Rate per 1000 females 15–44 years	*N* abortions	Rate per 1000 females 15–44 years	*N* abortions	
Very low availability	0.007	25	0.008	26	0.009	31	0.007	25	0.011	37	.570
Low availability	0.002	39	0.002	44	0.003	56	0.003	60	0.004	78	.841
Moderate availability	0.060	1045	0.065	1135	0.068	1187	0.072	1276	0.066	1173	.012
High availability	0.011	210	0.010	197	0.009	177	0.011	220	0.011	213	.171

** Abortion clinic availability refers to the percentage of state's women 15–44 years who lived in counties without an abortion-providing clinic in 2011. States were categorized as very low availability (76%–100%) including Arkansas, Mississippi, South Dakota, Virginia, West Virginia and Wyoming; low availability (51%–75%) including Alabama, Georgia, Idaho, Indiana, Kansas, Kentucky, Louisiana, Maine, Minnesota, Missouri, New Mexico, North Carolina, North Dakota, Ohio, Oklahoma, South Carolina, Tennessee, Utah, Vermont and Wisconsin; moderate availability (26%–50%) including Alaska, Colorado, Illinois, Iowa, Michigan, Montana, Nebraska, New Jersey, Oregon, Pennsylvania, Rhode Island and Texas; high availability (0%–25%) including Arizona, California, Connecticut, Delaware, Washington DC, Florida, Hawaii, Maryland, Massachusetts, Nevada, New Hampshire and Washington.

Table 4
Demographic and clinical characteristics of abortion patients in New York City, by residence, 2015

	NYC resident	Non-NYC resident	p value[a]
	(%)	(%)	
All patients	**100.0 (*N*=57,510)**	**100.0 (*N*=6136)**	
Age (in years)			<.001
19 or less	9.4	8.9	
20–24	28.6	27.5	
25–29	27.9	25.7	
30–34	18.9	19.5	
35–39	11.0	13.3	
40 or older	4.2	5.1	
Not reported	0.0	0.0	
Education			<.001
Less than high school	16.9	12.0	
High school graduate and/or some college	59.3	52.9	
College graduate or higher	11.8	17.5	
Not reported	12.0	17.7	
Race/ethnicity			<.001
White non-Latina	14.6	22.6	
Black non-Latina	40.6	38.7	
Latina	29.8	17.5	
Asian or Pacific Islander	6.3	6.6	
Other or multiple	3.5	2.7	
Not reported	5.3	11.8	
Primary payment			<.001
Medicaid	51.3	39.3	
Other	48.7	60.7	
Not reported	0.0	0.0	
Borough of report			<.001
Manhattan	40.9	52.7	
Bronx	17.4	9.7	
Brooklyn	20.0	6.4	
Queens	21.4	31.0	
Staten Island	0.2	0.1	
Not reported	0.0	0.0	
Facility type attended			<.001
Public hospital (*n*=11)	6.7	1.7	
Private hospital (*n*=29)	4.9	7.0	
High-volume clinic (1000+ abortions in 2015) (*n*=7)	82.3	86.3	
Low-volume clinic (<1000 abortions in 2015) (*n*=33)	6.1	5.1	
Not reported	0.0	0.0	
Gestational weeks, clinical estimate			<.001
12 weeks or less	89.6	78.0	
13–15 weeks	4.6	6.3	
16–19 weeks	3.2	6.8	
20+ weeks	2.5	9.0	
Not reported	0.0	0.0	
Primary procedure			<.001
Procedural	82.2	87.2	
Medication	17.7	12.2	
Not reported	0.0	0.5	
Previous live births			<.001
0	41.9	41.3	
1	24.1	18.5	
2 or more	28.4	22.8	
Not reported	5.7	17.5	
Previous abortions			<.001
0	42.2	41.9	
1	24.1	23.8	
2 or more	31.6	23.8	
Not reported	2.1	10.5	

[a] Pearson's χ^2 tests were used to test for associations between patient's usual residence (NYC resident or not) and other clinical and demographic variables. The level of statistical significance was set to .05.

4. Discussion

Overall, nonresidents constituted a small proportion of NYC abortion patients in 2005–2015, with minimal change in nonresident abortion rates despite significant declines in the overall NYC abortion rate during this period. Our model indicated minimal monthly changes in nonresident abortion rates reflecting seasonal fluctuations and shorter-term dependencies between successive observations.

Most nonresidents lived in other parts of New York State, and among out-of-state residents, most were from the Northeast. Compared to residents, nonresidents were more often white non-Latina, older, and more educated and had higher incomes. They more often obtained later-term abortions (20+ weeks) with greater financial costs and complication risks [11], although such risks are still markedly less common than those for delivery and childbirth [30]. This finding corresponds with research from other states showing that laws restricting abortion services delayed obtaining care [6,7], increased the number of later-term abortions [8,9] or drove women to other states or cities to terminate pregnancies [10,13].

We found that the overall NYC abortion rate declined by 34% during 2005–2015 as previously reported [31], which mirrors long-term declines in national abortion rates [17]. The declining national abortion rate may partly explain the limited change in nonresident rates in NYC over the past decade and specifically the declining rates in nearby states (e.g., New Jersey) where most nonresident abortion patients reside [5]. Similarly, most Northeast states had no new abortion restrictions enacted in recent years and relatively good access to abortion-providing clinics [5], which further explains current findings. In contrast, prior to *Roe v. Wade* (1970–1973), only four states allowed physicians to perform early-term abortions, and New York had no residency requirement, making it a main destination for nonresidents seeking abortions [16].

Our study found a significant linear increase in annual abortion rates in NYC during 2011–2015 among women from states with moderate abortion service availability or who lived in the Northeast. Both groupings included populous and nearby states (e.g., Pennsylvania and New Jersey) that experienced slight increases in nonresident abortion rates during this period and, when combined with smaller states, contributed sufficient numbers to detect group-level trends. Given the small number of nonresident abortions in NYC, examining trends by individual home states was not possible. Grouping home states by geography or abortion accessibility is useful to analyze trends among state subgroups that are similar in ways that could drive women to seek abortions outside home states including NYC.

We should highlight some data limitations in this study. First, ITOP certificates are underreported particularly for medication abortions [21], which could underestimate NYC residents who are more likely to have medication abortions. It is possible that medication abortions increased during this period, potentially masking declines in the proportion of nonresident patients in NYC [32]. Second, reporting quality differs across ITOP variables as evidenced by missing information for patient's education, race/ethnicity or previous pregnancy outcomes [21]. There is also potential for misreporting patient's residence as local rather than her home state particularly if the patient feels that this could increase anonymity and thus privacy. If this were the case, nonresidents would be underestimated, although it is unlikely that this practice changed over time to impact trends. Finally, ITOP certificates were revised in 2011 to include FIPS codes to further delineate county (New York State residents), state and country of usual residence. Trend analysis by home state of residence is therefore not possible before 2011.

Based on 885,816 abortions performed and reported to DOHMH in 2005–2015, we found that nonresidents constituted few abortion patients in NYC with minimal change in monthly nonresident abortion rates despite significant declines in the overall NYC abortion rate. This study is the first study to our knowledge to examine nonresident abortion trends and utilization patterns in the recent period marked by growing abortion restrictions across many states. While we found limited change in nonresident abortion rates in NYC, other jurisdictions bordering more restrictive states could show different results and should consider conducting similar research. Such research should

consider state regulatory analysis to help contextualize findings. Surveillance of nonresident abortion trends and utilization patterns is valuable for monitoring and planning local service delivery. This is particularly important in NYC and other jurisdictions committed to providing comprehensive women's healthcare where nonresidents from more restrictive states could increasingly seek abortion services in the future.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.contraception.2019.05.008.

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