The Effect of Integrating Family Planning with a Maternal and Newborn Health Program on Postpartum Contraceptive Use and Optimal Birth Spacing in Rural Bangladesh

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Meeting postpartum contraceptive need remains a major challenge in developing countries, where the majority of women deliver at home. Using a quasi-experimental trial design, we examine the effect of integrating family planning (FP) with a community-based maternal and newborn health (MNH) program on improving postpartum contraceptive use and reducing short birth intervals <24 months. In this two-arm trial, community health workers (CHWs) provided integrated FP counseling and services during home visits along with their outreach MNH activities in the intervention arm, but provided only MNH services in the control arm. The contraceptive prevalence rate (CPR) in the intervention arm was 15 percent higher than in the control arm at 12 months, and the difference in CPRs remained statistically significant throughout the 24 months of observation. The short birth interval of less than 24 months was significantly lower in the intervention arm. The study demonstrates that it is feasible and effective to integrate FP services into a community-based MNH care program for improving postpartum contraceptive use and lengthening birth intervals. (Studies in Family Planning 2015; 46[3]: 297–312)

Promoting contraceptive use immediately after birth is considered an important family planning (FP) program strategy. Because ovulation may return as early as four weeks after childbirth, and women may become pregnant before the resumption of their menses, attempts have been made to promote contraceptive use during the early postpartum period to prevent unwanted births and improve pregnancy spacing. Data suggest

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Published on behalf of the Population Council by Wiley-Blackwell.

that 95 percent of women in developing countries want to postpone pregnancy for at least two years after childbirth, yet almost two-thirds do not use a contraceptive method (Ross and Winfrey 2001). The World Health Organization (WHO) recommends an interval of at least 24 months after a live birth before attempting the next pregnancy (birth-to-pregnancy interval), equivalent to a minimum 33-month inter-birth interval, to reduce the risk of adverse maternal, perinatal, and infant outcomes (WHO 2005). However, an analysis of recent Demographic and Health Surveys (DHSs) conducted in 45 developing countries shows that about 20 percent of births had a short inter-birth interval <24 months and that 55 percent of the births were from pregnancies that occurred within three years after a delivery (Rutstein and Winter 2014).

Short birth intervals adversely affect the health of mothers and their babies, primarily through maternal nutritional depletion and sibling competition (Conde-Agudelo, Rosas-Bermúdez, and Kafury-Goeta 2006, 2007; DaVanzo et al. 2008; Conde-Agudelo et al. 2012). Research has shown that women with short birth intervals are at higher risk of maternal mortality and of developing nutritional deficiencies, experiencing preterm births, and delivering low-birth-weight or small-for-gestational-age infants (Cleland et al. 2012). Longer birth spacing improves child survival (Rutstein 2005). A study in Bangladesh has shown that shorter inter-pregnancy intervals were associated with increased odds of induced abortion, miscarriage, and stillbirth (DaVanzo et al. 2007).

The Population Council first launched a global postpartum family planning (PPFP) program in 1966 (Zatuchni 1971; Winikoff and Mensch 1991) to reach women immediately after birth. During the early years of this program, most contraceptive methods were clinic based, notably the IUD, and it was perceived that women could be approached at maternity wards in a clinical setting. As a result, the PPFP program was initially implemented at health facilities. In developing countries, however, the vast majority of women deliver at home and women's postpartum visits to health facilities are limited. Therefore, the clinic-based FP program failed to reach a large proportion of women in need of PPFP services, and the first international family planning program ended in 1974. Since that time, the PPFP program almost stalled in developing countries and experienced a period of neglect because of the enormous challenges of reaching women immediately after childbirth.

Integration of FP and maternal and newborn health (MNH) services is expected to provide a "gateway" for reaching women during antenatal care visits and soon after birth for FP counseling and services. Integration is anticipated to provide multiple opportunities to streamline service delivery and improve care at time points that are favorable and critical for maximizing women's reproductive health and the health of their children. Lack of integration is considered "a big missed opportunity" for both the FP and MNH programs (Druce and Nolan 2007). To date, however, the evidence base for the effect of FP–MNH program integration on improving contraceptive use and decreasing birth intervals is weak, according to Bain-Brickley et al. (2011) and Kennedy et al. (2011).

In 2007 an operations research project known as the Healthy Fertility Study (HFS) was undertaken in northeastern Bangladesh to examine the effect on postpartum contraceptive use of integrating FP into an existing MNH intervention program. Because the majority of women in Bangladesh deliver at home, the HFS employed an outreach approach through home visits to deliver integrated FP counseling and services along with MNH activities.

The HFS was carried out by a partnership of the Bangladesh Ministry of Health and Family Welfare (MOHFW), Shimantik (an NGO), ACCESS-FP (which became part of MCHIP in December 2010), and the Johns Hopkins Bloomberg School of Public Health (JHU). This article reports on contraceptive prevalence rates (CPRs), choice of methods, adoption patterns, continuation rates during the first 24 months postpartum, and birth spacing by HFS study arm. We also attempt to measure which aspects of the intervention were impactful or added additional value: FP counseling and community engagement; the addition of oral contraceptive and condom distribution; and the administering of subsequent doses of injectables.

METHODS

Study Setting

This study was implemented in a rural community in the Sylhet district of northern Bangladesh, home to 2.7 million of the country's population of 145 million. While national estimates of key maternal and child health indicators have improved significantly in Bangladesh, findings from the 2007 Bangladesh Demographic and Health Survey (BDHS) demonstrate that Sylhet still falls behind all other divisions (NIPORT, Mitra and Associates, and Macro International 2009). The CPR in 2007 in Sylhet was 32 percent (modern methods: 25 percent), compared with the national average of 56 percent (modern methods: 48 percent), and the total fertility rate (TFR) was 3.7, as compared with 2.7 nationally.

Study Design

The HFS began in December 2007. Using a quasi-experimental design, we tested integrated FP and MNH programs in four unions (small administrative areas) of two subdistricts. This had been the site of the Projahnmo study (Project for Advancing the Health of Newborns and Mothers), a community-based maternal and newborn health program involving home visits, and FP services were integrated into this program. Details of the Projahnmo study were presented earlier (Baqui et al. 2008).

Two of the unions initially served as the intervention arm, and the other two as the comparison arm. It was not possible to implement the study with a cluster randomized trial (RCT) design because of the limited number of unions available as clusters for sampling. In the HFS trial, two unions (covering a population of 25,000 to 35,000 in each) were selected to receive the intervention—an integrated MNH/FP package—and two comparison unions were selected to receive MNH-care services only. The standard FP program offered by Health and Family Welfare Centers, operated by the MOHFW, was available in both arms. A baseline survey of women who consented to participate voluntarily in the study was conducted at enrollment. The initial research design aimed to measure differences in CPRs between the intervention and comparison unions at six months and one year postpartum. Subsequently, additional funding was received to increase the study area and sample size to four intervention unions and four comparison unions in July 2008 in order to measure increases in birth intervals (reduction in the proportion of births spaced <24 months) as the primary outcome.

The unions were selected on the basis of the following considerations: (1) unions would not be adjacent to areas where other competing projects were conducted; (2) intervention and comparison unions would not be adjacent to each other, to minimize contamination; (3) no unions would include the Upazila Health Complex (UHC), a secondary-level health facility, to avoid service-availability bias; and (4) all unions (both intervention and comparison) would include functional government Health and Family Welfare Centers with posted outreach health workers, Family Welfare Visitors (FWVs), and their supporting assistants, Family Welfare Assistants (FWAs). The study arms were assigned to the intervention and control groups according to the listed order of the names of the unions. Among government personnel, FWVs and FWAs are directly involved with the provision of FP services. Each of the Health and Family Welfare Centers was staffed with an FWV and on average three to four FWAs.

The study received institutional review board (IRB) approval from Johns Hopkins Bloomberg School of Public Health and the Bangladesh Medical Research Council for ethical conduct of the trial.

Family Planning Intervention Package

In the intervention unions, behavior change communication (BCC) messages related to postpartum FP were added to the existing MNH intervention package for interpersonal counseling and group meetings. During antenatal care and postpartum visits every two months, CHWs discussed the benefits of lengthening birth intervals to at least 24 months, the importance of waiting 6 months after an abortion or miscarriage before becoming pregnant again, the risks of closely spaced births, and the timing of return to fertility. In addition, CHWs informed families about three criteria for the effective use of the lactational amenorrhea method (LAM) (including exclusive breastfeeding for six months) as well as other modern methods. These messages were reinforced during the postpartum visits every two months and were combined with counseling about specific contraceptive methods, depending on the woman's fertility intentions. CHWs also informed women and families about the importance of the "LAM transition," defined as the time when women using LAM need to switch to another modern contraceptive method because menses returns, exclusive breastfeeding is stopped, or the baby reaches the age of six months, and LAM would no longer protect against unwanted pregnancy. Pictorial fliers were given to women in the intervention areas to serve as reminders about the information provided.

Distribution of Contraceptives

In the original study design, CHWs were to serve as counselors but not to distribute FP methods. However, collaborating partners, including MOHFW, later decided that CHWs in the HFS should be trained to distribute oral contraceptives and condoms. CHW training was provided according to Bangladeshi government protocols for in-home provision of contraceptives. After receiving IRB approval for this protocol change in July 2009, CHWs integrated oral contraceptive and condom provision into their routine pregnancy-surveillance household visits conducted every two months. Oral contraceptives were provided only after the woman passed a medical eligibility screening checklist, which identified risk factors that would preclude her from using oral contraceptives. Progestin-only pills were not available in Bangladesh at the time of the study's inception. Beginning in March 2011, CHWs also began distributing follow-up doses of injectable contraceptives, per MOHFW guidelines, during the pregnancy-surveillance visits.

Community-based Meetings

In addition to the one-to-one counseling for mothers provided by CHWs, male and female community mobilizers (CMs) organized monthly meetings at the cluster level to discuss the importance of pregnancy spacing and postpartum FP, including LAM. These meetings were intended to sensitize the community and build support for HFS activities. Community meetings also presented the opportunity to recognize women who practice LAM successfully, some of whom were designated as "LAM Ambassadors." LAM Ambassadors served as role models for the successful adoption of LAM and promoted LAM use to other women in the community. The importance of providing information on LAM and exclusive breastfeeding cannot be overstated in Bangladesh: the median duration of exclusive breastfeeding is only 1.8 months, and resumption of sex occurs early (median: 2 months postpartum) (NIPORT, Mitra and Associates, and Macro International 2009).

The FP intervention package was implemented only in the intervention area. Standard FP services were available in both the intervention and comparison areas through outreach FWVs and FWAs and from the Health and Family Welfare Centers. FWVs and FWAs provide FP counseling, distribute oral contraceptives and condoms, and refer clients for clinical FP services; only FWVs are allowed to administer first and subsequent doses of injectables. Since 2005–06, FWAs have been allowed nationally to administer second and subsequent injectable doses after the first dose has been given by an FWV. These standard FP services were available to all reproductive-aged women in both intervention and control areas. In contrast, the CHWs targeted only pregnant and postpartum women for FP counseling and services.

Data Collection

Trained interviewers collected data from each study participant in her home through eight visits. These consisted of one visit during the antenatal period and before the second antenatal counseling visit by CHWs during weeks 32–36 of pregnancy and seven follow-up visits during the postpartum period at months 3, 6, 12, 18, 24, 30, and 36. Interviewers were recruited independently and no CHW or community mobilizer who implemented the intervention was engaged in data collection. Through face-to-face interviews, interviewers collected data on survival status of the index child (the child born from the pregnancy that was ongoing at enrollment), incidence and outcomes of subsequent pregnancies, breastfeeding, contraceptive-use history, and program exposure (visits by CHWs and community mobilizers, attendance at community meetings, and so forth). The survey rounds at 3 and 6 months also collected data on resumption of sex, amenorrhea status, and exclusive breastfeeding.

The results presented here are based on analysis of data from the survey rounds conducted at baseline (antepartum) and at 3, 6, 12, 18, and 24 months. Enrollment of pregnant women was completed in July 2009, and the last survey round began in December 2009 and was completed in December 2011. The follow-up rates at the 24-month survey period were similar in both arms (2,055/2,167 = 94.8 percent in the intervention arm and 2,028/2,154 = 94.2 percent in the control arm). The present study is limited to women who had a live birth, so that the samples are similar in terms of contraceptive needs. In the case of stillbirths or neonatal deaths, mothers were interviewed using a shorter questionnaire without any reference to postpartum contraceptive use, and they were excluded from this analysis. However, these women continued to receive FP counseling on optimal birth spacing and delaying next pregnancies.

Statistical Methods

We examined differentials in contraceptive adoption and continuation probabilities during the postpartum months by the study arms using the Kaplan–Meier life-table method. The similarities in survival curves were compared using both the Wilcoxon and log-rank tests. In the log-rank test, events (e.g., adoption, discontinuation) are weighted equally, while in the Wilcoxon test, early events are weighted more heavily than later events. Because contraceptive discontinuation was more pronounced in the early period after adoption, we present the Wilcoxon chi-square statistical results of the contraceptive use dynamics analysis. The log-rank test statistics, however, were similar and are not shown.

The Kaplan–Meier life-table method provides univariate results. To adjust for the confounding effects of other covariates, we first used multivariable time-to-event regression analysis with Cox proportional hazards models. Because our preliminary analysis suggested that the data violated the proportionality assumption of the Cox model, we used the parametric hazards models with Weibull distribution. Weibull distributions, which appears to be more robust to model misspecification, are preferred for contraceptive use dynamics analysis by parametric hazards models (Ali, Marshall, and Babiker 2001). In the survival analyses, women who had experienced the death of a child were treated as censored cases because their contraceptive needs might have changed. However, there is a concern that longer birth spacing is associated with better child survival and that, if birth spacing is shorter in the control area, the censoring may bias the results if the rates of censoring vary by the study arms. We conducted a sensitivity analysis to check the robustness of the findings by comparing the results with and without censoring.

Because CHWs only started distributing oral contraceptives in July 2009 and follow-up doses of injectables in March 2011, we conducted a stratified analysis corresponding to exposure to these three periods (home-based counseling only; period after start of distribution of oral contraceptives and condoms; and period after being allowed to administer second and subsequent doses of injectables) to determine whether the task-shifting of CHWs affected the intervention impact.

We estimated the differences between the study arms in the odds of early pregnancy and short birth intervals <24 months with logistic regression models, adjusted for confounding covariates. The following confounding covariates were included in all regression models: age, parity, socioeconomic status, women's education, husband's education, religion, fertility desire, and previous contraceptive use before the index pregnancy.

Because the data came from a quasi-experimental trial in which the samples were not drawn with simple random sampling, all analyses used robust standard errors to address the clustering effect of women within unions.

RESULTS

The intervention and comparison arms were similar at enrollment in terms of woman's age, husband's education, parity, and religion (Table 1). Woman's education level and the socio-economic status of households were significantly higher in the intervention area ($p < 0.05$). The rate of ever-use of any contraceptive, however, was lower in the intervention area (18 percent) compared with the control area (21 percent) at enrollment ($p = 0.008$).

Figure 1 shows the cumulative probabilities of modern contraceptive adoption in the first 24 months after a live birth. The probability of adoption of any modern contraceptive method was much higher in the HFS intervention area (cumulative 12- and 24-month probabilities expressed in rates were 65.9 percent and 76.6 percent, respectively) than in the comparison area (39.1 percent and 54.5 percent). The hazard of all-method adoption was approximately 2.5 times higher in the intervention arm than in the comparison arm (unadjusted hazard ratio [HR]=2.27 and adjusted hazard ratio [aHR]=2.57). LAM was actively promoted in the intervention area, and a major increase in contraceptive use in the early postpartum period was attributable to a higher use of LAM in the intervention area (Figure 1, left panel). The exclusion of LAM as a method, however, did not change the significant differences in contraceptive adoption rates between the study arms (Figure 1, right panel, Wilcoxon χ^2 p-value <0.001; aHR=1.51).

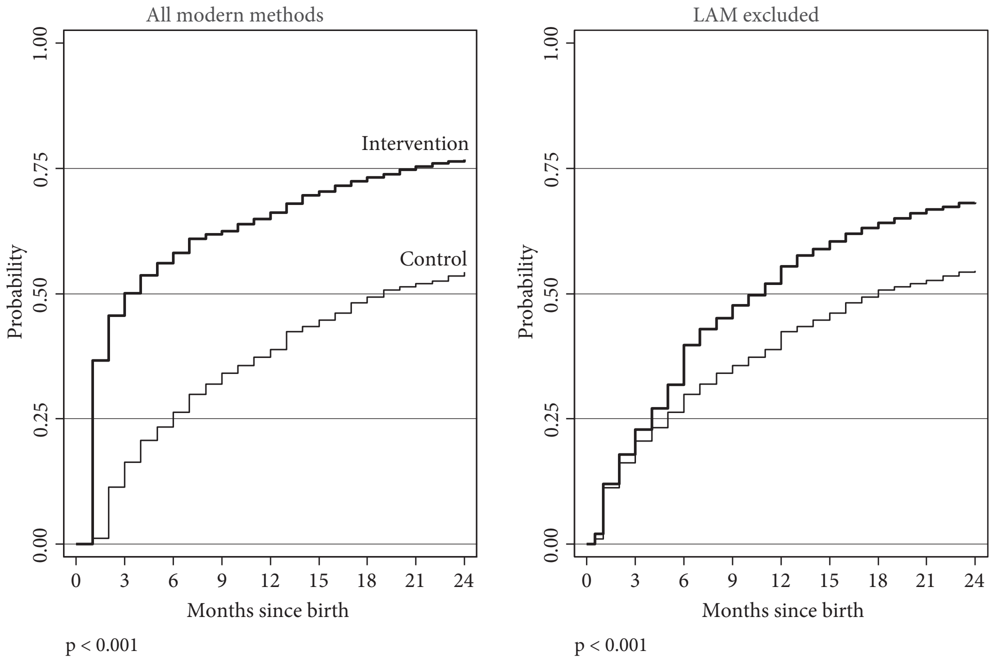
The sensitivity analysis for the robustness of censoring of women who had experienced the death of a child suggests that the estimated HRs with and without the exclusion of women who

TABLE 1 Selected baseline characteristics of participating women, by study arm

	Intervention (n = 2,247)		Comparison (n = 2,257)	
Characteristic	**N**	**%**	**N**	**%**
Woman's age (years) (mean)	26.5		26.6	
Woman's education (years of schooling) (mean)	4.5		4.1*	
Husband's education (years of schooling) (mean)	4.1		4.0	
Parity (mean)	2.2		2.2	
Religion				
Muslim	2,135	95.0	2,080	92.2
Hindu/other	112	5.0	177	7.8
Household wealth quintile				
Lowest	407	18.1	495	21.9***
Second	380	16.9	518	23.0
Third	440	19.6	461	20.4
Fourth	510	22.7	391	17.3
Highest	510	22.7	392	17.4
Fertility desire (at baseline)				
Want another child	1,340	59.6	1,257	59.6***
Want no more	582	25.9	733	32.5
Up to God	187	8.3	161	7.1
Undecided	138	6.1	106	4.7
Ever used contraceptives (before index pregnancy)				
Yes	405	18.0	481	21.1*
No	1,842	82.0	1,776	78.7

*Significant at $p < 0.05$; ***$p < 0.001$.
NOTE: P-values are adjusted for clustering effect at community level (design-effect >1) with Rao–Scott second-order corrected chi-square tests for categorical variables and with Tylor linearization method for continuous variables.

FIGURE 1 Cumulative probabilities of contraceptive adoption by study arm



experienced child death were similar (aHR of 2.54 without censoring, compared with 2.57 with censoring for all-method adoption including LAM; and aHR of 1.52 and 1.51, respectively, for all-method adoption without LAM).

Figure 2 shows the method-specific cumulative probabilities with p-values from the Wilcoxon test of the univariate Kaplan–Meier curves of contraceptive adoption by study arm. The acceptance of oral contraceptives (aHR=1.33) and condoms (aHR: 3.39) was higher in the intervention area. However, the adoption of traditional methods (withdrawal; periodic abstinence after the resumption of menses) was significantly higher in the comparison area (aHR=0.59). There were no differences in the adoption probabilities of injectables and female sterilization between the two study arms. The acceptance of IUDs was low in both areas (0.6 percent in the intervention area and 1.3 percent in the control area; Wilcoxon χ^2 p-value = 0.007), and the difference was not statistically significant in the multivariable hazards regression (p-value = 0.085).

CPRs, which indicate the point prevalence of a method used by women or their husbands at a specific cross-sectional time point, are shown in Table 2 for the period of 3, 6, 12, 18, and 24 months. The CPR at 12 months postpartum was 42 percent in the intervention area compared with 27 percent in the comparison area ($p < 0.001$). The CPR remained significantly higher in the intervention area at 24 months (46 percent versus 35 percent; $p < 0.001$). There were few changes in the CPR between 18 and 24 months in either trial arm. Women in the comparison area did not report the use of LAM in any survey round. In contrast, about 23 percent of women at 3 months and 12 percent at 6 months in the intervention arm reported the use of LAM.

The life-table analyses (Figure 3) of contraceptive continuation rates for the first 12 months after adoption show that continuation of oral contraceptives was significantly higher

FIGURE 2 Method-specific cumulative probabilities of contraceptive adoption by study arm

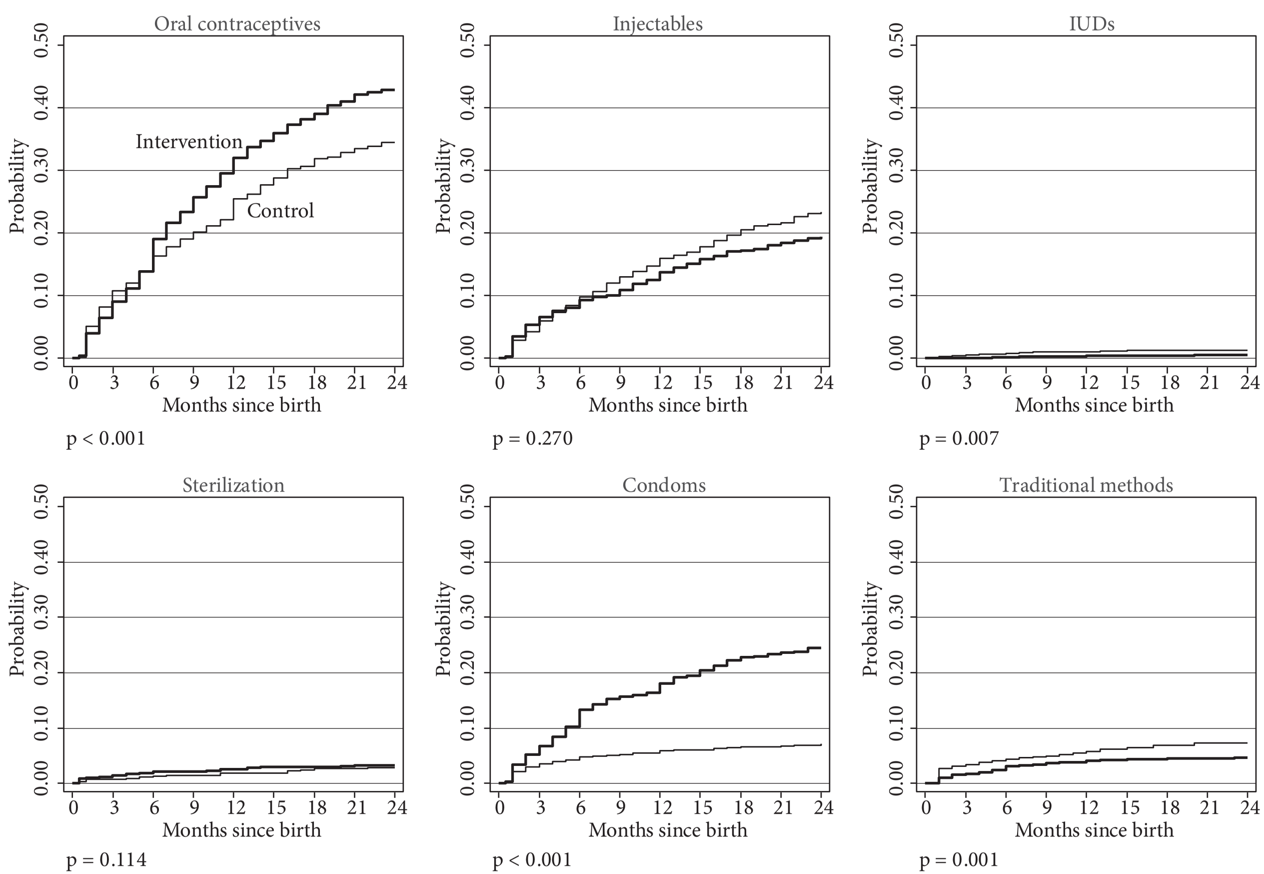


TABLE 2 Postpartum contraceptive prevalence rates at each survey round, by method and study arm

	Intervention										Comparison									
	3 months (n = 2,014)		6 months (n = 1,852)		12 months (n = 1,964)		18 months (n = 2,020)		24 months (n = 2,029)		3 months (n = 2,000)		6 months (n = 1,786)		12 months (n = 1,945)		18 months (n = 2,031)		24 months (n = 2,012)	
Method	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
LAM	459	22.8	220	11.9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Oral contraceptives	64	3.2	157	8.5	398	20.3	427	21.1	408	20.1	87	4.4	118	6.6	207	10.6	281	13.8	300	14.9
Condoms	74	3.7	133	7.2	191	9.7	194	9.6	164	8.1	34	1.7	36	2.0	65	3.3	63	3.1	51	2.5
Injectables	93	4.6	112	6.1	153	7.8	184	9.1	212	10.5	56	2.8	104	5.8	176	9.1	198	9.8	204	10.1
IUDs/Implants	1	0.1	4	0.2	23	1.2	31	1.5	53	2.6	10	0.5	19	1.1	28	1.4	39	1.9	53	2.6
Sterilization	21	1.0	38	2.1	37	1.9	60	3.0	69	3.4	7	0.4	14	0.8	17	0.9	29	1.4	45	2.2
Withdrawal or periodic abstinence	21	1.0	20	1.1	24	1.2	20	1.0	21	1.0	22	1.1	28	1.6	35	1.8	60	3.0	46	2.3
Any method user[a]	733	36.4	684	36.9	826	42.1	916	45.3	938	46.2	216	10.8	319	17.9	528	27.1	670	33.0	700	34.8

[a]Includes a small number of women using other methods. — = Not applicable.

FIGURE 3 Contraceptive continuation probabilities during first 12 months after adoption by study arm

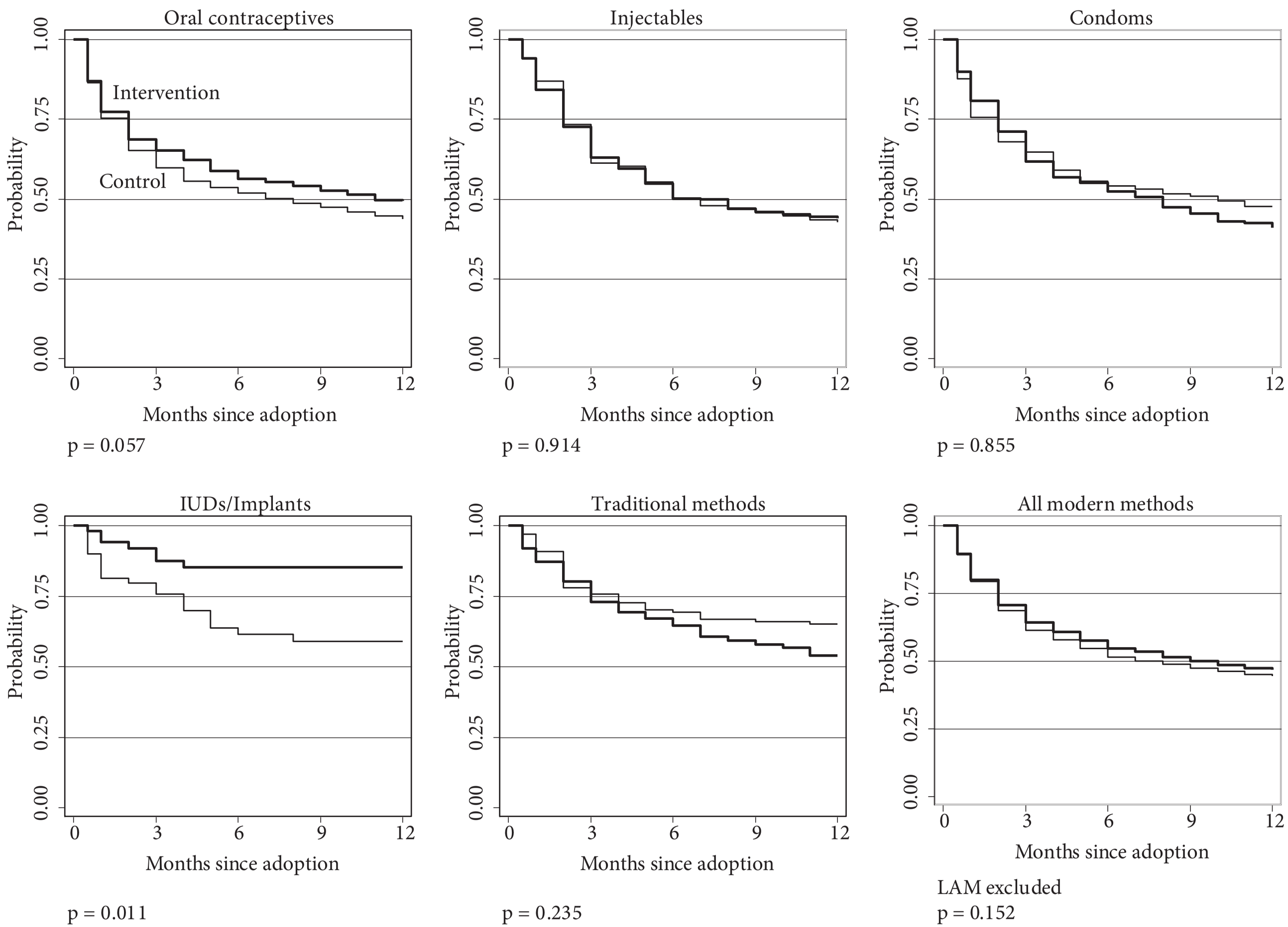


TABLE 3 Adjusted hazard ratios of contraceptive adoption and discontinuation risks between the intervention and control arms from the stratified analysis, by intervention change periods

	First period (CHWs provided counseling only and CMs conducted community meetings)	Second period (after CHWs allowed to provide oral contraceptives/ condoms)	Third period (after CHWs allowed to administer second and subsequent doses of injectables)	Total
All-method adoption				
With LAM	2.51***	2.60***	2.86***	2.57***
Without LAM	1.39***	1.56***	1.60***	1.51***
Method-specific adoption				
Oral contraceptives	1.21	1.43***	1.37**	1.33***
Condoms	2.52***	4.73***	3.53***	3.39***
Injectables	1.13	0.85	0.93	0.96
Method-specific continuation				
Oral contraceptives	0.94	0.74**	0.80	0.81**
Injectables	0.94	0.89	1.19	0.97

**Significant at $p < 0.01$; ***$p < 0.001$.
CHW = Community health worker. CM = Community mobilizer.

in the intervention arm (50 percent) than in the comparison arm (44.7 percent; aHR: 0.81). The continuation rate of IUDs/implants was also higher in the intervention arm (85.3 percent) than in the control arm (59.0 percent) but was not significantly different in the multivariable model (aHR: 0.32), primarily because of small sample size. The continuation rates of other methods were not significantly different between study arms. After discontinuation (n = 745), 34 percent of LAM users switched to oral contraceptives, 21 percent to condoms, 12 percent to injectables, 1 percent to IUDs/implants, and 2 percent to sterilization; 26 percent remained nonusers at 24 months (not shown).

The results of stratified analyses for the three periods when service provisions were added to the interventions are shown in Table 3. The hazard ratios for contraceptive adoptions were not substantially different across the periods; the risk of contraceptive adoption was at least 2.5 times higher (HR: 2.5) in the intervention arm, compared with the control arm, across all periods. Overall, the integration of FP counseling into CHW-delivered home-based MNH services appears to increase contraceptive adoption even in the absence of contraceptive provision by CHWs. Although there is some indication that contraceptive adoption increased further when provision of FP methods was added to the intervention, those increases were neither large nor statistically significant. Nevertheless, the continuation of oral contraceptive use has improved with the addition of oral contraceptive distribution. The discontinuation risk of oral contraceptives was 26 percent lower (HR: 0.74) in the intervention arm, compared with the control arm, after the CHWs started to distribute oral contraceptives; without the distribution provision, the discontinuation risk was only 6 percent lower (HR: 0.94).

Impact of Postpartum Contraceptive Use on Birth-to-Pregnancy and Birth-to-Birth Intervals

In results not shown here, the incidence of a subsequent pregnancy during the 24 months of postpartum observation was significantly lower ($p < 0.001$) in the intervention arm (28 percent) than in the comparison arm (34 percent). The results from logistic regression analysis show that the odds of a subsequent pregnancy within 24 months postpartum, adjusted to control for other confounding covariates, was 27 percent lower in the intervention arm. We also examined the differential in the short birth spacing (birth-to-birth) patterns by study arm. Of the 4,273 women who were interviewed at least once after 6 months, 678 (16 percent) had a live birth during the 24-month postpartum period. The rate of reporting a short birth interval of less than 24 months was significantly lower ($p = 0.010$) in the intervention area (14 percent) than in the comparison area (17 percent). The adjusted odds of a short birth interval <24 months was 23 percent lower in the intervention arm.

DISCUSSION

We have shown that the integration of FP with an MNH program significantly increased contraceptive use and reduced early pregnancy and short birth intervals within the first 24 months postpartum. In the intervention group, the CPR remained significantly higher during the first 24 months postpartum, the odds of pregnancy were reduced by 27 percent, and the odds of a short birth interval <24 months were reduced by 23 percent. However, the impact of the intervention on improving the contraceptive continuation rate was limited. Our stratified analysis by three periods corresponding to changes in CHWs' provision of contraceptive-method distribution (oral contraceptives, condoms, and injectables) suggests that the integration of FP counseling increased contraceptive adoption even when the program did not include contraceptive delivery.

Our study has some limitations. Given the small number of clusters, it was not possible to conduct a true randomized experimental trial; we used a quasi-experimental trial design, which is less robust to the threats to validity. We adjusted for any observable differences in sociodemographic and economic variables, fertility desire, and past contraceptive use through multivariable regression analyses. However, any bias due to unobservable factors cannot be ruled out. Another problem was the addition of contraceptive-delivery services (oral contraceptives, condoms, and injectables) by CHWs during the latter part of the project. We performed a stratified analysis to examine whether the addition of contraceptive-delivery provision affected or biased the impact of the intervention. Blinding to study arm was not possible because of the nature of the intervention.

Follow-up visits revealed that a larger proportion of husbands in the intervention area than in the comparison area were migrant workers, mainly living in Middle Eastern countries. The absence of husbands working abroad is likely to affect women's contraceptive use, and the differentials in the distribution of migrant husbands between the two study arms may affect the study results. However, because the proportion of migrant husbands was higher in the intervention area, the results are unlikely to be biased positively toward showing higher contraceptive use in that area.

Most studies examining the effect of postpartum interventions on increasing birth spacing or reducing frequent childbearing have been conducted in the United States and other developed countries, predominately among high-risk adolescent populations, and the results of these studies have been mixed (Corcoran and Pillai 2007; Lopez et al. 2012). These studies were predominately randomized controlled or quasi-experimental trials, with varying degrees of intensity in the intervention. Although many of these interventions were found to be effective in improving contraceptive use and reducing repeat pregnancies in the initial period, their effectiveness could not be sustained for a longer period. Very few studies have been conducted on the effect of postpartum FP interventions at the community level in developing countries, where most women deliver at home and where rates of postpartum care at health facilities are low. A randomized controlled trial in Syria found that home visits during the postpartum period did not increase contraceptive uptake in the intervention arm compared with the control arm (Bashour et al. 2008). However, another randomized controlled study conducted in Uttar Pradesh, India, found that an intervention targeting birth spacing increased the odds of postpartum contraceptive use by more than three times in the intervention area compared with the control area (Sebastian et al. 2012).

Salway and Nurani (1998, p. 52) suggested that the policy of "promoting contraception immediately after birth is inappropriate" in Bangladesh because women are reluctant to initiate contraception soon after birth and the majority of women in Bangladesh breastfeed their infants for an extended period (median duration of any breastfeeding is 29 months: BDHS 2011). In fact, however, about one-third of second- and higher-order births in Bangladesh occur following birth intervals (birth-to-birth) of less than 36 months. We consider that an integrated FP program with MNH services provides an environment conducive to adopting and practicing contraception during the postpartum period and reducing the risk of short birth intervals <24 months.

Contraceptive counseling and provision have become a standard part of postpartum care in all developed countries (Lopez, Hiller, and Grimes 2010); however, women have limited access to such services in many resource-poor settings. A renewed interest has emerged in recent years in integrating health programs in order to maximize their effectiveness as part of the continuum of care in maternal, neonatal, and child health (Kerber et al. 2007; Ekman, Pathmanathan, and Liljestrand 2008).

Our study demonstrates that integrating FP services within existing community-based MNH programs is feasible and effective. While a major challenge of early postpartum FP programs was how to reach postpartum women who deliver at home, our results show that an MNH program may serve as the gateway to reach women during the antenatal and postpartum period and thus improve their contraceptive access and use, reduce unwanted births, prolong birth intervals, and thereby improve the survival of children and the health of their mothers.

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ACKNOWLEDGMENTS

This publication was made possible through support provided by the Office of Health, Infectious Diseases, and Nutrition, Global Health Bureau, United States Agency for International Development (USAID), under the terms of Award No. GHS-A-00-08-00002-00, Maternal and Child Health Integrated Program (MCHIP)-Leader with Associates Cooperative Agreement. The opinions expressed herein are those of the authors and do not necessarily reflect the views of USAID. We thank USAID; the staff of the Healthy Fertility Study; Amnesty LeFevre; Emma Williams; representatives of the Bangladesh Ministry of Health and Family Welfare at the subdistrict, district, and central levels; and members of the collaborating NGO Shimantik's executive committee for their valuable help and advice. We also thank Nicole Simmons and Sarah Bradley for comments on an earlier version of this article.