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Estimating the Period Prevalence of Publicly Funded Abortion to Space Live Births, 1999 to 2014

James Studnicki[1], John W. Fisher[1], Tessa Longbons[1], David C. Reardon[2], Christopher Craver[1], and Donna J. Harrison[3]

Abstract

Introduction/Objectives: Although a majority of women who have an abortion report having 1 or more children, there is no published research on the number of abortions which occur between live births, after a first child but before the last. The objectives of this research, therefore, were to estimate the period prevalence of an induced abortion separating live births in a population of Medicaid eligible enrollees and to identify the characteristics of enrollees significantly associated with the use of abortion to enable child spacing. **Methods:** A retrospective, cross-sectional, longitudinal analysis of the pregnancy outcome sequences of eligible enrollees over age 13 from the 17 states where Medicaid included coverage of all abortions, with at least one identifiable pregnancy outcome between 1999 and 2014. Eligibles with a defined sequence of birth-abortion-birth within up to 5 consecutive pregnancies were identified to estimate the number of eligibles who could have practiced birth spacing by abortion. Logistic regression was applied to identify the significant predictor variables of the birth-abortion-birth sequence. **Results:** There were 50012 (1.02%) of 4875511 Medicaid eligible enrollees exhibited a birth-abortion-birth sequence. Eligibles with the birth-abortion-birth sequence are more likely to be Black than White (OR 2.641, CL 2.581-2.702), less likely to be Hispanic than White (OR 0.667, CL 0.648-0.687), and more likely to have received contraceptive counseling (OR 1.14, CL 1.118-1.163). Increases in months of Medicaid eligibility (OR 1.004, CL 1.003-1.004) and months from first pregnancy to second live birth (OR 1.015, CL 1.015-1.016) are associated with the likelihood of undergoing live births separated by one or more induced abortions. Increases in the age at first pregnancy are associated with a decreased likelihood of the birth-abortion-birth sequence (OR 0.962, CL 0.959-0.964). **Conclusion:** Birth spacing via abortion is uncommon among a low-income population for whom the financial barriers to abortion are somewhat alleviated.

Keywords

abortion, child spacing, pregnancy outcomes, Medicaid

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Introduction

According to the most recent data available (2018) from the Centers for Disease Control and Prevention (CDC), 59% of women who have an abortion have one or more children.[1] Additionally, survey research from the Guttmacher Institute concluded that fewer than 4 out of 10 women having abortions had completed their childbearing.[2] These findings have given support to the assertion that abortion allows some women who have already had one or more live births to postpone or prevent a subsequent birth. An actual example of child spacing via abortion is described in a recent report that relates the experiences of a mother with 2 daughters aborting a third pregnancy because the couple was not ready for another child. The couple attributed the third

[1]Charlotte Lozier Institute, Arlington, VA, USA
[2]Elliot Institute, Springfield, IL, USA
[3]American Association of Pro-Life Obstetricians and Gynecologists, Eau Claire, MI, USA

Corresponding Author:
James Studnicki, Charlotte Lozier Institute, 2800 Shirlington Road, Suite 1200, Arlington, VA 22206-3616, USA.
Email: jstudnicki@lozierinstitute.org

child, a son, to the availability of an abortion which enabled child spacing.[3]

Most women choose an abortion for multiple interconnected reasons, including personal, familial, social, or financial factors.[2] Any one or a combination of these reasons may motivate a woman to have an abortion to postpone a subsequent live birth. A much smaller percent of the abortions between births may result from health considerations, fetal anomalies, rape, and incest. All of these women who manifest the birth-abortion-birth sequence may derive the health benefits of child spacing, whatever their intent, or absence of it. A significant proportion of abortions occur either at the beginning of an abortion patient's reproductive experience, in order to delay a first live birth, or after she has finished having children. One survey found that at the time of the abortion, 20% of abortion patients sought to postpone a first birth and 31% were choosing to end childbearing, while 19% were delaying their next birth.[4] However, there is no published research on the actual percentage of abortion patients who go on to have additional children after delaying a subsequent birth, regardless of their intentions at the time of the abortion.

The concept of abortion as an important family planning tool to enable the planning and spacing of children appears frequently in the published literature.[5] One investigator noted that "An under-recognized benefit of abortion is that it has enabled child spacing, which has positive benefits for both women and children."[6] The connection between abortion and child spacing in the context of family planning has been referenced by various professional associations. The American Board of Obstetrics and Gynecology (ABOG)[7] emphasized "healthy child-spacing" in their application for approval of a subspecialty certification in Complex Family Planning. The child spacing rationale is prominently featured in policy statements from the American Public Health Association (APHA)[8] supporting abortion. Finally, influential private foundations that advance abortion as an integral part of family planning worldwide consistently promote the benefits of child spacing.[9]

The beneficial health effects of an interval of 18 to 60 months between a live birth and a subsequent pregnancy are prominent in the research literature. Intervals of less than 18 months are associated with a greater risk of preterm birth,[10] low birth weight,[11] severe neonatal morbidity,[12] and unintended pregnancy, especially among poor Black women.[13] Similarly, intervals longer than 5 years have been associated with prematurity, low birth weight and undersize at gestational age.[14]

While it has been suggested that children born to mothers who were denied access to abortion would be closely spaced with all the adverse consequences of short interval pregnancies,[15] there is no published research on the prevalence of abortion that spaces children or the characteristics of women who have abortions in the middle of their family building. Data from the Centers for Disease Control and Prevention (CDC) and the Guttmacher Institute patient and provider surveys do not provide patient level information on the sequencing of different pregnancy outcomes and are, therefore, insufficient to identify a woman who has one or more existing children and subsequently has an induced abortion followed by another live birth. In the absence of a comprehensive national registry of pregnancy outcomes, the only patient level publicly available data in the U.S. by which the sequencing of different pregnancy outcomes is discernible are the paid claims files of the Medicaid program. Our specific study objective, therefore, was to identify the prevalence of the birth-abortion-birth sequence as a proxy measure of child spacing in a population of Medicaid eligible enrollees. A secondary objective was to identify enrollee characteristics which were significantly associated with abortion that results in child spacing.

Methods

The study has been exempted from IRB review pursuant to the U.S. Department of Health and Human Services (DHHS) Policy for Protection of Human Research Projects at C.F.R. 46.101(b). See IRB ID:7269, www.sterlingirb.com. Data were obtained from the enrollee-level Medicaid Analytic eXtract (MAX) files licensed through the Centers for Medicare and Medicaid Services (CMS) Chronic Condition Data Warehouse's (CCW) Medicaid data. The study population is comprised of enrollees from the 17 states whose official policies applied state funds to most abortions not covered by federal Medicaid during the period 1999 through 2014. Not all states funded abortion consistently or to the same extent during the study period. Despite their official policies, Arizona and Illinois funded relatively few abortions during this period, and Alaska experienced a short interruption to its abortion coverage.[16] Not all states had provided claims data through 2014 due to differing reporting timeframes. The latest year of data relative to each state was 2012 for Alaska, Illinois, Maryland, Montana, and New Mexico; 2013 for Arizona, Connecticut, Hawaii, Massachusetts, New York, Oregon, and Washington; and 2014 for California, Minnesota, New Jersey, Vermont, and West Virginia.

The study population was made up of enrollees over 13 years of age with at least one identifiable pregnancy outcome from 1999 through the latest year of data available for each state. For each beneficiary, all unique pregnancy outcomes were identified using *International Classification of Diseases, Ninth Revision (ICD9)* codes. Additionally, *Current Procedural Terminology, 4th Edition (CPT4)* and Healthcare Common Procedure Coding System (HCPCS) codes were used to confirm pregnancy outcomes.

These codes were used to allocate all pregnancy outcomes into 4 categories: live birth (*ICD9* V27.0, V27.2, and

Table 1. Child Spacing Sequence Identification.

Gen Seq	Preg1	Preg2	Preg3	Preg4	Preg5	Child spacing profiles
1	B	A	B	X	X	21
2	B	A	**A, N, or U**	B	X	15
3	B	A	**A, N, or U**	**A, N, or U**	B	9
4	B	**B, N or U**	A	B	X	15
5	B	**B, N or U**	A	**A, N, or U**	B	9
6	B	**B, N or U**	**B, N or U**	A	B	9
7	**A, N, or U**	B	A	B	X	15
8	**A, N, or U**	B	A	**A, N, or U**	B	9
9	**A, N, or U**	B	**A, N, or U**	A	B	9
10	**A, N, or U**	**A, N, or U**	B	A	B	9
Total						120

V27.5), natural fetal loss (*ICD9* V27.1, V27.4, V27.7, 630, 631, 633, 634), induced abortion (*ICD9* 635.xx, *CPT4* 59840, 59841, 59850, 59851, 59852, 59855, 59856, 59857, and HCPCS: S0199, S2260, S2265, S2266, S2267, X7724, X7726, S0190, S0191), and undetermined (*ICD9* 636.xx, 637.xx, 638.xx). In order to identify each unique pregnancy, multiple diagnostic, or treatment codes within 30 days of a pregnancy loss (natural, induced, or undetermined) or within 180 days of a live birth were counted as a single pregnancy outcome using the first date associated with that series of Medicaid claims. Twins and higher order gestations that resulted in a combination of live birth and fetal loss were excluded from the analysis.

The analytic strategy was composed of 3 phases. First, we identified all possible combinations of pregnancy outcomes within up to 5 pregnancies. Second, we identified the population of enrollees whose history of pregnancy outcomes within the span of up to 5 pregnancies included a sequence of outcomes indicating that abortion could have been used for child spacing: a birth followed by an abortion followed by a birth. Third, we performed a logistic regression to identify the association of selected predictor variables with the birth-abortion-birth sequence. In order to ensure that eligible enrollees who did and did not undergo abortion as a means of child spacing had comparable exposure, our analytic population for the regression analysis included only the eligibles who had had at least 3 pregnancies and 2 live births. The outcome variable was the dichotomous indication that the birth-abortion-birth sequence was present or not. The predictor variables were as follows: age at first pregnancy (ie, index age); age at the second live birth; total months from the first pregnancy to the second live birth; total months of Medicaid eligibility; contraceptive use as indicated by a contraceptive counseling claim at any time during the study period; and, race and ethnicity.

Any given pregnancy can have 4 possible mutually exclusive outcomes: (A) induced abortion, (B) live birth, (N) natural loss, or (U) a loss of undetermined nature (unable to determine if induced or spontaneous loss). A single pregnancy can thus have 1 of 4 outcomes. Two pregnancies have a possible 4 times 4 or 16 possible sequences (A-A, A-B, A-N, A-U, B-A, B-B, B-N, etc.). Similarly, 3 pregnancies have 4 to the 3rd power combinations (64); 4 pregnancies 4 to the 4th power (256); and 5 pregnancies 4 to the 5th power (1024). For a data set consisting of enrollees who had at least one pregnancy, the total number of possible combinations for up to 5 pregnancies is thus $4 + 16 + 64 + 256 + 1024 = 1364$.

For this study, our definition of possible abortion-enabled child spacing is any birth followed by at least one abortion, and possibly additional intended or unintended pregnancy losses, followed by another birth. For example, the sequences B-A-B, B-A-A-B, and B-A-N-U-B are all treated as possible cases of child spacing. All enrollees who abort a pregnancy to child space will demonstrate this sequence regardless of intentionality. The period prevalence estimate derived from the count of all women with the sequence is a maximum if all child spacing sequences are identified. Child spacing sequences missed by lapses in eligibility, out-of-pocket payment, or exclusion from the observation period before the initial or after the terminal years would deflate the prevalence estimate.

As seen in Table 1, these 1364 sequences can be reduced to ten general sequences for the hypothesized child spacing patterns in a sequence of up to 5 pregnancies. X is any outcome, including the absence of a fourth or fifth pregnancy. The table steps through the birth-abortion-birth sequences serially, starting with a birth as the first pregnancy and an abortion as the second, and then collecting all combinations with the second birth occurring in pregnancy 3, then pregnancy 4, and then pregnancy 5. Next, we move through all first-pregnancy-birth sequences with an abortion as the third pregnancy, and finally, all first-pregnancy birth sequences with an abortion as the fourth pregnancy. This exhausts all possible first-pregnancy-birth profiles, so Table 1 then proceeds to profiles in which the first birth occurs in the second

Table 2. Univariate Statistics.

	Non-child spacing (n = 452 280)	Child spacing (n = 50 012)
White	182 081 (40.3%)	15 253 (30.5%)
Black	86 158 (19.0%)	21 555 (43.1%)
Hispanic	128 483 (28.4%)	7189 (14.4%)
Other	55 558 (12.3%)	6015 (12.0%)
Contraception		
Yes	193 237 (42.7%)	25 874 (51.7%)
No	259 043 (57.3%)	24 138 (48.3%)
Index age (mean/STD/median)	21.5/4.6/20.0	20.5/4.0/20.0
Age at second live birth	24.9/5.1/24.0	25.3/4.8/24.6
Months index pregnancy to second live birth	41.0/28.6/33.0	58.6/32.4/52.3
Months of eligibility	109.7/46.7/113.0	124.9/39.6/130.0

pregnancy, following the same process. Finally, Table 1 depicts the only sequence in which the first birth occurs in the third pregnancy ((A-N-U)-(A-N-U)-Birth-Abortion-Birth).

Thus, the Sequence 1, in line 1, encompasses a total of 21 possible sequences of 3 to 5 pregnancies based entirely on the outcome of the first 3 pregnancies. Sequence 2 conflates all sequences where the third pregnancy is 1 of the 3 pregnancy loss options, A, N, or U. This pattern is scored as a possible child spacing sequence birth-abortion-birth because the intermittent additional pregnancy loss, whether intentional or unintentional, does not rule out possible child spacing behavior. Conversely, sequence 4 represent all sequences where the first and fourth pregnancies are a birth, the third pregnancy is an induced abortion, and the second is either a birth, natural loss, or undetermined loss.

Of the 1364 possible profiles, only 120 display a pregnancy outcome sequence indicating abortion could have been used to space live births. Also, of note, only 1360 of the possible 1364 profiles were actually populated. For the sake of convenience, all 120 of possible child spacing patterns are collectively referred to as a **B-A-B sequence** throughout the remainder of this paper. Using these 120 B-A-B sequences, we then sorted through our sample of Medicaid eligibles with at least one pregnancy outcome to identify those who had a B-A-B sequence. For all group comparisons, we calculated odds ratios (OR) and confidence intervals (CI) for $P < .05$. Summary analytic tables were created using (SAS/STAT) software, version (10) of the SAS System for (Unix). Copyright (2019) SAS Institute Inc. All comparative analyses were completed using Microsoft Excel (Version 16).

Findings

There were 50 012 eligibles whose claims identifiable pregnancy history included one of the 120 B-A-B sequences over the span of up to 5 pregnancies. That number is just over 1% of the total study population of 4 875 511 Medicaid eligible women with at least one pregnancy and just over 10% of eligibles with 3 pregnancies and 2 births. For comparison purposes 4 280 549 (87.8%) of the women never had an abortion and 791 576 (16.2%) never had a live birth covered by Medicaid.

There were 502 292 (10.3%) eligibles who had at least 3 pregnancies and at least 2 live births. The mean values of the predictor variables for the univariate comparisons of the groups with and without the B-A-B sequence are in Table 2. Eligibles who exhibit the B-A-B sequence are more than twice (43.1% vs. 19.0%) as likely to be Black and half (14.4% vs. 28.4%) as likely to be Hispanic as those who do not. On average eligibles who exhibit the B-A-B sequence are: 1 year younger (20.5 vs. 21.5 years) at their index pregnancy; 4.8 months older (25.3 vs. 24.9 years) at the second live birth; have 17.6 months (58.6 vs. 41.0 months) longer from their index pregnancy to their second live birth; have 15.2 months more (124.9 vs. 109.7 months) of Medicaid eligibility and are more likely (51.7% vs. 42.7%) to have received counseling for contraceptive services via the Medicaid program.

A summary of the logistic regression analysis is in Table 3. Blacks are more likely to undergo the B-A-B sequence than Whites (OR 2.641, CL 2.581-2.702); Hispanics are less likely than Whites (OR 0.667, CL 0.648-0.687); eligibles with the B-A-B sequence are more likely to have received contraceptive counseling (OR 1.14, CL 1.118-1.163); increases in months from the index pregnancy to the second live birth (OR 1.015, CL 1.015-1.016) and months of Medicaid eligibility (OR 1.004, CL 1.003-1.004) are both associated with increases in the likelihood of the B-A-B sequence; and, increases in the age at first pregnancy are associated with a decrease in the likelihood of the use of abortion for child spacing (OR 0.962, CL 0.959-0.964).

All predictor variables are highly significant. The multivariate analysis repeated with both 10% and 5% samples returned the same results with all predictor variables remaining significant.

Table 3. Logistic Regression Odds Ratio Estimates and (Wald) Confidence Intervals.

	Odds Ratios	95% CLs	Chi-square	Pr>
Black vs. White	2.641	2.581-2.702	6835.037	<.0001
Hispanics vs. White	0.667	0.648-0.687	728.5398	<.0001
Contraceptive counseling (Y vs. N)	1.14	1.118-1.163	169.3785	<.0001
Age at 1st pregnancy (index age)	0.962	0.959-0.964	1055.5703	<.0001
Months to 2nd live birth	1.015	1.015-1.016	11868.5774	<.0001
Months of Medicaid eligibility	1.004	1.003-1.004	891.8059	<.0001

Discussion

The estimated period prevalence of B-A-B sequences among the population of Medicaid eligible women in the 17 states that provided comprehensive coverage of abortion services is just over 1%. Among the much smaller population of eligibles who have at least 3 pregnancies and 2 births, the period prevalence is just over 10%.

This relatively low prevalence occurs in a population where the financial barriers to abortion itself have been at least somewhat alleviated. It may be that abortion-enabled child spacing is in fact uncommon among all women, and that the Medicaid population reflects the behavior of the universe of pregnant women. We do know that in many of the 17 states in our study population, Medicaid represents about half of total abortions, and approximately 89% of the Medicaid-eligible women undergoing abortions in these states have their abortions funded by state Medicaid.[17] Research also indicates that about half of all abortions are paid for "out-of-pocket," that is, without public assistance or private insurance,[18] and that self-pay abortion patients appear less likely to have repeat abortions.[19] While our analysis did not address the possible effect of financial status on the likelihood of the use of abortion for child spacing, existing research suggests that publicly insured women are less likely to self-pay for abortion than more affluent women. Recent research findings from the same study population also indicate that an abortion greatly increases the likelihood of another abortion in subsequent pregnancies, and that this tendency is found across all races, ethnicities, and age groups.[20] A low incidence of B-A-B sequences is consistent with these results since it requires an abortion to be followed by a live birth in a subsequent pregnancy, a sequence of pregnancy outcomes which is relatively uncommon.

The strongest predictor variable for the likelihood of B-A-B sequences is race: Black eligibles are 2.6 times more likely to demonstrate one of the 120 B-A-B sequences than White eligibles. But this difference may be partially explained by the fact that the Black abortion rate is consistently 3 to 4 times higher than the White rate[21] and contributes to the resulting higher proportion of child spacing abortions in our 5 pregnancy outcome matrix for Black eligibles. Black eligibles were just under 19% of the total study population, 16% of eligibles who had no abortions, 37% of eligibles who had one or more abortions, and 43% of eligibles who exhibited a B-A-B sequence. Even among this group, however, the potential use of abortion for child spacing was still a rare event, with just 2.3% of Black eligibles displaying the B-A-B sequence. The B-A-B sequence is found in less than 1% of both Hispanic and White eligibles.

Eligibles with the B-A-B pregnancy outcome sequence are on average a year younger than women without the sequence at their first pregnancy (20.5 years vs. 21.5). The mean average age of first-time mothers in the United States has been steadily increasing and reached 26.3 years in 2014 (White 27.0 and Black 24.2).[22] This suggests that, overall, Medicaid eligible women are having their first and subsequent pregnancies earlier than non-Medicaid women. Eligibles with the B-A-B sequence accrue, on average, just under 5 years (58.6 months) from the first pregnancy to the second live birth. This is nearly a year and one-half longer than eligibles without the sequence, who on average take just under 3 and one-half years (41.0 months). It is worth noting that the average times to a subsequent birth for both groups fall within the recommended guidelines of no less than 18 nor more than 60 months between pregnancies, suggesting that the difference may have little clinical significance.

The eligibles in this study population did not appear to use abortion as an alternative to contraception. Eligibles experiencing the B-A-B sequence have, on average, more than 10 years of Medicaid eligibility, 15 months more than women without the sequence. They are also more likely to have received counseling for contraceptive services during their period of eligibility, although the timing of contraception related to each specific pregnancy was not considered in the analysis. For this comparison population of eligibles who have had at least 3 pregnancies and 2 births, contraception is positively associated with the likelihood of B-A-B sequencing, suggesting that abortion as a means of child spacing is not a phenomenon that occurs due to a lack of access to reliable contraception.

The use of Medicaid claims data has limitations. Medicaid-eligible beneficiaries are low-income and therefore not representative of all women experiencing abortion. Services received before 1998 or after 2014 or during

periods of ineligibility are not reflected in our claims data, and any non-Medicaid services received by eligible women, such as those funded out-of-pocket, are also not included. Administrative data may be affected by inconsistent and mistaken coding and the exclusion of codes considered unnecessary for billing,[23,24] which may vary from state to state. Our analysis used ICD codes to identify beneficiaries who had an induced abortion, which could result in an undercount of abortions due to the fact that some states or individual providers may not use ICD codes to code abortions. However, any undercount would likely result from a random variation in coding protocols and would be unlikely to impact the trends laid out in our findings.

Many of these limitations are mitigated by the fact that each B-A-B sequence required 3 or more pregnancies covered by Medicaid, which indicates prolonged eligibility. It is unlikely that there were many pregnancies missed by the data between any 2 live births. Therefore, despite data limitations, our findings support the conclusion that it is quite uncommon for Medicaid eligible women to utilize abortion for the purpose of child spacing.

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ORCID iDs

James Studnicki https://orcid.org/0000-0003-2958-7493
Tessa Longbons https://orcid.org/0000-0003-0479-9166

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