Provider and Women Characteristics as Risk Factors for Postpartum Copper IUD Expulsion and Discontinuation in Nepal

CONTEXT: *Providers' and women's characteristics are associated with postpartum copper IUD (PPIUD) outcomes, but the relationship between providers' level of experience and PPIUD expulsion and discontinuation has not been established.*

METHODS: *Data on 1,232 women and 118 providers who took part in a randomized trial of a PPIUD counselling and provision intervention in Nepal between 2015 and 2017 were used to identify associations between providers' and women's characteristics and PPIUD outcomes. Multinomial logistic regression models were used to estimate PPIUD expulsion and discontinuation risks at two years after insertion.*

RESULTS: *Thirteen percent of women had had partial or complete expulsions and 29% had discontinued PPIUD use by two years. Having a provider who had done at least 10 previous insertions was associated with lower risk of expulsion rather than continuation (relative risk ratio, 0.5) relative to having a less-experienced provider. Women had a higher risk of both expulsion and discontinuation relative to continuation if they were younger than 21 rather than aged 26–30 (2.4 and 1.7, respectively) or if they belonged to the Dalit rather than Brahmin caste (2.2 and 1.9, respectively). Women whose husbands did not live at home also had elevated discontinuation risks.*

CONCLUSION: *The findings highlight the need for increased training and supervision of providers during their first 10 PPIUD insertions. Counselling on risk of expulsion may especially benefit younger and Dalit women, and should include partners and other family members to avoid any stigma surrounding PPIUD use by women whose partner is away from home for a prolonged period.*

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To reduce levels of the negative maternal, perinatal and neonatal outcomes of short pregnancy intervals, the World Health Organization (WHO) recommends that women wait at least two years following a live birth before attempting their next pregnancy.[1–3] Use of family planning services, particularly postpartum family planning services in low- and middle-income countries, is associated with better birth spacing and a reduction in maternal and child mortality and morbidity.[4,5] Despite the benefits of postpartum family planning, one in two women who give birth in Nepal have an unmet need for contraception within two years of the delivery, and only 9% of women receive family planning counselling during the postpartum period.[6–8] Additionally, 21% of births in Nepal in 2016 occurred within two years postpartum, further indicating that levels of unmet need for postpartum contraception in the country are high.[6]

Long-acting reversible contraceptives (LARCs), including the IUD, are effective in meeting this unmet need. Several studies have shown that immediate postpartum IUD (PPIUD) insertion–i.e., performed within 48 hours of a vaginal or cesarean delivery–is a safe, cost-effective and long-lasting (yet reversible) approach to family planning that can be easily made available to women delivering in health institutions.[9–11] In 2016, 57% of births in Nepal were delivered in health institutions, which makes immediate PPIUD insertion a feasible postpartum contraceptive option for many women, especially those who are not able to attend postnatal visits or obtain postnatal family planning services because of high costs or long travel distances.[6]

In Nepal, family planning services have been integrated into a reproductive health package and are free of charge to the entire population in public facilities.[12] Half of health facilities claim to offer LARCs, but only one in five provides IUDs and implants.[13] To increase women's access to health care, Nepal initiated an auxiliary nurse midwife program in 1997 that trains these providers to insert and remove IUDs.[14] Despite being highly effective, IUDs are used to a much smaller degree in Nepal than other modern methods of contraception; only 1.4% of married women of reproductive age reported IUD use in 2016, and 28% of IUD users discontinue the method within 12 months.[6] This low level of use may be linked to barriers to access.[8,9,11,15–20] Many women in rural areas do not have access to IUDs or other modern contraceptives because reproductive health facilities are typically situated in larger towns, far from small villages.[21] Other barriers include

provider bias (for example, clinicians may refrain from offering LARCs because of the additional time needed for provision), and providers' lack of skills in IUD counselling and insertion.[22] Woman-related barriers include insufficient knowledge of methods or services, and personal aversion to family planning due to rumors, secondhand reports of side effects or personal experience.[23]

In recent years, there have been efforts to increase PPIUD uptake in Nepal by integrating postpartum contraceptive counselling and PPIUD insertion services into maternity care.[8,24,25] One such intervention increased the proportion of women receiving contraceptive counselling during the antenatal period by 25 percentage points, and PPIUD uptake itself increased an average of 4.4 percentage points.[8]

Previous studies have highlighted the small number of staff who are trained in PPIUD provision in Nepal compared with other low-income countries.[8,26] Nepal has a low provider-to-client ratio,[14] which limits the pool of providers who can receive PPIUD service training. Yet the importance of training and mentoring PPIUD providers in Nepal has been documented; providers report an increase in PPIUD-related knowledge, clinical skills, confidence, motivation, job satisfaction and professional development after receiving PPIUD training and mentoring.[27] However, broader issues in the Nepali health system—including high workload and lack of support from senior staff—remain barriers to high-quality service provision and training.[20]

From May 2014 to September 2017, more than 36,000 PPIUDs (copper IUDs inserted within 48 hours postpartum) were provided under the International Federation of Gynecology and Obstetrics (FIGO) PPIUD initiative in 48 hospitals in six countries: Bangladesh, India, Kenya, Nepal, Sri Lanka and Tanzania.[24] A study that compared PPIUD outcomes in these countries at six weeks after insertion found that women in Nepal had higher rates of expulsion (3.9% vs. 2.5%) and discontinuation (7.4% vs. 3.6%) than did women in the six countries as a whole.[26] Expulsion of PPIUDs is influenced by the type of delivery (vaginal versus cesarean), the physical placement of the IUD and the length of time between the birth and the insertion;[28] for example, two studies of the Copper T 380A IUD found that expulsion rates were lower for postplacental insertion (within 10 minutes of the birth) than for early postpartum insertion (at least 10 minutes but less than 72 hours after delivery).[29,30] However, a study of the same type of IUD found lower expulsion rates at six-week follow-up for insertions done within 10 minutes of vaginal delivery than for insertions done later but within 48 hours,[26] and another analysis revealed no significant difference in the rate of complete expulsion between postplacental (≤10 minutes) PPIUD insertion and immediate (>10 minutes) PPIUD insertion.[31] Moreover, expulsion rates for the copper IUD were lower for immediate insertion following a cesarean section than for insertion following a vaginal birth.[9,32] Additionally, one analysis found that the risk of expulsion was lower if the IUD was placed sufficiently

high in the uterine fundus and inserted by a trained health provider,[33] and another study found that the expulsion risk for copper IUDs was positively associated with parity, provision by an obstetrician (rather than a family medicine physician) and normal (vs. excess) gestational weight gain.[34]

Several studies, including one that analyzed early discontinuation of copper IUDs, have shown that the main reasons for IUD discontinuation in Nepal are expulsion and side effects (e.g., heavy bleeding during menstruation, nausea, and back and abdominal pain).[35–37] Other factors are largely socioeconomic and sociocultural. Women's characteristics—such as being older than 25, being a housewife and not having used any contraceptive before the IUD insertion—have been linked to discontinuation in Nepal and elsewhere.[38] A study in Nepal found that lack of support from husbands or in-laws was the main reason for discontinuation among women who had had a copper IUD inserted within 48 hours of delivery.[36] Other work in Nepal has found discrimination at health facilities based on patients' caste, ethnicity or religion, including discrimination against Muslims, members of Madhesi castes, and Dalits (so-called "untouchables");[37,39,40] reluctance to touch Dalits, for example, led providers to take less interest in these patients and perform fewer physical examinations. It is not clear whether such biases affect PPIUD uptake or outcomes; although a small study of 230 women found no relationship between ethnicity or religion and IUD discontinuation within 12 months,[37] no large-scale study has examined IUD discontinuation by religion, ethnicity and caste, though some studies have found that Dalit women are less likely to use modern contraceptives than women who belong to the Brahmin and Chhetri (higher) castes.

Other work has found that a partner's disapproval of family planning and women's dissatisfaction with their method are reasons for discontinuation of copper IUDs in Ghana,[41] and that fear of and attitudes toward the copper IUD in the local community influence discontinuation of IUDs in Malawi.[42] The type of delivery before insertion also matters, because correct placement of the IUD may be easier after a cesarean delivery than a vaginal one. In a U.S. study, the likelihood of PPIUD continuation was higher among women who had had a cesarean section than among those who had had a vaginal delivery.[43]

However, little is known about the potential relationship between health provider characteristics and IUD discontinuation and expulsion, although the quality of PPIUD counselling has been highlighted in qualitative studies as a factor influencing discontinuation.[20,36,38,42] Studies that examined provider characteristics have focused on the type of provider but have lacked a direct measurement of the providers' level of experience in PPIUD provision,[26,44] and the duration of follow-up has been short—typically six weeks or one year. The current study is novel in that it examined in detail the association between health providers' PPIUD service experience and the discontinuation

and expulsion of the device, and that it assessed discontinuation and expulsion for two years after insertion.

METHODS
Background
Data from this study were collected as part of an intervention that was designed and implemented by FIGO in collaboration with the Nepal Society of Obstetricians and Gynecologists and the Nepal Ministry of Health and Population (MoHP), and that sought to institutionalize PPIUD provision as part of delivery service. The details of the intervention are provided elsewhere;[8] briefly, the intervention included training in postpartum family planning counselling for female community health volunteers and hospital staff; training in PPIUD insertion and management of complications for maternity care providers; and provision by the MoHP of free nonhormonal copper IUDs to women and of Kelly forceps for vaginal PPIUD insertion to hospitals. In addition, pregnant women were to receive counselling on postpartum contraceptive methods during antenatal care visits, after being admitted for delivery (but before discharge), or both. During counselling, women were asked whether they desired PPIUD insertion; those who did were provided with the method within 48 hours after delivery. No incentive was provided for women to request a PPIUD.

The intervention was evaluated in a cluster-randomized, stepped-wedge trial (registered on ClinicalTrials.gov with identifier NCT02718222) whose protocol has been published previously.[25] The evaluation took place in six tertiary-level hospitals with high obstetric caseloads; details on inclusion criteria and on the location of study hospitals are available elsewhere.[8] Data were collected on both women and maternity care providers. Women were eligible to participate in the study if they gave birth in study hospitals between September 8, 2015, and March 8, 2017, and their primary residence was in Nepal. In total, 75,617 women were eligible for the study, of whom 75,571 (99.9%) consented to participate. Enrolled women received follow-up visits at one year and two years postpartum; those with a PPIUD insertion had an additional follow-up at two months postpartum to check the IUD's status. In addition, all providers working in the obstetrics and gynecology department of the study hospitals were interviewed before the intervention was implemented and twice afterward, at 6–10 months and 24 months. All interviewed providers received intervention training; in total, 220 providers participated in the study.

Ethical approval for the study was provided by the Nepal Health Research Council. The Harvard T.H. Chan School of Public Health did not require approval because the Harvard research team received only deidentified data.

Data Collection and Analytic Sample
Interviews with women were conducted by a team of 26 trained female interviewers, while those with providers were conducted by three senior-level enumerators who had master's degrees. In most cases, the same interviewers carried out the baseline and follow-up interviews with women and providers.

Questionnaires were developed in English and then translated into Nepali. The women's questionnaire was pretested among 20 women, and the provider's questionnaire among five providers at a public hospital in Kathmandu that was not part of the intervention; any necessary modifications were made before implementation. Both questionnaires were programmed into the CommCare data collection app.

The baseline women's questionnaire, which was administered in postnatal wards after delivery but before discharge, contained questions on women's demographic characteristics, latest birth, birth history, family planning counselling, and PPIUD-specific counselling and insertion. The questionnaire also included questions for providers to verify a PPIUD insertion if a woman reported receiving a PPIUD. In total, 1,545 women opted for a PPIUD, and 152 providers performed the insertions.

Women who received a PPIUD were reinterviewed by enumerators at the study hospitals when they returned for a two-month check-up. Women were interviewed by phone, using a similar questionnaire, if they were not able to have an in-person interview. The two-month questionnaire contained questions on women's PPIUD status (continuation, discontinuation or expulsion), as well as their satisfaction with and complaints about the PPIUD and any complications they had experienced. PPIUD status was confirmed through a medical exam by a health care provider; enumerators recorded women's PPIUD status on the basis of the exam results. For phone interviews, enumerators asked women for PPIUD exam results if the women had already had the exam. Of the 1,545 women who had a PPIUD inserted, 1,420 (92%) completed the two-month follow-up; 1,217 were interviewed in person and 203 via telephone. The mean time of the first follow-up was 2.1 months after baseline (standard deviation, 2.2 months).

Similar follow-up questionnaires were administered at each woman's home at one year and two years postpartum. The questions asked about women's births, pregnancies and terminations since the baseline interview; current contraceptive use; contraceptive switching and discontinuation since baseline; and fertility preferences. Of the 1,545 women who had a PPIUD insertion, 1,345 (87%) were interviewed at two months, one year and two years postpartum. The mean time since baseline was 11.9 months (standard deviation, 2.2 months) for the one-year follow-up, and 21.7 months (standard deviation, 2.6 months) for the two-year follow-up.

The providers' questionnaire included questions about their demographic background, education, clinical designation, and PPIUD training, knowledge, attitudes and practice. Enumerators interviewed providers in person at the study hospitals. A total of 146 providers were interviewed

at baseline. Follow-up interviews were conducted in person at six months with 202 providers (of whom 128 had been interviewed at baseline, and 74 had transferred to the obstetrics and gynecology department after baseline), and at 24 months with 176 providers (all of whom had been interviewed at baseline, at six months or both).

Researchers at the Center for Research on Environment, Health and Population Activities (CREHPA) merged the women's and providers' data sets, and shared them with the Harvard researchers after removing identifying information. The merged data set was used for this study.

For the current analysis, we excluded 125 women who were lost to follow-up at any wave after baseline, 24 women whose PPIUD status could not be ascertained at two years postpartum, and 164 women for whom information on their own or their providers' characteristics was missing. The final sample consisted of 1,232 women and the 118 providers who performed their PPIUD insertions.

Measures

•*Outcome.* The outcome of interest was women's PPIUD status—continuation, discontinuation or expulsion—at two years postpartum, although we present outcomes for all three rounds of follow-up. At the two-month follow-up, women received a medical exam to check if the IUD was in place, including a speculum exam to assess the presence of the IUD thread. If the IUD's presence could not be confirmed by checking for the thread, or if the woman or provider were uncertain about its presence, an ultrasound exam was conducted (22% of women). Enumerators identified women's PPIUD status through four questions: "Has your PPIUD been deliberately removed?"; "Do you have any complaints regarding PPIUD"; "What are these complaints?" and (in reference to the exam results) "Was the PPIUD present and in place?" We coded PPIUD status as "discontinuation" if the IUD had been deliberately removed, including at the woman's request during the examination. We coded PPIUD status as "expulsion" if the woman reported seeing the IUD expelled, if the examination revealed no evidence of the IUD or if the examiner found that the IUD was in the wrong place (e.g., instead of being in its intended position at the top of the uterus, it had rotated on its axis or its arms had become embedded in or even perforated the uterine wall). We considered PPIUD displacement as an expulsion—specifically, a partial expulsion—because like a complete expulsion, a partial expulsion is a complication of PPIUD insertion and can increase the risk of unintended pregnancies.

The questions regarding PPIUD status were similar at the one-year and two-year follow-up surveys. For example, women were asked "At any point after you received the PPIUD, was the PPIUD expelled (fell out without being intentionally removed)?" and "At any point after you received the PPIUD, was the PPIUD deliberately removed at your request?" We coded women's PPIUD status as expulsion or discontinuation on the basis of women's responses to those two questions.

We coded women's PPIUD status at two years postpartum as expulsion if their status was categorized as expulsion at any round of follow-up during two-year postpartum period. We defined discontinuation at two years postpartum in a similar way. At the two-year follow-up survey, women were asked about their current contraceptive method. We coded women's status as "continuation" if they reported currently using PPIUD.

•*Independent variables.* We used three kinds of independent variables in our statistical model: providers' characteristics, insertion characteristics and women's characteristics. We were interested in the relationship between providers' PPIUD insertion experience and women's PPIUD outcomes, and used the number of PPIUD insertions the provider had done in the past as an indicator of their level of experience. Since the study team interviewed all women with a PPIUD insertion in the six study hospitals during the 18-month enrollment period, we can calculate the prior number of PPIUD insertions for each provider based on women's time of delivery. Providers were given a certificate issued by the National Training Center of the MoHP after completing 10 PPIUD insertions, and we categorized providers' PPIUD insertion experience as a binary variable—fewer than 10 insertions versus 10 or more insertions. We also included measures of other provider characteristics, including age, sex, designation (obstetrician-gynecologist, medical officer or nurse), years of experience in current designation and average hours worked per week. This study also measured providers' levels of comfort in performing PPIUD counselling, insertion and removal. For each of these domains, providers indicated whether they felt "comfortable," "not comfortable," or "neutral" in providing the service. We also included a PPIUD knowledge index that was based on responses to four questions that asked respondents to indicate (from a list of possible answers) the chance that a woman using a copper IUD can get pregnant (the correct answer was "less than 1%"), the length of time that a woman can continually use the same copper IUD without having it removed (the correct answer was "12 years"), how soon a woman can get pregnant once her copper IUD is removed (the correct answer was "immediately") and whether an IUD can protect against STIs (the correct answer was "no"). Providers received one point for each correct answer; total scores thus ranged from 0 to 4, with a higher score indicating better knowledge of PPIUD.

The remaining providers' characteristics were whether the providers delivered family planning counselling or PPIUD counselling, whether they had received supervision on PPIUD insertion services in the past 12 months, and whether they had received training on PPIUD counselling or insertion from the Nepal Society of Obstetricians and Gynecologists. Since the providers' characteristics (except for sex) were time varying, we took advantage of having three waves of survey data and used the provider's characteristic at the earliest available wave after the PPIUD insertion.

Insertion characteristics included in our model were timing of PPIUD insertion (during cesarean section or less than 10 minutes after a vaginal delivery vs. at least 10 minutes but less than 48 hours after a vaginal delivery) and type of delivery (vaginal versus cesarean section). This information was reported by women's PPIUD providers in a section for providers on women's baseline questionnaire.

Analyses also accounted for women's characteristics at the time of insertion, including age, education, ethnicity, total number of living children, having at least one male child, having at least one deceased child, having had an abortion and whether the woman was living with a husband or partner. All of these characteristics were measured at baseline except for living with a husband or partner, information on which was available only at the one-year and two-year follow-up surveys. The one-year survey also asked women how many months their husband had been away from home at the time of interview; we classified the husband as being away from home if he had been away for at least one month.

•*Other measures.* We used a measure indicating whether women had checked the status of their IUD. This information was available only for the two-month follow-up, and was ascertained with a question asking women whether they could feel the IUD thread. To investigate reasons for discontinuation, we asked the question, "What was your main reason for getting the PPIUD removed?" This question was asked in all three follow-up surveys.

Statistical Analysis

Because the outcome of interest—women's PPIUD status at two years postpartum—has three categories (expulsion, discontinuation or continuation), we used multinomial logistic regression for our analysis, with PPIUD continuation as the reference category. This approach has advantages over analyzing expulsion and discontinuation as binary outcomes in separate regressions, since the latter approach does not consider the competing risk of the third possible outcome.

Each observation in our data set represents a PPIUD insertion. Therefore, the same provider may appear multiple times in the data set, and the provider characteristics we report are the average characteristics by insertion rather than the simple average over all providers.

We included providers' characteristics, insertion characteristics and women's characteristics in one model, and controlled for hospital and month fixed effects to account for differences between hospitals and any underlying time trends. The error terms for PPIUD status among women who received a PPIUD insertion from the same provider are likely to be correlated due to unobserved providers' characteristics; because the study sample comprised 118 providers, we clustered the standard errors for 118 clusters. We report relative risks ratios and their 95% confidence intervals. Statistical significance was assessed using two-tailed tests; no prior or post hoc power analysis was performed. All analyses were performed using Stata SE version 15.1.

RESULTS
Descriptive Findings

One-third of women had their PPIUD inserted by a provider who had performed 10 or more previous insertions (Table 1). On average, insertions were performed by providers who had done 8.7 previous procedures (range, 0–42). Most insertions were done by a nurse. More than three-quarters of providers reported that they were comfortable with performing PPIUD counselling and insertion, but a slightly smaller proportion was comfortable with PPIUD removal. Most insertions were completed less than 10 minutes after delivery (76%), and most deliveries were vaginal (72%).

The majority of women who received a PPIUD were aged 25 or younger. Slightly more than one-fourth (28%) had more than a secondary education; about one in nine (11%) had no education. More than one-third of women (36%) were of Brahmin or Chhetri ethnicity, while a similar proportion belong to the Janajati indigenous group. Approximately 14% of women had husbands who were away from home at the one-year follow-up.

Table 2 shows cumulative levels of PPIUD outcomes at the two-month, one-year and two-year follow-ups. Rates of expulsion and discontinuation were, respectively, 2.6 and 10.1 percentage points higher at one-year follow-up than at the two-month follow-up, and 1.4 and 8.6 percentage points higher at the two-year follow-up than at the one-year follow-up. Overall, rates of expulsion increased from 8.5% to 12.5% between the two-month and two-year follow-ups, and rates of discontinuation increased from 10% to 29%. Nearly three-fifths (59%) of women were continuing to use PPIUD at the two-year follow-up.

At the time of two-month follow-up, 80 women reported that they were not able to feel the IUD thread; subsequent examination revealed that 48 of them (60%) had experienced an expulsion (not shown). Among the 354 women who discontinued PPIUD, 23% reported that the main reason was heavy menstrual bleeding; only seven (2%) discontinued because they wanted another child.

Multivariate Findings

Compared with women whose provider had done fewer than 10 previous PPIUD insertions, those whose provider had completed 10 or more had a 54% lower risk of having experienced an expulsion rather than continuing the method at two years postpartum (relative risk ratio, 0.5; Table 3). Additionally, the risk of expulsion rather than continuation was 68% lower among women whose IUD had been inserted during a cesarean section rather than after a vaginal birth (0.3). Women whose PPIUD had been inserted by a provider who was not comfortable doing such insertions were more likely than those whose provider did feel comfortable to have an expulsion rather than continuing IUD use (2.1). In contrast, women who

TABLE 1. Selected provider, insertion and patient characteristics of postpartum IUD insertions, Nepal, 2015–2017

Characteristic	% or mean (N=1,232)
PROVIDER	
Sex	
Male	16.1
Female	83.9
Mean age (SD)	37.5 (8.4)
No. of prior PPIUD insertions	
<10	66.4
≥10	33.6
Mean no. of prior PPIUD insertions (range)	8.7 (0–42)
Designation	
Obstetrician/gynecologist	25.0
Medical officer	8.6
Nurse	66.4
Mean yrs. of experience in current designation (SD)	11.7 (7.4)
No. of hours working on average per week	
≤48	55.5
>48	44.5
Mean PPIUD knowledge index score (SD)	3.6 (0.6)
Level of comfort in providing PPIUD counselling	
Comfortable	78.5
Not comfortable/neutral	21.5
Level of comfort in performing PPIUD insertion	
Comfortable	90.1
Not comfortable/neutral	9.9
Level of comfort in performing PPIUD removal	
Comfortable	69.0
Not comfortable/neutral	31.0
Provides general FP counselling/PPIUD counselling	100.0
Received supervision on PPIUD insertion in past 12 mos.	66.7
Ever received PPIUD counselling/insertion training from NESOG	84.5
INSERTION	
Timing of insertion	
During cesarean/<10 min. after vaginal delivery	75.6
≥10 min. but <48 hours after vaginal delivery	24.4
Type of delivery	
Vaginal	72.0
Cesarean	28.0
PATIENT	
Age	
<21	23.1
21–25	38.7
26–30	25.8
31–35	9.7
≥36	2.7
Education	
None	10.6
Some primary	8.5
Completed primary	6.7
Some secondary	30.5
Completed secondary	16.3
>secondary	27.5
Ethnicity/caste	
Brahmin	20.9
Chhetri	15.1
Janajaati	35.6
Madhesi	7.5
Dalit	16.7
Muslim	2.2
Other	2.0
Mean no. of living children (SD)	2.0 (0.9)
Has ≥1 living male child	58.4
Has ≥1 dead child	4.4
Had ≥1 abortion before index birth	8.2
Husband was away at one-year follow-up	13.6
Hospital	
Bharatpur	6.7
Bheri	9.7
BPKIHS	13.8
Koshi	18.4
Lumbini	27.0
Western Regional	24.4

Notes: All values are percentages unless otherwise indicated. The unit of analysis is the individual insertion; thus, calculations for provider characteristics may include a specific provider multiple times (e.g., a provider who performed three insertions was counted three times in calculating providers' mean age). SD=standard deviation. PPIUD=postpartum IUD. FP=family planning. NESOG=Nepal Society of Obstetricians and Gynaecologists. BPKIHS=B.P. Koirala Institute of Health Sciences.

TABLE 2. Percentage distribution of PPIUD insertions, by status at two-month, one-year and two-year follow-ups

Status	Two months	One year	Two years
Expulsion	8.5	11.1	12.5
Discontinuation	10.0	20.1	28.7
Continuation	81.5	68.8	58.8
Total	100.0	100.0	100.0

had received a PPIUD from a provider who was not comfortable with removal had a 42% lower relative risk than women whose provider was comfortable with removal of reporting expulsion rather than removal (0.6). The timing of PPIUD insertion and providers' age and designation were not associated with expulsion risk.

Among women's characteristics included in the analysis, only age and caste were associated with expulsion. Women younger than 21 had a greater risk of expulsion rather than continuation compared with women aged 26–30 (relative risk ratio, 2.4). Dalit women were more likely than those who belonged to the Brahmin caste to have had an expulsion rather than to have continued PPIUD use (relative risk ratio, 2.2).

In contrast, women's characteristics were the main drivers of PPIUD discontinuation. The relative risk of discontinuing rather than continuing PPIUD use was higher among women younger than 21 than among those aged 26–30 (relative risk ratio, 1.7). Women who had completed a primary education had a higher risk of PPIUD discontinuation rather than continuation compared with those with no education (2.5). Similarly, women whose husband or partner was not living at home at the one-year follow-up had an elevated risk of PPIUD discontinuation rather than continuation relative to women whose husband or partner was at home (1.7). Finally, woman from the Dalit caste were more likely than Brahmin women to report PPIUD discontinuation rather than continuation, mirroring their high expulsion risk (1.9).

DISCUSSION

We found provider and insertion characteristics to be associated primarily with PPIUD expulsion risk, and women's characteristics to be associated with PPIUD discontinuation risk, during two years of follow-up. Rates of both discontinuation and expulsion were significantly higher in this study than in previous studies conducted in Nepal and other low-income countries. For example, in a study that assessed PPIUD complication rates in six countries, rates of expulsion and discontinuation in Nepal at the two-month follow-up were lower than those in this study—3.9% versus 8.5% for expulsion, and 7.4% versus 10% for discontinuation.[26]

These differences could be due to differences in the measurement of PPIUD expulsion and discontinuation and in follow-up rates. We counted ultrasound evidence of misplacement of PPIUD leading to removal and replacement as an expulsion. Other studies were based on self-report of PPIUD status, which may misclassify removals that were done because of partial expulsion.[24,26]

In our study, expulsion rates increased by 47%—from 8.5% to 12.5%—between two months and two years postpartum. Usually, women receive a PPIUD check-up six weeks after insertion. Our findings indicate that more rounds of check-up and long-term follow-up are important, because the cumulative PPIUD expulsion rate continues to increase after six weeks postinsertion. Unlike deliberate discontinuation, women may not be aware of expulsion, especially partial expulsion due to misplacement. More rounds of check-up can inform women about their PPIUD status and thus prevent unintended pregnancy. Ideally, check-ups should be provided by clinicians within facilities; however, given the challenges women face in accessing LARC services in Nepal, alternatives to facility-based PPIUD check-ups should be considered. In our study, 60% of women who reported at the two-month follow-up that they were not able to feel the IUD thread were found to have had an expulsion, suggesting that counselling women on how to do string checks may be a feasible approach for identifying possible expulsions.

The discontinuation rate increased steadily during the study period, such that one in four women who had a PPIUD inserted discontinued the method within two years. The main reason for discontinuation was heavy menstrual bleeding; only a few women discontinued PPIUD because they wanted another pregnancy. Clinical research is needed to investigate the complication of heavy bleeding, and especially to disentangle bleeding directly attributable to IUD use from bleeding aggravated by IUD use; although heavy bleeding often occurs in the first months after insertion of a copper IUD, heavy bleeding that continues for six months or longer may be due to hormonal imbalances, infection or other causes, and should be investigated. Our findings thus underscore the need to better train reproductive health providers to screen patients for risk factors for bleeding and to provide quality counselling; this will help ensure that women are aware of the possibility of heavy bleeding in the first few months following insertion and know to consult their provider if the bleeding continues for six months or longer.

We found a clear association between providers' prior PPIUD insertion experience and women's experiencing expulsion: The risk of expulsion was lower if a provider had done at least 10 prior insertions. Importantly, we found no difference in PPIUD expulsion or discontinuation by provider's designation, a finding consistent with results of a previous study in Tanzania.[44] Another study found that compared with insertions performed by senior doctors, insertions by nurses were less likely to result in expulsion.[26] Both our study and previous research support task-shifting in family planning services, which can promote access to contraceptives by expanding the supply of trained personnel, especially in resource-limited settings where nurses and midwives may be the only providers.

The likelihood of expulsion was higher following a vaginal birth than following a cesarean section, which is consistent with other studies.[29,45] Previous research has found

TABLE 3. Relative risk ratios (and 95% confidence intervals) from multinomial logistic regression analysis assessing associations between selected characteristics and PPIUD outcomes at two-year follow-up

Characteristic	Expulsion vs. continuation	Discontinuation vs. continuation
PROVIDER		
Sex		
Male (ref)	1.00	1.00
Female	0.94 (0.44–2.01)	1.08 (0.69–1.69)
Age	0.99 (0.94–1.03)	0.99 (0.95–1.03)
No. of prior PPIUD insertions		
<10 (ref)	1.00	1.00
≥10	0.46 (0.25–0.87)*	0.91 (0.62–1.35)
Designation		
Obstetrician/gynecologist (ref)	1.00	1.00
Medical officer	0.97 (0.44–2.15)	0.84 (0.50–1.44)
Nurse	0.52 (0.18–1.50)	0.63 (0.29–1.36)
Yrs. of experience in current designation	1.04 (0.99–1.10)	1.03 (0.98–1.08)
No. of hours working on average per week		
≤48 (ref)	1.00	1.00
>48	0.56 (0.25–1.26)	0.68 (0.43–1.07)
PPIUD knowledge index score	1.03 (0.66–1.62)	1.01 (0.75–1.37)
Level of comfort in providing PPIUD counselling		
Comfortable (ref)	1.00	1.00
Not comfortable/neutral	0.64 (0.38–1.08)	1.02 (0.69–1.51)
Level of comfort in performing PPIUD insertion		
Comfortable (ref)	1.00	1.00
Not comfortable/neutral	2.12 (1.14–3.93)*	1.24 (0.69–2.25)
Level of comfort in performing PPIUD removal		
Comfortable (ref)	1.00	1.00
Not comfortable/neutral	0.58 (0.36–0.93)*	0.96 (0.68–1.35)
Received supervision on PPIUD insertion in past 12 mos.		
No (ref)	1.00	1.00
Yes	1.35 (0.84–2.15)	0.80 (0.55–1.18)
Ever received PPIUD counselling/insertion training from NESOG		
No (ref)	1.00	1.00
Yes	1.40 (0.69–2.81)	1.25 (0.81–1.93)
INSERTION		
Timing of insertion		
During cesarean/<10 min. after vaginal delivery (ref)	1.00	1.00
≥10 min. but <48 hours after vaginal delivery	1.12 (0.74–1.67)	0.93 (0.65–1.33)
Type of delivery		
Vaginal (ref)	1.00	1.00
Cesarean	0.32 (0.15–0.67)**	0.56 (0.31–1.00)
PATIENT		
Age		
<21	2.36 (1.26–4.40)**	1.66 (1.04–2.64)*
21–25	1.44 (0.91–2.29)	1.01 (0.70–1.47)
26–30 (ref)	1.00	1.00
31–35	1.17 (0.62–2.19)	0.82 (0.46–1.48)
≥36	0.87 (0.26–2.88)	1.14 (0.45–2.87)
Education		
None (ref)	1.00	1.00
Some primary	1.89 (0.66–5.43)	1.44 (0.73–2.83)
Completed primary	2.75 (0.96–7.85)	2.48 (1.32–4.64)**
Some secondary	1.64 (0.76–3.55)	1.47 (0.92–2.37)
Completed secondary	1.29 (0.44–3.77)	1.26 (0.75–2.14)
>secondary	1.54 (0.69–3.45)	1.01 (0.59–1.72)
Ethnicity/caste		
Brahmin (ref)	1.00	1.00
Chhetri	1.16 (0.54–2.49)	1.25 (0.81–1.92)
Janajaati	1.21 (0.69–2.14)	0.89 (0.58–1.38)
Madhesi	1.59 (0.58–4.37)	1.61 (0.91–2.86)
Dalit	2.15 (1.03–4.48)*	1.87 (1.11–3.15)*
Muslim	1.81 (0.37–8.85)	1.82 (0.73–4.57)
Other	0.47 (0.08–2.95)	1.78 (0.69–4.61)
No. of living children	1.17 (0.90–1.51)	0.90 (0.76–1.07)
Has ≥1 living male child		
No (ref)	1.00	1.00
Yes	0.88 (0.60–1.30)	0.95 (0.73–1.24)
Has ≥1 dead child		
No (ref)	1.00	1.00
Yes	1.66 (0.67–4.14)	1.58 (0.84–3.00)
Had ≥1 abortion before index birth		
No (ref)	1.00	1.00
Yes	2.04 (0.98–4.26)	1.13 (0.63–2.02)
Husband was away		
No (ref)	1.00	1.00
Yes	1.27 (0.72–2.25)	1.70 (1.23–2.37)**

*p<.05. **p<.01. *Notes*: Models also include fixed effects for hospital and month of delivery. ref=reference group. PPIUD=postpartum IUD. NESOG=Nepal Society of Obstetricians and Gynaecologists.

lower expulsion risks with postplacental insertion (within 10 minutes of vaginal delivery) than with early postpartum insertion (more than 10 minutes but less than 72 hours after a vaginal delivery).[29,30] However, our study did not find an association between timing of insertion and risk of expulsion or discontinuation. This finding is also consistent with recent studies,[31,46] and supports FIGO's recommendation of insertion within 48 hours after delivery.[47]

Most providers of PPIUDs were comfortable in providing the service. However, the risk of expulsion was elevated for PPIUD insertions performed by the small number of providers who were not comfortable with the procedure, suggesting a need for training and supervision of this group as well as for providers of women with expulsions. Providers requiring such training and mentoring can be identified from hospital records or from occasional provider surveys, and be prioritized for refresher training and mentoring.

A surprising result from this study was the association we found between providers' comfort in removing PPIUDs and women's experiencing expulsion: Women had a higher risk of PPIUD expulsion if their provider reported being comfortable with PPIUD removal. This unusual association could be explained by the Dunning-Kruger effect, in which people of low ability tend not to recognize their lack of ability.[48] Providers who were less capable of performing PPIUD removal may have failed to recognize this inability and in turn reported feeling comfortable in providing a PPIUD removal service; conversely, providers who were capable of PPIUD removal but reported feeling less comfortable may have been more conservative in evaluating their ability, and thus have been more careful to ensure a correct insertion. At the time providers were asked whether they were comfortable in providing PPIUD services, providers may have had less experience in PPIUD removal than in insertion. Thus, overconfidence may have been more likely to occur in evaluating PPIUD removal than insertion.

This study also found that some women's characteristics were associated with expulsion and discontinuation. Age and ethnicity were both associated with these outcomes: Women aged 21 or younger had a higher risk of expulsion and discontinuation than those aged 26–30. A U.S. study of copper IUDs (not restricted to postpartum insertions) found no differences by age in the rates of expulsion and discontinuation at 12 months, but by the end of the three-year study women aged 13–19 were disproportionately more likely to have discontinued IUD use early.[49] The higher expulsion rates among younger women in our study may indicate that current copper IUDs do not fit younger Nepalese women well. Further clinical studies are needed to investigate biological or physiological factors related to PPIUD expulsion. Moreover, younger women may discontinue IUD use because they want to try other family planning methods to find the most appropriate one; future studies should further investigate women's discontinuing and switching methods.

Dalit women had higher risks of expulsion and discontinuation than their counterparts from the Brahmin caste. Previous studies have shown that Dalit people—women in particular—face discrimination in Nepal, and have less access to education and health services.[50] Dalit women are also less likely to use modern methods of family planning than members of other castes, especially Brahmin women.[39] Not much is known about Dalit women's use of PPIUDs and other postpartum family planning methods; however, familial and societal influence over Nepali women's use of contraceptives, especially IUDs, might explain the higher risk of PPIUD discontinuation among younger women and Dalit women, who are more prone to be influenced by their families and communities.[51] Additionally, the higher risk of expulsion among younger and Dalit women could be influenced by provider prejudice and caste-based discrimination that result in lower-quality provision of PPIUD services and insertions.[50] This is a potential factor that should be explored further.

We found high rates of discontinuation among women whose husband or partner was away from home, which is often due to labor migration. Women with husbands who live away from home may decide on their own that contraception is unnecessary, but they may also be prone to societal and familial pressure—especially from mothers-in-law and peers—to discontinue method use (e.g., because women who continue to use contraceptives when their husbands are away may be suspected of infidelity).[23] Inclusion of husbands and other family members in postpartum family planning counselling sessions could increase their understanding of PPIUDs, reduce their negative attitudes toward use of the method and lessen their influence on discontinuation.

The risk of PPIUD discontinuation was greater among study participants who had completed a primary education than among those with no education. Previous studies have shown that women with lower education are less likely to use modern methods of contraception, including PPIUDs;[52] however, less is known about the relationship between educational level and PPIUD discontinuation, and more research in this area is needed.

Limitations and Conclusions

A limitation of this study is that only tertiary-level hospitals with high obstetric caseloads were included, and thus our sample excluded women who had delivered outside of the formal health care system (e.g., at home). Moreover, the study sample was not nationally representative; on average, study participants were younger and had more years of schooling than the general population of women of reproductive age in Nepal.[6] Because access to health care is difficult for many women in rural and remote areas,[15,53] such women may be disinclined to use IUDs, which require a visit to a clinician for removal. Finally, we do not know the PPIUD status of women who were lost to follow-up or who were excluded from the study because of incomplete survey information, or the extent to which the

absence of these women from the sample may affect the generalizability of our findings.

Despite these limitations, the study's two-year follow-up period offers unique insight into longer-term PPIUD use in Nepal. This study also stands out because it looked at the relationships between provider characteristics and experience and PPIUD expulsion and discontinuation (in addition to including measures of women's characteristics). The findings regarding provider characteristics highlight the need for further training and mentoring of PPIUD providers, particularly those who lack confidence. Expulsion and discontinuation were high among younger women and Dalit women, and those whose husbands were living away from home. Further research is needed to fully understand these associations, but the findings suggest that there should be an emphasis on counselling women in these groups about the risks of PPIUD expulsion to ensure that the method is the right choice for them. They also suggest that PPIUD counselling should include partners and family members, to avoid potential adverse influences on PPIUD discontinuation. Finally, research should assess if caste-based discrimination is present in family planning services in Nepal and whether such discrimination affects PPIUD expulsion and discontinuation among Dalit women.

Our findings have programmatic implications. First, the lack of significant difference in rates of PPIUD expulsion and discontinuation by provider designation bolsters the case for task shifting by expanding PPIUD service training to nonphysician health workers. With task shifting and sharing, more women can have access to family planning service and thus meet their reproductive goals. Second, the increase in the cumulative PPIUD expulsion rate between the two-month and two-year follow-ups indicates a need to provide multiple rounds of PPIUD status check-ups, which can help maintain the efficacy of PPIUD and prevent short interpregnancy intervals. Finally, the findings highlight the importance of tailoring family planning counselling to a woman's particular family circumstance (for example, whether her husband is living at home) as well as her fertility desires and risk factors.

REFERENCES

1. Conde-Agudelo A, Rosas-Bermúdez A and Kafury-Goeta AC, Birth spacing and risk of adverse perinatal outcomes: a meta-analysis, *JAMA*, 2006, 295(15):1809–1823, http://dx.doi.org/10.1001/jama.295.15.1809.

2. Conde-Agudelo A, Rosas-Bermúdez A and Kafury-Goeta AC, Effects of birth spacing on maternal health: a systematic review, *American Journal of Obstetrics & Gynecology*, 2007, 196(4):297–308, http://dx.doi.org/10.1016/j.ajog.2006.05.055.

3. World Health Organization (WHO), *Report of a WHO Technical Consultation on Birth Spacing: Geneva, Switzerland, 13–15 June 2005*, Geneva: WHO, 2007, https://apps.who.int/iris/handle/10665/69855.

4. Cleland J et al., Family planning: the unfinished agenda, *Lancet*, 2006, 368(9549):1810–1827, http://dx.doi.org/10.1016/S0140-6736(06)69480-4.

5. Singh S et al., *Adding It Up: The Costs and Benefits of Investing in Family Planning and Maternal and Newborn Health*, New York: Guttmacher Institute, 2009.

6. Ministry of Health of Nepal, New ERA and ICF, *Nepal Demographic and Health Survey 2016*, Kathmandu, Nepal: Ministry of Health, 2017.

7. Mehata S et al., Unmet need for family planning in Nepal during the first two years postpartum, *BioMed Research International*, 2014:649567, http://dx.doi.org/10.1155/2014/649567.

8. Pradhan E et al., Integrating postpartum contraceptive counselling and IUD insertion services into maternity care in Nepal: results from stepped-wedge randomized controlled trial, *Reproductive Health*, 2019, 16:69, http://dx.doi.org/10.1186/s12978-019-0738-1.

9. Kapp N and Curtis KM, Intrauterine device insertion during the postpartum period: a systematic review, *Contraception*, 2009, 80(4):327–336, http://dx.doi.org/10.1016/j.contraception.2009.03.024.

10. Sonalkar S and Kapp N, Intrauterine device insertion in the postpartum period: a systematic review, *European Journal of Contraception & Reproductive Health Care*, 2015, 20(1):4–18, http://dx.doi.org/10.3109/13625187.2014.971454.

11. Whitaker AK and Chen BA, Society of Family Planning Guidelines: Postplacental insertion of intrauterine devices, *Contraception*, 2018, 97(1):2–13, http://dx.doi.org/10.1016/j.contraception.2017.09.014.

12. Ministry of Health and Population, *National Family Planning Costed Implementation Plan 2015–2020*, Kathmandu, Nepal: Ministry of Health and Population, 2015, http://ec2-54-210-230-186.compute-1.amazonaws.com/wp-content/uploads/2016/03/FP-Costed-Implementation-Plan-nepal.pdf.

13. Ministry of Health et al., *Nepal Health Facility Survey 2015*, Kathmandu, Nepal: Ministry of Health, Nepal, 2017.

14. Chakraborty NM et al., Knowledge and perceptions of the intrauterine device among family planning providers in Nepal: a cross-sectional analysis by cadre and sector, *BMC Health Services Research*, 2015, 15:39, http://dx.doi.org/10.1186/s12913-015-0701-y.

15. Adeyemi AB et al., The unmet need for contraception among Nigerian women in the first year post-partum, *European Journal of Contraception & Reproductive Health Care*, 2005, 10(4):229–234, http://dx.doi.org/10.1080/13625180500279763.

16. Daniele MAS et al., Provider and lay perspectives on intra-uterine contraception: a global review, *Reproductive Health*, 2017, 14:119, http://dx.doi.org/10.1186/s12978-017-0380-8.

17. Greene E and Stanback J, Old barriers need not apply: opening doors for new contraceptives in the developing world, *Contraception*, 2012, 85(1):11–14, http://dx.doi.org/10.1016/j.contraception.2011.05.004.

18. Hamid S and Stephenson R, Provider and health facility influences on contraceptive adoption in urban Pakistan, *International Family Planning Perspectives*, 2006, 32(2):71–78, http://dx.doi.org/10.1363/3207106.

19. Jacobstein R, Long-acting and permanent contraception: an international development, service delivery perspective, *Journal of Midwifery & Women's Health*, 2007, 52(4):361–367, http://dx.doi.org/10.1016/j.jmwh.2007.01.001.

20. Puri MC et al., Delivering postpartum family planning services in Nepal: Are providers supportive? *BMC Health Services Research*, 2018, 18:948, http://dx.doi.org/10.1186/s12913-018-3777-3.

21. Ministry of Health and Population, New ERA and ICF International, *Nepal Demographic and Health Survey 2011*, Kathmandu, Nepal: Ministry of Health and Population and New ERA; and Calverton, MD, USA: ICF International, 2012.

22. Center for Research on Environment Health and Population Activities (CREHPA), The status of family planning and reproductive health in Nepal, Kathmandu, Nepal: CREHPA, 2011, http://www.icomp.org.my/new/uploads/fpconsultation/Nepal.pdf.

23. Staveteig et al., Barriers to family planning use in eastern Nepal: results from a mixed methods study, *DHS Qualitative Research Studies*, Rockville, MD, USA: ICF, 2018, No. 21.

24. de Caestecker L et al., Planning and implementation of a FIGO postpartum intrauterine device initiative in six countries, *International Journal of Gynaecology & Obstetrics*, 2018, 143(Suppl. 1):4–12, http://dx.doi.org/10.1002/ijgo.12598.

25. Canning D et al., Institutionalizing postpartum intrauterine device (IUD) services in Sri Lanka, Tanzania, and Nepal: study protocol for a cluster-randomized stepped-wedge trial, *BMC Pregnancy and Childbirth*, 2016, 16:362, http://dx.doi.org/10.1186/s12884-016-1160-0.

26. Makins A et al., FIGO postpartum intrauterine device initiative: complication rates across six countries, *International Journal of Gynaecology & Obstetrics*, 2018, 143(Suppl. 1):20–27, http://dx.doi.org/10.1002/ijgo.12600.

27. Thapa K et al., Institutionalizing postpartum family planning and postpartum intrauterine device services in Nepal: role of training and mentorship, *International Journal of Gynaecology & Obstetrics*, 2018, 143(Suppl. 1):43–48, http://dx.doi.org/10.1002/ijgo.12604.

28. Madden T et al., Association of age and parity with intrauterine device expulsion, *Obstetrics & Gynecology*, 2014, 124(4):718–726, http://dx.doi.org/10.1097/AOG.0000000000000475.

29. Eroğlu K et al., Comparison of efficacy and complications of IUD insertion in immediate postplacental/early postpartum period with interval period: 1 year follow-up, *Contraception*, 2006, 74(5):376–381, http://dx.doi.org/10.1016/j.contraception.2006.07.003.

30. Morrison C et al., Clinical outcomes of two early postpartum IUD insertion programs in Africa, *Contraception*, 1996, 53(1):17–21, http://dx.doi.org/10.1016/0010-7824(95)00254-5.

31. Lerma K et al., Importance of the delivery-to-insertion interval in immediate postpartum intrauterine device insertion: a secondary analysis, *International Journal of Gynaecology & Obstetrics*, 2020, 149(2):154–159, http://dx.doi.org/10.1002/ijgo.13115.

32. Hooda R et al., Immediate postpartum intrauterine contraceptive device insertions in cesarean and vaginal deliveries: a comparative study of follow-up outcomes, *International Journal of Reproductive Medicine*, 2016:7695847, http://dx.doi.org/10.1155/2016/7695847.

33. Van Kets H et al., Clinical experience with the GYNE-T 380 postpartum intrauterine device, *Fertility and Sterility*, 1991, 55(6):1144–1149, http://dx.doi.org/10.1016/S0015-0282(16)54366-0.

34. Gurney EP et al., Six-month expulsion of postplacental copper intrauterine devices placed after vaginal delivery, *American Journal of Obstetrics & Gynecology*, 2018, 219(2):183.e1–183.e9, http://dx.doi.org/10.1016/j.ajog.2018.05.032.

35. Chethan R et al., Study on post-partum intrauterine contraceptive device practices and causes for discontinuation of PPIUCD at follow up in a tertiary hospital, *International Journal of Reproduction, Contraception, Obstetrics and Gynecology*, 2018, 7(6):2299–2303, http://dx.doi.org/10.18203/2320-1770.ijrcog20182339.

36. Puri MC et al., Exploring reasons for discontinuing use of immediate post-partum intrauterine device in Nepal: a qualitative study, *Reproductive Health*, 2020, 17:41, http://dx.doi.org/10.1186/s12978-020-0892-5.

37. Thapa S, Early discontinuation of intrauterine device in Nepal–a retrospective study, *WHO South-East Asia Journal of Public Health*, 2012, 1(3):309–319, http://dx.doi.org/10.4103/2224-3151.207027.

38. Azmat SK et al., IUD discontinuation rates, switching behavior, and user satisfaction: findings from a retrospective analysis of a mobile outreach service program in Pakistan, *International Journal of Women's Health*, 2013, 5:19–27, http://dx.doi.org/10.2147/IJWH.S36785.

39. Mishra MK, Ethnic disparities in contraceptive use and its impact on family planning program in Nepal, *Nepal Journal of Obstetrics and Gynaecology*, 2011, 2:14–19, 10.3126/njog.v6i2.6750.

40. Thomas D et al., *Voices from the Community: Access to Health Services: A Rapid Participatory Ethnographic Evaluation and Research (PEER) Study, Nepal*, Kathmandu, Nepal: Ministry of Health and Population, 2012.

41. Gbagbo FY and Kayi EA, Use and discontinuation of intrauterine contraceptive device in the Greater Accra Region of Ghana, *Contraception and Reproductive Medicine*, 2018, 3:8, http://dx.doi.org/10.1186/s40834-018-0061-1.

42. Bryant AG et al., Reasons for intrauterine device use, discontinuation and non-use in Malawi: a qualitative study of women and their partners, *African Journal of Reproductive Health*, 2015, 19(4):50–57.

43. Colwill AC et al., Six-week retention after postplacental copper intrauterine device placement, *Contraception*, 2018, 97(3):215–218, http://dx.doi.org/10.1016/j.contraception.2017.10.012.

44. Muganyizi PS et al., Clinical outcomes of postpartum intrauterine devices inserted by midwives in Tanzania, *International Journal of Gynaecology & Obstetrics*, 2018, 143(Suppl. 1):38–42, http://dx.doi.org/10.1002/ijgo.12603.

45. Tatum HJ et al., Immediate postplacental insertion of GYNE-T 380 and GYNE-T 380 postpartum intrauterine contraceptive devices: randomized study, *American Journal of Obstetrics & Gynecology*, 1996, 175(5):1231–1235, http://dx.doi.org/10.1016/S0002-9378(96)70033-9.

46. Lopez LM et al., Immediate postpartum insertion of intrauterine device for contraception, *Cochrane Database of Systematic Reviews*, 2015, Issue 6, No. CD003036, http://dx.doi.org/10.1002/14651858.CD003036.pub3.

47. International Federation of Gynecology and Obstetrics, PPIUD project, 2020, https://www.figo.org/ppiud-project.

48. Kruger J and Dunning D, Unskilled and unaware of it: how difficulties in recognizing one's own incompetence lead to inflated self-assessments, *Journal of Personality and Social Psychology*, 1999, 77(6):1121–1134, http://dx.doi.org/10.1037/0022-3514.77.6.1121.

49. Aoun J et al., Effects of age, parity, and device type on complications and discontinuation of intrauterine devices, *Obstetrics & Gynecology*, 2014, 123(3):585–592, http://dx.doi.org/10.1097/AOG.0000000000000144.

50. Thapa R et al., Uptake of health services by people from the Dalit community, *Journal of BP Koirala Institute of Health Sciences*, 2018, 1(2):1–6, http://dx.doi.org/10.3126/jbpkihs.v1i2.22072.

51. Thapa K et al., Factors affecting the behavior outcomes on post-partum intrauterine contraceptive device uptake and continuation in Nepal: a qualitative study, *BMC Pregnancy and Childbirth*, 2019, 19:148, http://dx.doi.org/10.1186/s12884-019-2310-y.

52. Pradhan S et al., Determinants of uptake of post-partum intra-uterine contraceptive device among women delivering in a tertiary hospital, Odisha, India, *International Journal of Reproduction, Contraception, Obstetrics and Gynecology*, 2017, 6(5):2017–2020, http://dx.doi.org/10.18203/2320-1770.ijrcog20171968.

53. Robinson N et al., Barriers to intrauterine device uptake in a rural setting in Ghana, *Health Care for Women International*, 2016, 37(2):197–215, http://dx.doi.org/10.1080/07399332.2014.946511.

RESUMEN

Contexto: *Las características de proveedores de servicios de salud y mujeres están asociadas con los resultados del DIU de cobre posparto (DIUPP), pero no se ha establecido la relación entre la experiencia de los proveedores de servicios de salud y la expulsión y discontinuación del DIUPP.*

Metodos: *Se utilizaron datos de 1,232 mujeres y 118 proveedores de servicios de salud que participaron en un ensayo aleatorio de una intervención de consejería y provisión de DIUPP en Nepal entre 2015 y 2017, para identificar asociaciones entre las características de proveedores de servicios de salud y mujeres y los resultados relacionados con el DIUPP. Se utilizaron modelos de regresión logística multinomial para estimar los*

riesgos de expulsión y discontinuación de DIUPP dos años después de la inserción.

Resultados: *El 13% de las mujeres había tenido expulsiones parciales o completas y el 29% había descontinuado el uso de DIUPP a los dos años. Haber tenido un proveedor con experiencia de al menos 10 inserciones previas en comparación con un proveedor con menos experiencia se asoció con un menor riesgo de expulsión en lugar de continuación (índice de riesgo relativo 0.5). Las mujeres tuvieron un mayor riesgo tanto de expulsión como de discontinuación si eran menores de 21 años, en lugar de tener entre 26 y 30 (2.4 y 1.7, respectivamente), o si pertenecían a la casta dalit en lugar de a la casta brahmán (2.2 y 1.9, respectivamente). Las mujeres cuyos maridos no vivían en casa también tenían un riesgo elevado de discontinuación del tratamiento.*

Conclusión: *Los hallazgos destacan la necesidad de una mayor capacitación y supervisión de los proveedores de servicios de salud durante sus primeras 10 inserciones de DIUPP. La consejería sobre el riesgo de expulsión podría beneficiar especialmente a las mujeres más jóvenes y que pertenecen a la casta dalit; y debe incluir a las parejas y otros miembros de la familia para evitar cualquier estigma en torno al uso de DIUPP por parte de las mujeres cuya pareja está fuera de casa durante un período prolongado.*

RÉSUMÉN

Contexte: *Les caractéristiques des prestataires et des femmes sont associées aux résultats du DIU au cuivre post-partum (DIUPP), mais le rapport entre l'expérience des prestataires, l'expulsion du DIUPP et l'arrêt de la méthode n'a pas été établi.*

Méthodes: *Les données relatives à 1 232 femmes et 118 prestataires ayant participé à un essai randomisé d'intervention de conseil et de pose d'un DIUPP au Népal entre 2015 et 2017 ont permis d'identifier les associations entre les caractéristiques des prestataires et des femmes et les résultats relatifs au DIUPP. Les risques d'expulsion du DIUPP et d'arrêt de la méthode ont été estimés à deux ans après la pose par modélisation de régression logistique multinomiale.*

Résultats: *Treize pour cent des femmes avaient connu une expulsion partielle ou complète et 29% avaient arrêté l'utilisation du DIUPP en l'espace de de deux ans. Le fait d'avoir un prestataire ayant pratiqué au moins 10 poses antérieures s'est avéré associé à un risque moindre d'expulsion que de continuation (rapport de risque relatif de 0,5), par rapport au fait d'avoir eu un prestataire moins expérimenté. Les femmes couraient un plus grand risque d'expulsion aussi bien que d'arrêt de la méthode si elles avaient moins de 21 ans par rapport à la tranche d'âge de 26 à 30 ans (2,4 et 1,7, respectivement) ou si elles appartenaient à la caste des Dalits plutôt que des Brahmanes (2,2 et 1,9, respectivement). Les femmes dont le mari ne vivait pas sous le même toit présentaient aussi de plus hauts risques d'arrêt.*

Conclusion: *Les résultats révèlent clairement la nécessité d'une formation et d'un encadrement accrus des prestataires lors de leurs 10 premières poses de DIUPP. Le conseil relatif au risque d'expulsion pourrait bénéficier tout particulièrement aux femmes plus jeunes et de la caste des Dalits. Il doit aussi inclure les partenaires et d'autres membres de la famille pour éviter toute stigmatisation concernant l'utilisation du DIUPP par les femmes dont le partenaire est absent pendant une période prolongée.*

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