Repeat Abortions in New York City, 2010

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ABSTRACT *This study aims to describe factors associated with the number of past abortions obtained by New York City (NYC) abortion patients in 2010. We calculated rates of first and repeat abortion by age, race/ethnicity, and neighborhood-level poverty and the mean number of self-reported past abortions by age, race/ethnicity, neighborhood-level poverty, number of living children, education, payment method, marital status, and nativity. We used negative binomial regression to predict number of past abortions by patient characteristics. Of the 76,614 abortions reported for NYC residents in 2010, 57 % were repeat abortions. Repeat abortions comprised >50 % of total abortions among the majority of sociodemographic groups we examined. Overall, mean number of past abortions was 1.3. Mean number of past abortions was higher for women aged 30–34 years (1.77), women with ≥5 children (2.50), and black non-Hispanic women (1.52). After multivariable regression, age, race/ethnicity, and number of children were the strongest predictors of number of past abortions. This analysis demonstrates that, although socioeconomic disparities exist, all abortion patients are at high risk for repeat unintended pregnancy and abortion.*

KEYWORDS *Abortion, Induced, Pregnancy outcome, Pregnancy, Unplanned*

INTRODUCTION

Approximately 95 % of elective abortions (hereafter "abortion") in the USA result from unintended pregnancies,[1] and half of abortion patients have had one or more prior abortions.[2] Repeat abortions can be viewed as a proxy for repeat unintended pregnancies and may indicate persistent challenges accessing health information and services or using contraception consistently and correctly. Understanding characteristics of women having repeat unintended pregnancies ending in abortions can help determine whether certain groups have greater or unique needs for postabortion contraception services.

The most recent US population-based study of repeat abortions used data collected in 2000.[2] More recent US studies are based on small, nonrepresentative samples from clinical settings.[3,4] This analysis adds to the literature on repeat abortion by using 2010 data from the New York City (NYC) abortion reporting system. We compared rates of first and repeat abortions by sociodemographic group. Additionally, we calculated the proportion of 2010 reported abortions that were repeat procedures by sociodemographic characteristics and used multivariable

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regression modeling to relate number of past abortions to patient characteristics among 2010 abortion patients.

MATERIAL AND METHODS

We used data from NYC's Department of Health and Mental Hygiene (DOHMH) abortion reporting system. NYC's health code requires reporting of all abortions performed in NYC to DOHMH's Bureau of Vital Statistics. NYC is a separate vital statistics reporting jurisdiction from New York state.[5] The health code defines an abortion as "a purposeful interruption of an intrauterine pregnancy with the intention other than to produce a live-born infant and which does not result in a live birth."[6] The abortion report form is completed by health care providers or their designees and includes individual patient demographic and socioeconomic data, and self-reported past pregnancy outcomes, including live births, miscarriages/stillbirths, and abortions. No identifying data are collected other than patient initials, ZIP code, and birthdate. The reason for having the abortion is not reported. In comparison to estimates from the Guttmacher Institute's Abortion Provider Census, NYC's abortion reporting system captures approximately 88 % of abortions performed in NYC.[5] On average, approximately 90,000 abortions/year (range 83,730–94,466) were reported during 2000–2010.[7]

DOHMH received reports of 83,730 abortions occurring during 2010; 76,614 of these were performed for NYC residents. We limited our study population to NYC residents to allow us to calculate rates using NYC population data and assign a patient neighborhood income level to each procedure using census data. The single-year restriction was made to minimize inclusion of successive abortions for a single patient. We defined repeat abortion as a procedure for which the patient reported having ≥1 past abortion. Otherwise, the procedure was defined as a first abortion. Both medication and surgical abortion procedures were included. We calculated rates of first and repeat abortions/1000 women aged 15–44 years in NYC by variables for which 2010 census denominator data were available (i.e., age, race/ethnicity, and neighborhood-level poverty). Neighborhood-level poverty was defined as the percentage of the population in a ZIP code living below the federal poverty threshold. Analysis of health outcomes by neighborhood-level poverty is a DOHMH standard practice and is described elsewhere.[8] ZIP code was used as the analysis unit because it is the smallest geographic unit reported for abortion data. Each abortion procedure was assigned to one of four poverty categories, as follows: very low (<10 % of population living below federal poverty threshold), low (10 to <20 %), medium (20 to <30 %), and high (≥30 %). Additionally, we calculated the number and proportion of abortions that were repeat abortion procedures by age, race/ethnicity, neighborhood-level poverty, number of children, education, payment method, nativity, and marital status. We restricted analysis of education to women aged ≥25.

We calculated mean number of self-reported past abortions by each covariate and the unadjusted relative increase in past abortions for each level of each covariate in comparison with reference values. Reference categories were as follows: aged 25–29 years, high poverty, black non-Hispanic, one child, high school graduate, Medicaid payment, US-born, and unmarried. We developed a negative binomial regression model, adjusting for all covariates, with outcome defined as number of past abortions. We used the model to estimate mean number of previous abortions for women with each covariate pattern. We then calculated the adjusted ratio of

mean number of past abortions for each level of each covariate in comparison with the reference value for that covariate.

The education covariate had 21 % missing values. All other covariates had from <1 to 5 % missing values. The outcome—number of past abortions—was missing for 2267 observations (3 %). For the descriptive analysis, procedures with missing data for the covariates of interest were removed from the analysis. For the multivariable analysis, missing values for all potential predictors and the outcome were imputed by using multiple imputation techniques[9] with IVEware software (University of Michigan, Ann Arbor, Michigan). Five imputations were performed, and each imputed data set was analyzed by using SAS PROC GENMOD. Resulting estimates and standard errors were pooled by using PROC MIANALYZE. Because of the high proportion of missing values for education, a sensitivity analysis was conducted omitting education. Since resulting estimates were within 3 % of estimates obtained with education included, only results with the full model (i.e., including education) are presented. All statistical analyses were conducted by using SAS (version 9.2, SAS Institute, Inc., Cary, North Carolina). This study underwent human subjects review at the Centers for Disease Control and Prevention and was determined to be a nonresearch, public health surveillance activity.

RESULTS

In 2010, repeat abortions comprised 57 % of the 74,347 abortions for which data on number of previous abortions were available. This proportion in NYC has ranged from 54 to 59 % during the previous 10 years (Table 1). Among 2010 abortion patients, the percentage of abortions that were repeat abortions increased with age, number of children, and neighborhood-level poverty (Table 2). A higher proportion of abortions were repeat procedures among Puerto Rican and black non-Hispanic women, compared with other racial/ethnic groups. The proportion of repeat procedures was also higher among US-born women, women with a high school education, and procedures paid for by Medicaid or other third-party insurance.

Repeat abortion rates increased with patient age from 0.6/1000 for women aged <15 years to 37.5/1000 for women aged 20–24 years and decreased with age thereafter. Black non-Hispanics had a four times higher first abortion rate (27.6) and

TABLE 1 Number and proportion of reported abortions that were first and repeat abortions, New York City, 2001–2010

Year	First abortion	Repeat abortion
2001	37,280 (41 %)	52,898 (59 %)
2002	38,332 (42 %)	51,902 (58 %)
2003	37,784 (42 %)	51,579 (58 %)
2004	38,951 (43 %)	51,149 (57 %)
2005	39,500 (45 %)	48,609 (55 %)
2006	38,041 (44 %)	48,335 (56 %)
2007	40,281 (46 %)	48,139 (54 %)
2008	36,372 (42 %)	50,221 (58 %)
2009	35,768 (42 %)	48,625 (58 %)
2010	34,461 (42 %)	46,821 (58 %)

Includes all abortions performed in NYC, including those for non-NYC residents

TABLE 2 Abortion procedures and number of past abortions, by patient characteristics, New York City, 2010

Patient characteristics	Total number of abortions reported	Number (%) of abortions that were repeat procedures
Age (years) (0.4 % missing)		
<15	395	50 (13 %)
15–17	4165	913 (22 %)
18–19	6837	2585 (38 %)
20–24	22,184	12,385 (56 %)
25–29	18,513	12,217 (66 %)
30–34	12,357	8576 (69 %)
35–39	6922	4839 (70 %)
≥40	2698	1823 (68 %)
Race/ethnicity (5 % missing)		
White non-Hispanic	7,362	3322 (45 %)
Asian/Pacific Islander	4,007	1736 (43 %)
Other Hispanic	14,966	8205 (55 %)
Puerto Rican	9,666	6278 (65 %)
Black non-Hispanic	35,021	22,966 (66 %)
Neighborhood-level poverty[a] (2 % missing)		
Very low <10 %	6,510	3,284 (50 %)
Low 10–19.9 %	20,248	11,327 (56 %)
Medium 20–29.9 %	17,767	10,429 (59 %)
High ≥30 %	28,412	17,821 (63 %)
Number of living children (3 % missing)		
0	30,681	10,163 (33 %)
1	19,436	13,944 (72 %)
2	13,652	10,644 (78 %)
3	5575	4426 (79 %)
4	2028	1624 (80 %)
≥5	1131	926 (82 %)
Education level (21 % missing)		
Below high school	10,801	5,664 (52 %)
High school	29,220	18,847 (65 %)
Some college	11,689	7400 (63 %)
College graduate	7337	3776 (51 %)
Payment method (4 % missing)		
Self	16,103	8303 (52 %)
Medicaid	32,252	19,889 (62 %)
Other third party payer	23,037	14,430 (63 %)
Nativity (4 % missing)		
USA	51,575	31,428 (61 %)
Outside USA	19,491	10,928 (56 %)
Marital status (4 % missing)		
Married	9616	5789 (60 %)
Unmarried	62,141	37,012 (60 %)
Overall total	74,347	43,567 (58 %)

[a]Neighborhood-level poverty was defined as the percentage of the population in a ZIP code who live below the federal poverty threshold

TABLE 3 Rate of first and repeat abortion, by selected patient characteristics, New York City, 2010

Patient characteristics	First abortion		Repeat abortion	
	No.[a]	Rate per 1000 population	No.	Rate per 1000 population
Age (years)				
<15	345	3.9	50	0.6
15–17	3252	21.1	913	5.9
18–19	4252	39.2	2585	23.8
20–24	9799	29.7	12,385	37.5
25–29	6296	16.5	12,217	32.0
30–34	3781	11.0	8576	25.0
35–39	2083	6.9	4839	16.1
≥40	875	3.0	1823	6.2
Race/ethnicity				
White non-Hispanic	4040	6.8	3322	5.6
Asian/Pacific Islander	2271	8.6	1736	6.6
Hispanic[b]	10,149	18.1	14,483	25.9
Black non-Hispanic	12,055	27.6	22,966	52.5
Neighborhood-level poverty[c]				
Very low <10 %	3226	9.2	3284	9.4
Low 10 %–19.9 %	8921	14.2	11,327	18.1
Medium 20–29.9 %	7338	16.2	10,429	23.0
High ≥30 %	10,591	22.1	17,821	37.1

Numerator includes all abortion procedures reported for 2010 and is not deduplicated; thus, individual women might have had multiple procedures

[a]Totals do not match due to varying amounts of missing data for each variable of interest

[b]Rate calculated for Hispanic women because census denominators are unavailable for Puerto Rican and other Hispanic women

[c]Neighborhood-level poverty was defined as the percentage of the population in a ZIP code who live below the federal poverty threshold

nine times higher repeat abortion rate (52.5) than white non-Hispanics (6.8 and 5.6, respectively). First and repeat abortion rates increased as neighborhood-level poverty increased, from 9.2 and 9.4 in very low poverty areas to 22.1 and 37.1 in high poverty areas, respectively (Table 3).

Table 4 summarizes the unadjusted mean number of past abortions and unadjusted and adjusted ratio of mean number of past abortions for each sociodemographic characteristic. On multivariable regression, all covariates of interest were significantly associated with self-reported number of past abortions. After multivariable adjustment, predicted number of past abortions increased with age. For women aged 35–39 years, the adjusted ratio of means (ARM) was 1.05 (95 % CI, 1.02–1.08), compared with women aged 25–29 years, indicating that mean number of past abortions among women aged 35–39 years was 5 % higher than among women aged 25–29 years after adjustment for other covariates. Similarly, the number of past abortions predicted by our model increased with increasing number of children. ARMs ranged from 0.50 (95 % CI, 0.49–0.51) for

TABLE 4   Unadjusted mean number of past abortions and unadjusted and adjusted ratio of mean number of past abortions for 2010 abortion patients, by patient characteristics, New York City, 2010

Patient characteristics	Unadjusted mean number of past abortions	Unadjusted ratio of means	Adjusted ratio of means (95 % CI)
Age (years)			
<15	0.18	0.12	0.19 (0.14, 0.26)
15–17	0.29	0.19	0.29 (0.27, 0.31)
18–19	0.56	0.36	0.49 (0.47, 0.51)
20–24	1.06	0.68	0.78 (0.76, 0.80)
25–29 (ref.)	1.56	1.00	
30–34	1.77	1.13	1.08 (1.05, 1.10)
35–39	1.72	1.10	1.05 (1.02, 1.08)
≥40	1.61	1.03	1.03 (0.99, 1.08)
Race/ethnicity			
White non-Hispanic	0.82	0.54	0.71 (0.68, 0.73)
Asian/Pacific Islander	0.77	0.51	0.67 (0.64, 0.70)
Other Hispanic	1.10	0.72	0.82 (0.80, 0.84)
Puerto Rican	1.56	1.03	0.99 (0.96, 1.01)
Black non-Hispanic (ref.)	1.52	1.00	
Neighborhood-level poverty[a]			
Very low <10 %	0.97	0.66	0.89 (0.86, 0.92)
Low 10–19.9 %	1.21	0.82	0.99 (0.97, 1.01)
Medium 20–29.9 %	1.30	0.88	0.97 (0.95, 0.99)
High ≥30 % (ref.)	1.47	1.00	
Number of living children			
0	0.56	0.36	0.50 (0.49, 0.51)
1 (ref.)	1.56	1.00	
2	1.93	1.24	1.15 (1.13, 1.18)
3	2.11	1.35	1.22 (1.19, 1.26)
4	2.21	1.42	1.24 (1.19, 1.30)
≥5	2.50	1.60	1.38 (1.30, 1.46)
Education level[b]			
Below high school	2.01	1.05	0.94 (0.92, 0.96)
High school (ref.)	1.92	1.00	
Some college	1.48	0.77	0.93 (0.91, 0.95)
College graduate	0.91	0.47	0.84 (0.79, 0.88)
Payment method			
Self	1.00	0.72	0.89 (0.87, 0.91)
Medicaid (ref.)	1.39	1.00	
Other third party payer	1.44	1.04	1.02 (1.00, 1.04)
Nativity			
USA (ref.)	1.39	1.00	
Outside USA	1.12	0.81	0.78 (0.77, 0.80)
Marital status			
Married	1.31	0.99	0.86 (0.84, 0.88)
Unmarried (ref.)	1.32	1.00	

[a]Neighborhood-level poverty was defined as the percentage of the population in a ZIP code who live below the federal poverty threshold

[b]For education level, we restricted bivariate analysis to women aged ≥25 years

[c]Results from multivariate negative binomial regression modeling number of past abortions with other covariates held at reference values

no children to 1.38 (95 % CI, 1.30–1.46) for ≥5 children, compared with 1 child. ARMs were highest for Puerto Ricans (0.99; 95 % CI, 0.96–1.01) and lowest for Asians and Pacific Islanders (0.67; 95 % CI, 0.64, 0.70) compared with black non-Hispanics. ARMs across neighborhood-level poverty, education, payment method, nativity, and marital status groups were of smaller magnitude.

DISCUSSION

This is the first published analysis of predictors of repeat abortions based on a US population-based sample in over a decade and only the second such analysis ever published.[2] Additionally, our multivariable analysis enabled us to explore relationships among sociodemographic characteristics and repeat abortion among women who have had at least one abortion. Among 2010 abortion patients, our analysis revealed smaller socioeconomic disparities than those observed by comparing citywide rates of first and repeat abortion. This demonstrates that, although socioeconomic disparities exist, the majority of abortion patients are at high risk for repeat unintended pregnancy and abortion.

Approximately 40,000 (57 %) of abortions performed in NYC in 2010 were repeat abortions. Repeat abortions were a substantial proportion of total abortions in each sociodemographic group we examined, constituting >50 % of total abortions for the majority of groups. Nationally, an estimated 45 % of abortions performed in 2010 were repeat abortions.[10] Similarly, the Guttmacher Institute estimated that 48 % of abortions performed in the USA during 2000–2001 were repeat procedures.[2] The higher proportion of repeat abortions in NYC might reflect demographic differences or greater access to abortion services. However, comparison data are unavailable for other demographically diverse urban areas.

Among 2010 NYC abortion patients, socioeconomic status variables (i.e., education, Medicaid payment, and neighborhood-level poverty) had a smaller relationship with number of past abortions than age, number of children, and race/ethnicity. Similarly, a California study in an urban hospital indicated no association between poverty, education, or insurance coverage and repeat abortions,[3] and the Guttmacher Institute's 2000–2001 national Abortion Patient Survey identified no association between individual poverty status and repeat abortions.

Older age has been associated with repeat abortions in this and other cross-sectional studies,[2–4] but prospective studies have reported decreased incidence of future abortion in association with older age.[11–13] The association appears in cross-sectional studies because older age represents a longer period at risk for unplanned pregnancy. Additionally, repeat abortion has been associated with cohabitation and greater coital frequency,[14] both markers for increased pregnancy risk.

Repeat abortions among women with more children might reflect an increased likelihood of pregnancy termination after a woman has achieved or surpassed her desired family size. Lower numbers of past abortions among foreign-born women, although consistent with previous research,[3] are insufficiently understood and might relate to lower rates of unintended pregnancy, limited access to abortion services, or unwillingness to disclose previous abortions.

The relationship between race/ethnicity and number of past abortions was stronger than that of socioeconomic factors in our analysis. We included Asians/Pacific Islanders and Puerto Ricans, who had not been studied previously at the population level. Black non-Hispanic and Puerto Rican abortion patients had approximately 40 % more past abortions on average than white non-Hispanic

women. At the population level, black non-Hispanics had a nine times higher repeat abortion rate than white non-Hispanics. Racial/ethnic disparities also exist for repeat unintended childbearing: black women are more likely to have repeat unintended births than women of other racial/ethnic groups.[15] Thus, black women are at higher risk for repeat unintended pregnancy, regardless of pregnancy outcome. These differences might reflect underlying disparities in access to or use of family planning services. Cultural attitudes toward abortion,[16] contraception, and the health care system, lack of control over contraceptive decision making, or ambivalence about pregnancy intentions might also contribute.[17]

This study provides information solely on patient demographics and does not address women's contraceptive preferences or practices. However, others have reported that although repeat abortion patients are more likely to have been using contraception than women undergoing a first abortion,[14,18] inconsistent use or nonuse of contraception remains common.[4,19] Women discontinue contraceptives or use them inconsistently for various reasons, including side effects, cost, disruptive life events, and misperceptions regarding pregnancy risk.[20]

Abortion providers have an opportunity to reduce future unintended pregnancies by providing contraception counseling and services on the day of the procedure. The majority of US abortion providers offer contraception counseling (96 %) or oral contraceptive pills (99 %) at the abortion visit,[21] but contraceptive counseling, alone without providing a contraceptive method, is ineffective at preventing future unplanned pregnancy and abortion.[22,23] The American College of Obstetricians and Gynecologists recommends offering long-acting reversible contraceptives (LARC) as first-line contraception for most women, and adopting same day insertion protocols for surgical abortions.[24–26] However, fewer than one third of US providers offer immediate postabortion LARC.[21] NYC's Bureau of Vital Statistics began collecting data on postabortion contraception in 2011. Data from the latter half of 2012 show that contraception was not offered at 29 % of abortion visits. Contraception was offered but declined at 13 % of visits. Among the 58 % of visits where contraception was offered and accepted, 18 % of patients received a long-acting method (IUD, implant or injectable) (NYC Vital Statistics unpublished data). Data are not available on the proportion of patients who were offered but declined LARC or who underwent medication abortions and were ineligible for same-day LARC insertion. Barriers to LARC provision include higher initial costs to patients, unfavorable insurance reimbursement policies (e.g., reduced compensation for LARC insertion performed during the abortion visit) and in some cases, lack of staff trained to perform LARC insertion.[27,28]

Because the risk of repeat abortion is significantly higher among black non-Hispanic and Puerto Rican women, attention should be paid to barriers to their use of postabortion contraception. Research shows that black and Hispanic women have greater misconceptions about contraception and concerns about contraceptive safety.[29] Moreover, the history of coercive family planning policies in the USA[30] and ongoing experiences of race-based discrimination when accessing family planning services[31] has led to mistrust of the health care system and negative attitudes toward contraception.[32] To address these barriers, postabortion contraceptive counseling and services should provide accurate information about all contraceptive choices while addressing questions about contraceptive safety and concerns arising from patient mistrust. Research is needed regarding current practices in postabortion contraception and factors that influence providers' decisions to offer various contraceptive methods. Additionally, research is needed on factors that influence

women's choice of contraceptive method and decisions to continue or discontinue contraception.

In contrast to most published studies of repeat abortion, our study population is large, demographically diverse and population-based. We were able to calculate population rates of repeat abortion by age, race/ethnicity, and neighborhood-level poverty. Additionally, we newly describe repeat abortion epidemiology among Asian and Puerto Rican NYC residents.

Limitations

One limitation of this study was that past pregnancy outcome data relied on patient self-report. Underreporting of prior abortions among women accessing abortion services has been estimated at 9 %. Nonwhite women and women with a lower educational level were more likely to underreport.[33] If this occurred in our population, we may have underestimated the effects of race/ethnicity and education on number of abortions. Moreover, our unit of analysis is the abortion event, not the woman, because patient-level identifiers are unavailable. Thus, if a patient had more than one abortion during 2010, we could not account for overrepresentation of her characteristics. Information is limited regarding spacing of repeat abortions in the USA. In a 1977 clinic-based study in Atlanta, Georgia, approximately half of repeat abortion patients had had an abortion in the previous 12 months.[18] Further, using abortion as a proxy for unintended pregnancy underestimates unintended pregnancy incidence because approximately 37 % of births also result from unintended pregnancy.[34] Additionally, we had a relatively high proportion of missing values for education, requiring the use of multiple imputation, which although shown to produce less bias and greater precision than complete case analysis, may still introduce bias.[35] Finally, we could not exclude therapeutic abortions, i.e., abortions performed because of a woman's health or fetal abnormalities. Therapeutic abortions, which comprise approximately 5 % of all abortions,[1] are probably more common among older age groups. Including them in this analysis may have caused us to overestimate the relationship between age and number of abortions.

CONCLUSIONS

Repeat abortions have comprised over 50 % of total abortions in NYC for 10 years. We demonstrate racial/ethnic and economic disparities in repeat abortion rates and show that the majority of abortion patients are at high risk for repeat unintended pregnancy and abortion. Unfortunately, many women remain without access to postabortion contraception services despite the fact that such services decrease the incidence of repeat abortion. Addressing barriers like high initial costs, unfavorable insurance reimbursement policies, and lack of trained providers would extend the availability of postabortion contraception services to more women.

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