

Contraceptive Use Behavior Change After an Unintended Birth in Colombia and Peru

By Ewa Batyra

Ewa Batyra is a postdoctoral fellow at the Population Studies Center, University of Pennsylvania, Philadelphia, PA, USA.

CONTEXT: No studies using longitudinal contraceptive histories have investigated whether having an unintended birth (i.e., one resulting from an unintended pregnancy) is associated with change in contraceptive behavior, including in Colombia and Peru, where levels of unintended fertility remain high.

METHODS: Monthly reproductive history calendar data from the 2010 Colombia and 2012 Peru Demographic and Health Surveys were used to study contraceptive behavior among 13,373 and 7,425 women, respectively. Transition matrices and hazard models were utilized to identify associations between prepregnancy and postpartum contraceptive methods used, and to assess how these relationships differed between women who reported an unintended birth and those with an intended birth.

RESULTS: Women who had been using a traditional, barrier or (in Colombia) short-acting hormonal method before pregnancy were more likely to choose a more effective method postpartum, than to use no method, if their birth had been unintended rather than intended (relative risk ratios, 1.2–1.3 in Colombia; 1.6 in Peru). Compared with their counterparts whose birth had been intended, women with an unintended birth who had been utilizing the most effective methods used in the country (IUD or implant in Colombia, pill or injectable in Peru) were less likely to resume using them postpartum than to use no method (0.7 in Colombia; 0.8 in Peru).

CONCLUSIONS: Unintended birth is associated with change in contraceptive behavior. Efforts to understand postpartum contraceptive choices of women who have had an unintended birth should take into account contraceptive behavior at more than one point in women's reproductive lives.

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Studying the relationship between fertility intentions and contraceptive use is important for understanding the persistently high levels of unintended pregnancy that exist in many settings. The association between unintended childbearing and contraceptive behavior has been studied primarily at a single point in a woman's reproductive life course: Studies have described contraceptive practices that precede unintended pregnancy^{1,2} or have investigated how having an unintended birth is related to subsequent contraceptive uptake.^{3–6} However, few studies have looked at the dynamics of contraceptive use, and none has comprehensively examined how contraceptive behavior changes in relation to important reproductive events, such as unintended births (i.e., those resulting from unintended pregnancy).

Unintended childbearing can be a disruptive and stressful event for a woman. It can adversely influence a mother's health as well as her behavior during pregnancy and after birth.⁷ Having had an unintended birth might, therefore, be associated with changes in women's contraceptive decision making (e.g., choosing to switch methods) to prevent future pregnancies more effectively. However, studies examining determinants of postpartum contraceptive use have largely ignored women's prepregnancy behavior. One could hypothesize that contraceptive method choice after birth will be related to a woman's past experience with contraceptives, particularly if the birth was unintended.

Understanding the relationship between contraceptive practices that precede unintended births and those that follow can extend our knowledge of the determinants of contraceptive use and inform postpartum family planning programs. Moreover, because women who have had an unintended birth have an elevated risk of having another such birth,⁸ studying whether and how contraceptive practices change after an unintended birth could shed light on the proximate determinants of repeat unintended childbearing and short interpregnancy intervals.

In Latin America, fertility is close to replacement level and contraceptive prevalence is high, but the proportion of pregnancies reported as unintended is the highest of any region in the world.⁹ Moreover, funding for family planning has declined in the region because countries have "graduated" from receiving international assistance.¹⁰ However, the factors that influence changes in contraceptive use and method choice in Latin America are poorly understood.

Consequently, the goal of this study was to examine the association between unintended birth and changes in contraceptive practice in two Latin American countries with persistently high levels of unintended fertility, Colombia and Peru, using contraceptive histories from reproductive calendars completed by Demographic and Health Survey (DHS) respondents.

Unintended Childbearing and Contraceptive Use

Unintended births can be unwanted or mistimed¹¹ and result from nonuse or discontinuation (abandonment) of contraceptives, or from method failure.^{12,13} Nonuse or abandonment of contraceptives can be related to a variety of barriers, including the method's physical availability and cost, women's health concerns and experiences of side effects, misinformation and lack of knowledge about the methods, and limited choice of methods.¹⁴ Contraceptive failure typically results from inconsistent use or from use of relatively ineffective methods.

Although some women might not desire or plan a pregnancy, their intentions to avoid childbearing may not be strong enough to motivate them to use a contraceptive, and they may have attitudes that influence the effectiveness of contraceptive practice. For example, they may perceive their risk of pregnancy to be low, lack motivation to avoid pregnancy, or have ambivalent or conflicting attitudes toward pregnancy or contraceptive use (e.g., because of health concerns or side effects).^{2,15,16}

Mechanisms by which an unintended birth could lead to change in contraceptive practice are likely to differ depending on the factors that led to the pregnancy. Current evidence comes from qualitative research. One study suggests that unintended pregnancy can bring women in contact with health care services and—particularly for young women—be an opportunity to get information, receive counseling and obtain a method postpartum.¹⁷ Such exposure might facilitate contraceptive uptake among women whose unintended childbearing resulted from an inability to implement effective contraceptive use because of external barriers. Among women who became pregnant despite a strong desire to avoid childbearing, an unintended birth might induce distress and anxiety, resulting in increased determination not to experience a similar event again; it might also worsen the woman's economic situation and create a need to avoid future pregnancy.³ If an unintended birth followed the use of less effective methods and, in turn, contraceptive failure, the experience might induce a desire to transition to more effective methods after childbirth. Similarly, a woman who had an unintended pregnancy after discontinuing a method because of side effects, health concerns or inconvenience might switch to an alternative method after childbirth to better meet her needs.¹⁷ An unintended birth might lead a woman who had considered her risk of pregnancy to be low to change her contraceptive decision making because of a higher perceived pregnancy risk. A woman who had been ambivalent about pregnancy might change her contraceptive decisions after an unintended birth because the increase in her family size strengthened her motivation to avoid future pregnancies.¹⁸ Finally, unintended birth might serve as a learning experience—more colloquially, a “teachable moment” or “wake up call”—leading to a reassessment of contraceptive behavior.^{3,4}

Conversely, experience of an unintended birth might not lead to contraceptive method change if barriers that

had contributed to poor contraceptive practice before the pregnancy persist. Moreover, unintended pregnancy may not affect the contraceptive behavior of a woman who had been ambivalent about pregnancy if her attitudes toward childbearing or contraceptive use remain unchanged.

To the author's knowledge, only one quantitative study—conducted among 466 teenagers in 1990 in the United States—has examined these processes.¹⁹ It found that adolescents who reported an unplanned pregnancy did not improve their contraceptive practices (in terms of both use of a method and the effectiveness of the method used) compared with teenagers who had not had an unplanned pregnancy. Moreover, the adolescents who had had an unplanned pregnancy were the least effective contraceptive users both before and after the pregnancy. Other studies have compared method use between women who had unintended births and those who had intended births,³⁻⁵ but did not consider women's prepregnancy practices and thus could not ascertain whether an unintended birth had induced a change in contraceptive behavior.

The novelty of the current study is its examination of the relationship between the last contraceptive method a woman used before she became pregnant and her first postpartum contraceptive method, and how this relationship differs between women who had an unintended birth and those who had an intended birth. Unlike previous research, this study uses nationally representative data and includes women of all reproductive ages to examine these processes, which is possible through the use of longitudinal contraceptive histories from DHS reproductive calendars. Thus, this is the first study to explore in a comprehensive manner whether the experience of an unintended birth is associated with change in contraceptive behavior.

The second contribution of this research is that it examines how the studied processes differed in two settings with distinct contraceptive method mixes and family planning contexts. In Colombia, the contraceptive method mix is dominated by modern, permanent methods; in Peru, traditional methods are most commonly used.²⁰ By examining whether the contraceptive use dynamic varies between countries with different method mixes, this study allows consideration of whether and how the findings might be related to the country's family planning policy and cultural setting.

This study examines two hypotheses. The first is that if unintended birth is associated with change in contraceptive practice through the mechanisms described above, women who report an unintended birth will be more likely than women who report an intended birth to switch methods after the birth—in particular, to more effective methods. The second hypothesis is that if barriers to contraceptive use persist or women's motivation to avoid future childbearing does not change following birth, women will remain poorer contraceptive users after an unintended birth than after an intended one. This could be reflected by lower levels of contraceptive use or by use of less effective methods.

Country Contexts

Although Colombia's contraceptive prevalence rate has steadily increased, the proportion of births reported as unintended rose from 36% to 52% between 1990 and 2010;²⁰ in Peru, the proportion of births that are unintended has been stable but is similarly high (around 55%).²⁰ One of the determinants of these high levels of unintended birth is that the growing preference for smaller families and the trend toward earlier initiation of sexual activity have not been accompanied by effective and consistent contraceptive use.^{21,22} In Colombia, contraceptive discontinuation has been a major factor in unintended childbearing;^{23,24} in Peru, unintended pregnancies have been predominantly the result of failure of traditional methods.²⁵

The prevalence of contraceptive use among women of reproductive age was 61% in Colombia in 2010 and 51% in Peru in 2012. Despite their broadly similar contraceptive prevalence rates, the two countries differ with respect to method mix. In Colombia, the family planning program initially focused on provision of the pill, barrier methods and the IUD; sterilization was not introduced until later, but the subsequent organization of mobile services facilitated the provision of this method to all parts of the country.²⁶ Sterilization has become Colombia's most popular method, used by 43% of reproductive-age women who are using contraceptives.²⁰ Other women report using the injectable (13%); long-acting reversible contraceptives (LARCs), namely the IUD and implant (14%); barrier methods, including condoms, diaphragm, foam and jelly (13%); the pill (11%); and traditional methods, notably withdrawal and periodic abstinence (7%).²⁰ The provision of contraceptives has been free of charge in Colombia since 1993, and all of the modern methods mentioned above are available as part of the social security system.²⁷

In Peru, family planning methods have been available free of charge since 1995, and are obtained mostly through the public sector.²⁰ The use of the injectable grew substantially between the 1990s and 2000s as its availability through the public health system increased.²⁸ However, the progress achieved by Peru's family planning program during the 1990s stalled in the early 2000s, when the country's conservative government reduced access to services,^{10,29} and use of modern contraceptives decreased.²⁸ This decline was accompanied by increased use of traditional methods (periodic abstinence and withdrawal),²⁸ which are currently the most commonly used methods (30% of reproductive-age women who are using a contraceptive rely on a traditional method).²⁰ The high level of traditional method use is due in part to their widespread use by indigenous groups, who constitute a large proportion of Peru's population. The most commonly used methods after traditional ones are the injectable (23%), barrier methods (20%), the pill (12%), sterilization (11%) and LARCs (4%).²⁰ These percentages indicate that the method mix is less diverse in Peru than in Colombia; notably, use of LARCs is very low in Peru. Moreover, fewer methods

were offered in Peru than in Colombia: The implant and monthly injectable* were not available as part of the public health care system until 2012.

METHODS

Data

This study used data from women aged 15–49 who had completed the 2010 Colombia DHS (53,521 women) or the 2012 Peru DHS (23,888 women). The two surveys included a reproductive calendar module in which women retrospectively reported their pregnancies, births and contraceptive use for each month during the five years prior to the survey. The current analysis was restricted to women who had given birth during the five years prior to the survey (14,521 women in Colombia and 8,000 in Peru); only women's last birth was considered in the analysis. The calendar data were integrated with women's maternity histories, which provided retrospective information about the intendedness of pregnancies resulting in births. A birth was classified as intended if the woman reported that she had wanted to become pregnant at the time of conception; if she reported that she had wanted to become pregnant later or not at all, the birth was classified as unintended. Only pregnancies that ended in live births were included in the analysis; those ending in abortion could not be examined because detailed information about pregnancy terminations were not available in the surveys.

A challenge in using DHS reproductive calendar data is left censoring and the resulting need to define the period of contraceptive use before pregnancy to compare individuals consistently. Because of the survey design, data on a woman's contraceptive history before pregnancy are limited to the interval starting at the beginning of the calendar. If a woman became pregnant before then, no information about her preconception contraceptive use is available. For the rest of women, the length of the contraceptive history before pregnancy differs depending on the timing of the pregnancy. If a pregnancy occurred because of contraceptive failure, then the last episode of contraceptive use is recorded in the reproductive calendar as having occurred one month before the pregnancy began. If a woman abandoned a method, then the last episode of use is recorded as having occurred a certain number of months before conception, and nonuse is recorded for subsequent months until pregnancy. Since the return to fecundity may take longer after abandonment of more effective methods (e.g., the injectable) than after less effective ones, the shorter the chosen observation period before pregnancy, the more likely it is that women who discontinued use of an effective method before the chosen cut-off would be classified as nonusers. On the other hand, the choice of a relatively long observation period (e.g., 12 months) would result in

*Prior to 2012, only three-month injections were available (source: Chávez S and Távora L, *El Derecho a la Planificación Familiar: Una Agenda Inconclusa en El Perú*, Lima, Peru: Centro de Promoción y Defensa de los Derechos Sexuales y Reproductivos, 2010).

the need to exclude an increasing number of women who lacked data because of left censoring.

In this study, contraceptive use before the woman's last pregnancy that ended in a live birth was defined as the last episode of method use (if any) during the five months before pregnancy. This time frame was used because previous research has found that the median time between cessation of contraception and pregnancy was less than five months for all method types.³⁰ Moreover, an analysis comparing various cut-offs found that the distribution of methods used before pregnancy according to effectiveness did not differ markedly between a cut-off of five months and a cut-off of 12 months;[†] however, differences were apparent for shorter periods, suggesting that use of a five-month prepregnancy observation period (but not a shorter one) is justifiable. In this study, use of a five-month observation period resulted in the exclusion of 1,148 women (8%) in Colombia and 575 women (7%) in Peru,[‡] yielding final samples of 13,373 and 7,425 women, respectively.

Contraceptive use after birth was defined as the first method initiated during the 12 months postpartum, in accordance with the World Health Organization's definition of the postpartum period.³¹ Change in contraceptive use behavior between the prepregnancy and postpartum periods was defined as a switch in methods by effectiveness level or a change from nonuse to use of a method (or vice versa). Contraceptive use was classified into four categories according to increasing level of effectiveness: nonuse; use of traditional methods (withdrawal, periodic abstinence) or barrier methods (male and female condom, diaphragm, foam, jelly); use of the pill or injectable (which have high perfect-use efficacy rates but lower typical-use effectiveness rates); and use of long-acting or permanent methods (the IUD or implant before pregnancy, and the IUD, implant or sterilization after the birth). Unlike other methods, those in the last category, once initiated, do not require further action from the user.[§]³²

As explained earlier, the last episode of method use before pregnancy might have ended in contraceptive failure or method abandonment. This study did not distinguish between these two events, but aimed to capture both of them, as both can lead to unintended pregnancy. Although differentiating between abandonment and

failure would have been of interest, such disaggregation was not feasible because of sample size limitations.

Analyses

Women were followed from their last birth until the moment they start using a contraceptive method, or until the end of the postpartum period if they did not initiate any method. Women who had given birth less than 12 months before the survey were censored at the month when they completed the survey, if they had not started using a contraceptive by that time; survival analysis was used to account for right censoring.

The first step of the analysis was to calculate transition matrices to show the distribution of the first contraceptive method women used after birth, by the type of the last method used before pregnancy, according to birth intendedness. For that purpose, multiple-decrement life tables were used. The results are presented in the form of tables that show the cumulative proportion of women who began using a given type of method within 12 months postpartum, by the type of method used before pregnancy.

Next, discrete-time competing-risk hazard models were used to examine whether the risk of initiating a method in a given category after birth was associated with the category of method use before pregnancy, and whether this relationship differed by whether the birth had been intended. These analyses controlled for covariates and, unlike the transition matrices, permitted examination of whether the differences in contraceptive use dynamics by birth intendedness were statistically significant. The outcome in this multinomial logistic regression was a categorical variable consisting of the four postpartum method categories, as specified earlier. Time was included as a dummy variable in the model and was measured as a month of the postpartum period. For that reason the discrete-time approach was used, which also allowed for the straightforward inclusion of time-varying covariates. The main explanatory variables in the model were the type of contraceptive used before pregnancy (a four-category variable), birth intendedness (a binary variable) and a term for interactions between these two variables. The results are presented in the form of relative risk ratios, which show the difference between the birth intendedness groups in the risk of initiating a given type of method compared with not initiating any method postpartum, by the type of method used before pregnancy. The inclusion of the interaction term allowed calculation of relative risk ratios for all categories of the variable describing prepregnancy contraceptive use.

The regression models also controlled for variables that are known to be associated with unintended pregnancy and contraceptive use. The socioeconomic and demographic characteristics included in the models as time-invariant covariates were household wealth (categorized as quintiles according to household ownership of certain

[†]Twelve months was considered to be a reasonable maximum cut-off, as the one-year pregnancy rates following cessation of pill, injectable, implant or IUD use are similar to that during nonuse (source: reference 30). Consequently, in the absence of fertility problems, sexually active women who stop using a method are likely to become pregnant within a year.

[‡]There were no discernible differences in socioeconomic and demographic characteristics between these women, the women selected for the study and the total sample. Moreover, there are no obvious reasons why these subgroups of women should be systematically different. Therefore, the selection process should not have caused any serious bias in the analysis.

[§]Because the use of lactational amenorrhea (LAM) is low in both countries, it was not considered a separate contraceptive method in the analysis. Different ways of classifying LAM users were explored, and the study's main results did not differ depending on how the users of LAM were treated in the analyses.

assets and characteristics of the dwelling), region,** place of residence (urban or rural), education level (none, primary, secondary or more than secondary), ethnicity,†† age at birth (<20, 20–29, 30–39 or 40–49), birth order (1, 2, 3, or ≥4), union status (never in union, married, cohabiting, formerly in union/not living together), whether the birth was singleton or multiple, preceding birth interval (<18, 18–36 or >36 months)‡‡ and time since delivery (in months). Time-varying variables capturing women's postpartum behavior were breast-feeding status (whether a woman had breast-fed in a given month), sexual activity (whether a woman was sexually active in a given month) and whether a woman was amenorrheic.

Separate models were fit for Colombia and Peru. The models were identical, with one exception. Because use of the IUD, implant and sterilization after a woman's last birth was very low in Peru, these methods could not be included in the competing risks model. Peruvian women who used these methods (5% of the sample) were included in the transition matrices analysis, but excluded from the multivariate analysis. Compared with the rest of the sample, these women tended to be older and better educated, and were more likely to live in wealthy households and speak Spanish; the possible impact of their exclusion is explored in the Discussion. Consequently, in the description of the results of the multivariate analysis, the IUD, implant and sterilization are referred to as the most effective methods in Colombia, while the pill and injectable are considered the most effective methods in Peru.

RESULTS

Descriptive Statistics

Fifty-five percent of women in Colombia indicated that their last birth had been unintended (Table 1); in Peru, the proportion was 57%. In both countries, intendedness was associated with women's demographic and socio-economic characteristics. For example, the proportion of births that were unintended declined as women's educational attainment increased; in Colombia, the proportion ranged from 63% among women with no education to 42% among those with more than a secondary education, while in Peru it ranged from 73% among women with no education to 47% among women with more than a secondary education. Moreover, in both countries, women's likelihood of reporting an unintended birth tended to be higher if they belonged to an indigenous group, lived in a less affluent household, resided in a rural area, were single or had a short preceding birth interval. The youngest and the oldest women, and those with higher parities, tended

to experience unintended births more often than other women.

Transition matrices show that the pattern of method change between the pre- and postpartum periods was more pronounced among women who reported an unintended birth than among women who reported an intended birth, albeit only for women who had used contraceptives before pregnancy (Table 2). In Colombia, this was reflected in three broad patterns. First, the proportion of women who returned to the same method tended to be smaller after

TABLE 1. Percentage distribution of women aged 15–49 in analytic samples, by selected characteristics; and percentage of births in analyses reported as unintended by women with specified characteristics, 2010 Colombia DHS and 2012 Peru DHS

Characteristic	Colombia (N=13,373)		Peru (N=7,425)	
	% of women	% of births unintended	% of women	% of births unintended
Birth intendedness				
Intended	45.4	na	42.8	na
Unintended	54.7	na	57.2	na
Education				
None	2.5	62.5	3.3	72.9
Primary	28.3	60.4	30.7	62.5
Secondary	52.4	55.4	44.1	57.4
>secondary	16.9	41.6	21.9	46.8
Ethnicity				
Indigenous language speaker	na	na	12.3	68.9
Spanish speaker	na	na	87.7	55.5
Native Colombian	13.6	61.7	na	na
Black	11.2	59.0	na	na
Other	75.2	52.7	na	na
Wealth quintile				
Poorest	34.0	61.1	27.4	65.6
Poorer	26.8	54.5	27.5	60.2
Middle	19.4	53.5	21.2	51.4
Richer	12.3	46.9	14.9	50.9
Richest	7.5	41.6	8.9	46.3
Residence				
Urban	65.8	52.1	59.0	53.4
Rural	34.2	59.5	41.0	62.6
Union status				
Never in union	10.7	72.5	6.2	75.8
Married	17.6	40.1	25.4	54.3
Cohabiting	56.5	53.7	60.2	55.7
Formerly in union/not living together	15.2	62.3	8.3	62.9
Preceding birth interval (in mos.)				
<18	11.2	73.7	9.6	72.8
18–36	30.1	69.5	29.9	68.3
>36	58.6	43.4	60.5	49.2
Age at birth				
<20	22.8	66.1	15.5	68.9
20–29	50.8	52.4	47.3	54.7
30–39	23.3	47.5	32.1	53.3
40–49	3.1	61.2	5.1	67.9
Birth order				
1	37.4	49.7	32.1	52.0
2	28.5	47.2	26.7	47.6
3	16.2	61.5	17.3	57.4
≥4	17.9	70.7	24.0	74.5
Total	100.0	na	100.0	na

***p<.001 for differences across subgroups. Notes: DHS=Demographic and Health Survey. na=not applicable.

**In Peru, they were Lima Metropolitana, Resto Costa, Sierra and Selva; in Colombia, they were Atlantica, Oriental, Central, Pacifica, Bogota and Territorios Nacionales.

††For Peru, women were categorized as Spanish speakers or indigenous language speakers; for Colombia, they were classified as Native Colombian, Black or other.

‡‡For women with no prior births, the preceding birth interval denoted the time from first sex to first birth.

TABLE 2. Percentage distribution of women by contraceptive method used before last birth; and percentage distribution of women by first contraceptive method used postpartum, according to method used before birth—all by birth intendedness, 2010 Colombia DHS

Method used before last birth	% of women	% of women using method postpartum				
		None	Traditional/barrier	Pill/injectable	IUD/implant/sterilization	Total
INTENDED BIRTHS						
None	59.6	20.9	18.7	36.1	24.2	100.0
Traditional/barrier	15.9	12.7	43.3	22.4	21.5	100.0
Pill/injectable	20.2	9.6	14.7	50.6	25.2	100.0
IUD/implant	4.3	8.5	10.4	23.1	58.0	100.0
All	na	16.8	21.4	36.4	25.4	100.0
UNINTENDED BIRTHS						
None	49.3	30.3	13.7	32.1	24.0	100.0
Traditional/barrier	22.6	14.5	32.8	27.8	24.9	100.0
Pill/injectable	25.3	11.8	14.4	41.0	32.8	100.0
IUD/implant	2.9	11.7	14.4	24.5	49.3	100.0
All	na	21.5	18.1	33.2	27.1	100.0
Total	100.0	na	na	na	na	na

Notes: Percentages may not total 100.0 because of rounding. DHS=Demographic and Health Survey. na=not applicable.

TABLE 3. Percentage distribution of women by contraceptive method used before last birth; and percentage distribution of women by first contraceptive method used postpartum, according to method used before birth—all by birth intendedness, 2012 Peru DHS

Method used before last birth	% of women	% of women using method postpartum				
		None	Traditional/barrier	Pill/injectable	IUD/implant/sterilization	Total
INTENDED BIRTHS						
None	52.8	18.6	32.2	44.5	4.8	100.0
Traditional/barrier	31.6	12.9	59.3	23.3	4.4	100.0
Pill/injectable	14.9	6.7	21.1	67.5	4.7	100.0
IUD/implant	0.8	8.3	25.0	41.7	25.0	100.0
All	na	15.0	38.8	41.4	4.8	100.0
UNINTENDED BIRTHS						
None	30.3	26.3	21.5	46.5	5.7	100.0
Traditional/barrier	49.3	16.2	43.0	35.8	5.0	100.0
Pill/injectable	20.1	10.6	22.5	58.4	8.4	100.0
IUD/implant	0.4	8.3	41.7	50.0	0.0	100.0
All	na	18.2	32.3	43.7	5.9	100.0
Total	100.0	na	na	na	na	na

Notes: Percentages may not total 100.0 because of rounding. DHS=Demographic and Health Survey. na=not applicable.

an unintended birth than an intended one. For example, among women who had used the pill or injectable before pregnancy, 41% of those who had had an unintended birth resumed using these methods postpartum, compared with 51% of those who had had an intended birth.

Second, women who had used one of the least effective methods (traditional or barrier) or a moderately effective method (pill or injectable) tended to switch to a more effective method more frequently if their birth had been unintended. For instance, among women who had used traditional or barrier methods, 28% of those with an unintended birth switched to the pill or injectable, compared with 22% of women with an intended birth.

Finally, women who had used one of the most effective methods before pregnancy (IUD or implant) had a

greater tendency to use a less effective method after an unintended birth than after an intended one. Specifically, relative to their counterparts with an intended birth, LARC users who had had an unintended birth had a greater tendency to discontinue contraceptive use (12% vs. 9%), or to switch to a traditional or barrier method (14% vs. 10%) or to the pill or injectable (25% vs. 23%). Overall, 51% of LARC users who had had an unintended birth switched to a less effective method, compared with 42% of those who had had an intended birth.

The pattern of method change seen among women who had been using contraceptives before an unintended pregnancy was less evident among women who had not been using a method. That is, among nonusers, the tendency to change their behavior (in this case, to initiate a method) was less pronounced among women with an unintended birth than among those with an intended birth—the opposite of the pattern seen among prepartum contraceptive users. Although about a quarter of nonusers started using a LARC or sterilization postpartum, regardless of whether their birth had been intended, nonusers who had had an unintended birth had a lower tendency to use traditional or barrier methods (14% vs. 19%) or the pill or injectable (32% vs. 36%) relative to their counterparts with an intended birth.

The patterns observed in the transition matrices for Colombia were broadly similar to those for Peru (Table 3). It is important to note that almost half (49%) of women who reported an unintended birth in Peru had used a traditional or barrier method before pregnancy. Moreover, the use of the most effective methods (IUD, implant and sterilization) was negligible both pre- and postpartum.

A particularly striking feature of the pattern observed in Peru is that none of the women who had been using an IUD or implant before an unintended pregnancy used these methods or sterilization postpartum. This result needs to be interpreted with caution, however, given the very small proportion of women who used these methods.

Lastly, in Peru, as in Colombia, the proportion of nonusers who changed their contraceptive practices tended to be smaller among those with an unintended birth than among those with an intended birth. Notably, 26% of nonusers with an unintended birth continued not using a method, compared with 19% of those with an intended birth, and only 22% switched to a traditional or barrier method, compared with 32% of those with an intended birth.

Multivariate Findings

In competing risk hazard models that controlled for covariates, the type of method women used before pregnancy was associated with the type they used after birth (Table 4). In both countries, the risk that a woman would use a method in a particular category, rather than no method, after a birth was highest if she had been using a method in the same category before she became pregnant. That is, the values of relative risk ratios for a given category

of postpartum contraceptive method (e.g., traditional/barrier methods) are always the highest for the prepartum contraceptive method of the same category. In likelihood ratio tests, terms for interaction between the prepregnancy method use and birth intentions status were statistically significant.^{§§}

The results of regression analyses that examined whether the relationship between preconception and postpartum contraceptive use differed by birth intendedness confirm the patterns observed in the transition matrices among women who had used a method before pregnancy (Table 5). That is, after taking covariates into account, women who had been using a method of lower or moderate effectiveness before pregnancy were more likely to switch to a more effective method postpartum if the birth had been unintended rather than intended. In Colombia, for example, women who had been using a traditional or barrier method before they became pregnant had a higher risk of using the pill or injectable, rather than using no method, if the pregnancy had been unintended rather than intended (relative risk ratio, 1.3). Moreover, after an unintended birth that followed the use of the pill or injectable, Colombian women had a reduced risk of returning to those methods postpartum (0.8) and an elevated risk of adopting the IUD, implant or sterilization (1.2) rather than using no method, as compared with women who had had intended birth. In addition, women who had used a highly effective long-acting method (IUD or implant) before pregnancy were less likely to resume using them or to turn to sterilization postpartum, rather than using no method, if the birth had been unintended rather than intended (0.7).

Finally, the risk that Colombian women who had not used any method before their birth initiated use of a moderately or highly effective method did not differ between those with an unintended birth and those with an intended birth. However, women had a reduced risk of starting a traditional or barrier method, rather than not using a method postpartum, if the birth had been unintended rather than intended (0.8).

In Peru, the patterns of change were broadly similar (Table 6). Women who had used a traditional or barrier method before their pregnancy had a reduced risk of returning to one of those methods after the birth (0.8) and an elevated risk of initiating use of the pill or injectable (1.6) relative to using no method if the birth had been unintended rather than intended. Moreover, prepregnancy users of the country's most effective methods (pill and injectable) were less likely to use those methods postpartum, rather than to not use a method, if the resulting birth had been unintended rather than intended (0.8). Finally, among women who had not been using a method before pregnancy, postpartum use of the pill or injectable did not differ by birth intendedness, but women were less likely to

adopt a traditional or barrier method postpartum, rather than to use no method, if the birth had been unintended as opposed to intended (0.7).

TABLE 4. Relative risk ratios from competing risk hazard models assessing associations between selected measures and postpartum contraceptive initiation, by method category and country

Measure	Traditional/ barrier vs. nonuse		Pill/injectable vs. nonuse		IUD/implant/ sterilization vs. nonuse	
	Colombia	Peru	Colombia	Peru	Colombia	Peru
Birth intendedness						
Intended (ref)	1.00	1.00	1.00	1.00	1.00	na
Unintended	0.82**	0.73**	0.91†	1.03	1.06	na
Method used before pregnancy						
None (ref)	1.00	1.00	1.00	1.00	1.00	na
Traditional/barrier	3.12***	2.17***	0.74***	0.60***	1.00	na
Pill/injectable	1.09	1.08	1.82***	2.12***	1.12	na
IUD/implant	0.91	na	1.19	na	2.33***	na
Interactions between birth intendedness and method used before pregnancy						
Unintended*none (ref)	1.00	1.00	1.00	1.00	1.00	na
Unintended*traditional/barrier	1.05	1.12	1.45***	1.57***	1.14	na
Unintended*pill/injectable	1.23†	1.31	0.88	0.78*	1.15	na
Unintended*IUD/implant	1.54	na	1.06	na	0.65*	na

*p<.05. **p<.01. ***p<.001. †p<.10. Notes: All models control for region and place of residence, education level, wealth quintile, ethnicity, age, parity, time since birth, whether birth was multiple, union status, preceding birth interval, sexual activity, breast-feeding status and amenorrhea. ref=reference group. na=not available.

TABLE 5. Relative risk ratios from competing risk hazard models examining associations of contraceptive method used before last birth and birth intendedness with method used after birth, Colombia

Method used before last birth	Birth intendedness	Method used after birth		
		Traditional/ barrier vs. none	Pill/injectable vs. none	IUD/implant/ sterilization vs. none
None	Intended (ref)	1.00	1.00	1.00
	Unintended	0.82**	0.91†	1.06
Traditional/barrier	Intended (ref)	1.00	1.00	1.00
	Unintended	0.86†	1.32**	1.21†
Pill/injectable	Intended (ref)	1.00	1.00	1.00
	Unintended	1.01	0.81**	1.22*
IUD/implant	Intended (ref)	1.00	1.00	1.00
	Unintended	1.27	0.97	0.69*

*p<.05. **p<.01. †p<.10. Note: ref=reference group.

TABLE 6. Relative risk ratios from competing risk hazard models examining associations of contraceptive method used before last birth and birth intendedness with method used after birth, Peru

Method used before last birth	Birth intendedness	Method used after birth	
		Traditional/barrier vs. none	Pill/injectable vs. none
None	Intended (ref)	1.00	1.00
	Unintended	0.73**	1.03
Traditional/barrier	Intended (ref)	1.00	1.00
	Unintended	0.82**	1.63***
Pill/injectable	Intended (ref)	1.00	1.00
	Unintended	0.96	0.81*

*p<.05. **p<.01. ***p<.001. Note: ref=reference group.

^{§§}The difference between the nested models with and without the interaction term was statistically significant at p<.001.

DISCUSSION

This study had four key findings. First, there was a tendency for women to continue using the same method after a birth that they had been using before their pregnancy, but the association was weaker among women whose birth had been unintended. In both Colombia and Peru, women who had been using a relatively less effective method tended to switch to a more effective method postpartum if their birth had been unintended. These results, which support the hypothesis that having an unintended birth is associated with change in contraceptive behavior in Colombia and Peru, differ from those of a U.S. study that found no association between unplanned pregnancy and contraceptive practice change among teenagers,¹⁹ and suggest that the pattern of change in high-income countries might not be generalizable to other settings.

The second notable finding is that women who had used the most effective contraceptives in each country's method mix were less likely to reinstate them postpartum if their birth had been unintended. This suggests that experience with a method before an unintended pregnancy might discourage postpartum use of the same method—even if the method is generally highly effective. It is possible that women who had used one of the most effective methods before having an unintended pregnancy had had a strong motivation to avoid pregnancy, but discontinued the method for some reason other than to become pregnant. Previous studies have found that short-acting hormonal methods and LARCs are discontinued mainly because of side effects and health concerns.²⁴ The occurrence of unintended pregnancies resulting from such discontinuation might reflect an unmet need for more information about the women's method-related concerns or indicate a need for a wider choice of methods.¹ In this study, the results suggest a need to strengthen postpartum family planning programs in Colombia and Peru. In both countries, antenatal visits and postpartum check-ups should be used as an opportunity to provide women with information to address any problems that had led to discontinuation of highly effective methods or to facilitate the choice of alternative methods, particularly among women who report an unintended pregnancy.

Third, comparison of Colombia and Peru provides insights into how contraceptive use dynamics can be similar, but also can differ, in two countries with different contraceptive method mixes and distinct family planning and cultural settings. Although the results for Peru and Colombia were broadly similar, transition matrices showed that a very small proportion of women in Peru used LARCs before or after pregnancy. As a result, it was not possible to include women who used these methods in the multivariate analysis, which is a limitation of this study. Nevertheless, none of the women in Peru who had used the IUD or implant before an unintended pregnancy returned to using them or chose sterilization postpartum. That this was not the case for Colombia suggests that a problem with method provision, accessibility

or information may have existed in Peru, perhaps related to the smaller range of methods available at the time of the survey in Peru compared with Colombia. However, the negligible use of highly effective methods in Peru might also be related to women's contraceptive preferences and the acceptability of these methods. In particular, this pattern may reflect the high level of use of the least effective methods by indigenous groups, which constitute a large proportion of Peru's population, and also reflect concerns stemming from accusations that the Peruvian government sterilized women without informed consent during the 1990s.²⁸

Lastly, although levels of method switching were generally higher after an unintended birth than after an intended one, many women went back to the same method after an unintended birth. From a programmatic perspective, this finding highlights that it is important for clinicians to understand and address the reasons women discontinued a method when providing family planning counseling and information. This could help ensure that the method is not discontinued again for the same reason, which would expose women to the risk of repeat unintended pregnancy or short interpregnancy intervals. Moreover, it is important to understand why, in both countries, women who did not use a contraceptive before their pregnancy were less likely to adopt a traditional or barrier method if their birth had been unintended. This reduced uptake of coital-dependent methods might be related to the fact that use of these methods depends on both women and their partners, and that some women might not be able to negotiate, for example, the use of condoms or withdrawal. Alternatively, these results might reflect women's or their partners' dislike of coital-dependent methods. These barriers and preferences might have persisted in spite of their having had an unintended birth. Because the DHS does not collect information about contraceptive preferences, the present analysis could not take into account desires related to postpartum method adoption, limiting the ability to cast light on this issue. This is a shortcoming of the analysis, as previous studies have found that discordance between women's postpartum contraceptive preferences and their actual method use can provide insight into barriers to fertility regulation.³³

This study has other limitations. It could not address causal relationships between unintended birth and changes in contraceptive use, as it explored the association between these two events. This fact does not compromise the objectives of the study or the importance of its findings. Moreover, retrospective reporting of birth intendedness is subject to *ex post* rationalization because of mothers' reluctance to consider their pregnancy as having been unwanted or their adaptation to the reality of having a new child.^{34,35} Because of insufficient information, more nuanced measures capturing additional dimensions of pregnancy intentions could not be used. Moreover, the study used the simplest definition of unintended childbearing; the complexity of the analysis and the prospect

of small sample sizes did not allow unintended births to be disaggregated into more detailed categories (e.g., mistimed and unwanted births). Further, although women's future childbearing intentions could be important in postpartum contraceptive uptake, they could not be included in the analysis. Although the DHS collects information on whether women would like to have children in the future, this information was not relevant to the current study because it refers to women's future intentions at the time of the survey, which might not reflect women's intentions right after their last birth.*† Finally, reproductive calendar data can be affected by recall problems. Nonetheless, prior work found that the reliability of calendar data collected in Latin American countries was reasonable.^{36,37}

Conclusion

In spite of these limitations, this study contributes to the small body of research about the dynamics of contraceptive use and sheds light on the determinants of postpartum contraceptive uptake. The results illustrate the importance of studying contraceptive behavior at more than one point in women's reproductive lives when attempting to better understand the contraceptive practices of women who have had an unintended pregnancy. In particular, it is vital to take into account women's past contraceptive practices when studying their postpartum method choices. Moreover, although retrospective measures of pregnancy intentions have limitations,^{15,34,35} the results of this study suggest that such intentions are strongly associated with postpartum contraceptive use. Both factors, but especially past contraceptive use, have been largely ignored in previous studies. Lastly, a novelty of the analysis was the use of detailed, longitudinal contraceptive histories from DHS reproductive calendars, which are well suited for this type of analysis, yet remain an underused source of data. More analyses for other countries with available calendar data could be conducted to examine whether the findings from this study can be generalized.

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RESUMEN

Contexto: Ningún estudio basado en historias anticonceptivas longitudinales ha investigado si tener un parto no planeado (es decir, resultante de un embarazo no planeado) se asocia con el cambio en el comportamiento en el uso de anticonceptivos, incluso en Colombia y Perú, en donde los niveles de fecundidad no planeada siguen siendo altos.

Métodos: Se utilizaron datos mensuales del calendario de historia reproductiva de las Encuestas Demográficas y de Salud de Colombia 2010 y de Perú 2012, para estudiar el

comportamiento anticonceptivo de 13,373 y 7,425 mujeres, respectivamente. Se utilizaron matrices de transición y modelos de riesgo para identificar las asociaciones entre los métodos anticonceptivos usados antes del embarazo y posparto, así como para evaluar la forma en que estas relaciones diferían entre las mujeres que reportaron haber tenido un parto no planeado y aquellas con un parto planeado.

Resultados: Las mujeres que habían estado usando un método hormonal tradicional, de barrera o (en Colombia) de corta duración antes del embarazo, tuvieron más probabilidades de elegir un método posparto más efectivo, en lugar de no usar ningún método, si su parto había sido no planeado en lugar de planeado (razones de riesgo relativo, 1.2–1.3 en Colombia; 1.6 en Perú). En comparación con sus contrapartes cuyo parto había sido planeado, las mujeres con un parto no planeado que habían estado utilizando los métodos más efectivos utilizados en el país (DIU o implante en Colombia, píldora o inyectable en Perú) tuvieron menos probabilidades de reanudar su uso que de no usar ningún método después del parto (0.7 en Colombia; 0.8 en Perú).

Conclusiones: El parto no planeado se asocia con un cambio en el comportamiento anticonceptivo. Los esfuerzos para comprender las decisiones anticonceptivas posparto de las mujeres que han tenido un parto no planeado deberían tener en cuenta el comportamiento anticonceptivo en más de un momento de la vida reproductiva de las mujeres.

RÉSUMÉ

Contexte: Aucune étude de données historiques longitudinales sur la contraception n'a cherché à établir si une naissance non planifiée (résultat d'une grossesse non planifiée) était associée à un changement de comportement contraceptif, y compris en Colombie et au Pérou où les niveaux de fécondité non planifiée restent élevés.

Méthodes: Les données de calendrier historique mensuel ayant trait à la reproduction, extraites des Enquêtes démographiques et de santé 2010 de Colombie et 2012 du Pérou, ont servi à l'étude du comportement contraceptif de 13 373 et 7 425 femmes, respectivement. Des tables de transition et des modèles de risque ont permis d'identifier les associations entre les méthodes contraceptives utilisées avant et après la grossesse, ainsi que d'évaluer la différence de ces rapports suivant que les femmes avaient déclaré une naissance non planifiée ou planifiée.

Résultats: Les femmes qui pratiquaient une méthode traditionnelle, barrière ou (en Colombie) hormonale à courte durée d'action avant la grossesse se sont révélées plus susceptibles d'en choisir une plus efficace (plutôt que de n'en utiliser aucune) après la naissance s'il s'agissait d'une naissance non planifiée (par rapport à planifiée) (rapports de risque relatif de 1,2–1,3 en Colombie; 1,6 au Pérou). Par rapport à leurs homologues qui avaient eu une naissance planifiée, les femmes dont la grossesse ne l'avait pas été et qui avaient pratiqué les méthodes les plus efficaces utilisées dans le pays (stérilet/DIU ou implant en Colombie, pilule ou injectable au Pérou)

étaient moins susceptibles d'en reprendre la pratique après la naissance que de n'utiliser aucune méthode (0,7 en Colombie; 0,8 au Pérou).

Conclusions: Les naissances non planifiées sont associées à un changement du comportement contraceptif. Les efforts déployés pour comprendre les choix contraceptifs post-partum des femmes qui ont eu une naissance non planifiée doivent tenir compte du comportement contraceptif à plus d'un moment de la vie reproductive des femmes.

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Author contact: batyra@sas.upenn.edu