

Role of Maternal and Child Health Care Services on Postpartum Contraceptive Adoption in India

SAGE Open
July-September 2017; 1–12
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DOI: 10.1177/2158244017733515
journals.sagepub.com/home/sgo


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Abstract

The aim of this article is to examine the impact of maternal and child health care (MCH) service utilization on the timing of initiation and type of contraceptive use in the subsequent months after delivery of the most recent child. The required data were extracted from India's third round of National Family Health Survey conducted during 2005–2006, which first time provides the 5 years retrospective monthly information about contraceptive history. Overall, 36,115 currently married women who had delivered live birth during 5 years preceding the survey were included in the analysis. Discrete-time complementary log-log multilevel model was applied to examine the impact of MCH service utilization on the timing of initiation and type of contraceptive use in the subsequent months after delivery of the most recent child. Result shows that after controlling the impact of socioeconomic factors, women who visited health center more than twice for antenatal care (ANC; coefficient = 0.28, SE = .02) were more likely to initiate modern contraceptive methods compared with women who had lower number of visits (coefficient = 0.16, SE = .02). Findings also show that compared with ANC visits, postnatal care did not emerge as a significant factor for contraceptive adoption. Study shows that among programmatic factors, all the three selected MCH indicators emerged as significant predictors of early contraceptive adoption. A significant program implication of the findings is that the promotion of more number of ANC visits, institutional delivery, and postnatal care within 2 weeks of delivery services should be regarded as a mechanism to promote postpartum family planning use.

Keywords

maternal and child health care, postpartum contraceptive, India, National Family Health Survey-III, ANC visits, institutional delivery, postnatal care utilization, reproductive calendar data

Strengths and Limitations of This Study

- This is the first study in India that investigates the impact of maternal and child health care (MCH) service utilization on the timing of initiation and type of contraceptive use in the subsequent months after delivery of the most recent child.
- The study's main strength is the analysis of retrospective monthly information about contraception in calendar data. These calendar data provide detailed information about 5-year contraceptive history but has hardly been used in India.
- The study is important because the probability of conception after childbirth is a vital question for those who do not hurry to conceive a new baby just after birth.
- A limitation of the study is that the analysis does not control the effect of availability of contraceptive as National Family Health Survey (NFHS) do not provide this information.

- Another limitation is that the information on 5-year monthly contraceptive use is subject to recall bias, which can affect the quality of the resulting data.

Introduction

Recently, the time span between births was a subject of renewed interest in the field of maternal and child health due to the increased risk of adverse perinatal outcomes like the risk of low birth weight, small-for-gestational age, and infant death (Conde-Agudelo, Rosas-Bermúdez, & Kafury-Goeta, 2006). In a wide range of populations, linkages between

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short birth interval and high infant mortality have been established (Rutstein, 2008; Rutstein & Johnston, 2004). Moreover, the study based on India and Bangladesh shows that women who had short and long birth intervals had a considerably higher chance of maternal complications (DaVanzo et al., 2004; Whitworth & Stephenson, 2002). Women having 27 to 32 months interval between their babies are more likely to avoid anemia, third trimester bleeding, and infant death. A longer interval between births helps the mother to recover from pregnancy and consequentially it improves the chances of having next birth as a full gestation and growth. Also, longer birth interval helps the mother to allocate enough time and care for each child in terms of breastfeeding, food, and nutrition (Gibson & Gurmu, 2011; Lawson & Mace, 2009; National Research Council, 1989). The third round of the National Family Health Survey (NFHS) data shows that 84% women visited a health center at least once to receive maternal and child health care (MCH) services like antenatal care (ANC), institutional delivery, and postnatal care. In this situation, MCH center would be hypothesized as the best place to motivate women or couple for early adoption of contraceptive, and this motivation works as a strong linkage between utilization of MCH services and contraceptive use. Apart from motivation, the association between utilization of MCH and family planning services is plausible for several reasons. First, integrated service of MCH with family planning services was recognized as a key strategy to adopt contraceptive among those women who have utilized maternal health care. This mechanism would work because providing all the services at one place is cost-effective and responds to the manifold demands on women's time. Colombia, Indonesia, Mexico, the Philippines, and Thailand provide a successful example of this strategy (Foreman, 2011).

Second, MCH services were the logical and strategic entry point into the health center during the first pregnancy. During the utilization of MCH services, women's contact with the health workers may help them in developing trust on the health care systems. This trust provides motivation to use multiple services and plays a key role in improving the health status of women and by establishing strong medical relationships. The lack of patient trust was linked with less communication between health workers and patient, poor clinical interaction exhibiting less continuity, and reduced utilization of preventive health care services (Musa, Schulz, Harris, Silverman, & Thomas, 2009; O'Malley, Sheppard, Schwartz, & Mandelblatt, 2004; Pearson & Raeke, 2000; Thom, Hall, & Pawlson, 2004).

The chance of contraceptive adoption will be increased if health workers provide proper motivation and appropriate information about safe and effective birth control methods. This motivation, information, and trust can help to condense the social barriers for accessing the family planning services. Also, a woman's precontact with health care systems may also lower down the cognitive, psychosocial, and indirect

economic impediments in the forms of time and opportunity costs to the subsequent use of family planning service.

Appropriate timing and spacing of pregnancies, which is possible through the proper use of contraceptive, have positive effects on maternal health and newborn outcomes. In contrast to this, short birth intervals (less than 24 months) have a potential effect on the augmented risk of maternal death and pregnancy complications (Blurton & Bushman, 1986; Bongaarts, 1987; Conde-Agudelo, Belizán, & Lindmark, 2000). Improved use of family planning services can reduce maternal and child morbidities and mortality (Li, Fortney, Kotelchuck, & Glover, 1996).

Studies show that several maternal characteristics and socioeconomic status affect the contraceptive adoption and subsequently interpregnancy interval (Sharan & Valente, 2002). Among them, few studies have studied the association between utilization of maternal health care services with contraceptive use after having a child (Hotchkiss et al., 1999; Ahmed & Mosley, 2002). Initially, literature suggests the positive impact of utilization of MCH services and ever use of family planning methods (Seiber, Hotchkiss, Rous, & Berruti, 2005; Sinha, 1997). However, ever use of contraceptive was a time independent indicator; therefore, studies found difficulty while examining the "impact phenomena."

Moreover, literature suggests that though the integration of MCH and FP services has come to focus following the International Conference on Population and Development in Cairo (Hardee & Yount, 1995), only a few papers based on some developing countries have tested the linkages between utilization of MCH services and contraceptive use (Hotchkiss et al., 1999; Seiber et al., 2005; Zerai & Tsui, 2001).

In this regard, addressing the research question "Does utilization of MCH service influence subsequent contraceptive adoption and choice of methods?" holds significant implications for policy planner. Therefore, this intends to investigate the impact of MCH service utilization on the timing of initiation and type of contraceptive use in the subsequent months after delivery of the most recent child using reproductive calendar data. MCH indicators include ANC visits, institutional delivery, and postnatal care utilization. It was decisive to understand this because the likelihood of conception after childbirth was an essential question for those who do not have the urgency to conceive a new baby just after birth.

Data and Method

Data for the study have been taken from the third round of NFHS conducted in the year 2005-2006. The NFHS data are in cross-sectional format but for the first time NFHS-III provides the retrospective monthly information about contraception in calendar data. The study makes use of calendar data collected in concurrence with the individual questionnaire. The ever-married women who, or whose husband, was not sterilized at the start of the calendar were asked to report retrospectively their pregnancy status, pregnancy outcomes,

and contraceptive use on a month-by-month basis for the past 5 years from the date of survey. The NFHS-III also has information about prenatal, delivery, and postnatal care from those women who had a birth during 5 years preceding the survey. The initiation of postpartum contraceptive use was examined using calendar data by extracting the information of first use of contraceptive in subsequent months after having the last birth during 5 years preceding the survey. For outcome, the analysis examines the duration that leads to the use of any methods of contraception versus nonuse after having a recent pregnancy with the possibility of censoring. The censored observations were the subjects who have not yet experienced the event during the observation period. Right censoring occurs when women do not initiate contraceptive use till the end of the observation period.

However, in left censoring cases, data points below a certain value were unknown. In the present objective, left censored cases were events experienced by women before calendar start and were not the interest of study subject.

The time period of each interval is recorded in NFHS survey to the nearest completed months, so we have adopted the discrete-time approach. As data were recorded in the nearest months, it may contain a number of ties which means two women may start contraceptive in the same months, and this may lead to biases if partial likelihood estimation was used (Steele, Diamond, & Amin, 1996). When time was collected in discrete periods, the conditional hazards of event occurrence in each time period have a bounded nature, with the lower and upper limits of 0 and 1. Therefore, it was essential to convert the hazards into another scale that does not have any bound and can be expressed in a linear function of independent variables (Brett, Todd, & Noel, 2011).

Multilevel Discrete-Time Model

Assuming that time was divided into p intervals with discrete time $T = t$, where t in $(1, \dots, p)$ denotes an observed event in interval, the discrete proportional hazard function (complementary log-log model) for woman i in primary sampling unit (PSU) j is

$$\log(-\log(1 - h_{ij}(t))) = \beta_0 + \sum_{p=1}^q \beta_p \mathbf{x}_{pij} + f(t) + u_j,$$

where $\mathbf{x}_{ij}$ was a vector of covariates, β is a vector of parameters to be estimated and represents the effect of the covariates on the baseline hazard, u_j was the random-effect for PSU j and was assumed to be normally distributed with mean 0 and variance σ_u^2 , and $f(t)$ was a function of time to model the baseline hazards function.

After choosing a discrete-time approach, complementary log-log has been chosen as a link function. Under the assumption of binary response, the complementary log-log model was one of the alternatives to logit model. Over the log-odds transformation, the complementary log-log transformation

was preferred due to proportional hazards assumption. Moreover, for small hazards, results from complementary log-log link and logit link were closer to each other (Singer & Willett, 2003).

The advantage of complementary log-log model over logit and probit models was that when given data were not symmetrical in the $[0,1]$ interval and slowly increase at small to moderate value but sharply increases near 1, the other two models, logit and probit, were inappropriate; however, the complementary log-log model might give a satisfactory answer. Unlike logit and probit, the complementary log-log model was asymmetrical and used when the probability of an event was either very small or very large.

Inclusion Criteria

In the first stage, 36,115 currently married women who had delivered live birth during 5 years prior to the survey were included in the analysis. Previous research shows that FP use was more likely in the month following menses return (Becker & Ahmed, 2001). Of total 36,115, only 25,992 women had resumed menstruation at the time of the survey. However, the analysis also includes those women who have not resumed the menstruation as it was observed that woman may not be able to differentiate between postpartum bleeding (known as lochia) and resumption of menstruation. Finally, analysis of this article was based on 36,115 currently married women.

Outcome

The outcome of interest was the duration of first use of a modern or traditional contraceptive method after having the last child. The modern methods include pill, intrauterine device (IUD), injections, condom, and sterilization, whereas the traditional contraceptive methods include use of periodic abstinence, withdrawal, and other traditional methods.

Independent Variables

The independent variables were the utilization of antenatal, postnatal, and delivery care services corresponding to the last childbirth during the 5 years preceding the survey.

The following questions and categories were used to construct these variables:

1. Number of ANC visits (No ANC visit/1-2 visits/3+ ANC visits)
2. Place of delivery of last child (hospital/home delivery)
3. Received postnatal check-ups (within 2 weeks after the delivery/no or after 2 weeks).

All the above-mentioned program variables were converted to binary response using dummy variables.

Control Factors

In this study, following factors were hypothesized to directly affect contraceptive use. Under community-level variables, region (central/north/east/northeast/west/south) and place of residence (rural/urban) were included. Household-level variables include religion of head of the household (Hindu/Muslim/Others [it includes other than Hindu and Muslim religion]), caste of head of the household (others [it includes other than scheduled caste and scheduled tribe]/scheduled caste/scheduled tribe), and wealth index of household (poorest/poor/middle/richest). The individual-level variables include women's age (15-24/25-29/30-34/35-49), educational status of women and their partners (illiterate/literate but below primary level/primary school completed but below middle level/middle school completed but below high school/high school and above), respondent ever experienced child loss (no child loss/at least one child loss), sex composition of living children (number of living sons [nls] = number of living daughters [nld]/no living child/nls < nld/nls > nld), total number of births women have (1-2/3-4/5+), desire for more number of children (wanted another child/wanted no more/sterilized or infecund), wanted status of last child (wanted/mistimed/unwanted), exposure to family planning through mass media (no exposure/exposure through print media/exposure through electronic media), ever use family planning (no/yes), and breastfeeding status (no/yes). These covariates have been previously considered appropriate to assess mechanisms that influence contraceptive adoption in other developing countries (Alemayehu, Belachew, & Tilahun, 2012; Dwivedi & Sundaram, 2000; Hernandez, Sappenfield, Goodman, & Pooler, 2012; Stephenson, Baschieri, Clements, & Hennink, 2007). Earlier studies have also considered knowledge of family planning methods, but NFHS-III data show that knowledge of one or more modern methods of contraception was nearly universal; only 1.6% currently married women reported having no knowledge of contraceptive methods. Ever use of any contraceptive methods was found to be relevant to adjust in determining the outcome as data show that 38% women have never used any contraceptive methods. To obtain estimates, MLwiN software version 2.15 (<http://www.cmm.bristol.ac.uk/MLwiN>) has been used.

Results

Table 1 shows the socioeconomic and demographic characteristics of the currently married women who had at least one birth during last 5 years preceding the date of survey. A total of 36,115 currently married women were included in the study, of which 29% belonged to the central region and one fourth to the eastern region; 73% were rural residents, and around 79% belonged to Hindu religion. With respect to the age distribution, 41% women were aged 15 to 24 years, whereas one third women were in the age group 25 to 29 years. About 47% respondent had no education, 15% had

primary-level education, and 18% had high school and above education. With respect to partner's education, 32% had high school and above education.

A large proportion of women had one to two children, and 28% had three to four children at the time of the survey. A majority (42%) of women wanted no more children, 36% wanted another child in future, whereas remaining 22% women were either sterilized or infecund. Of the total, 78% women reported that their last child was wanted whereas 10% and 13% women reported mistimed and unwanted status, respectively. Table 1 also depicts that one fourth of the women had gone to health facility for ANC at least 1 to 2 times whereas 52% of the women utilized ANC more than twice. Of the total, only 42% delivered recent birth in an institution and two out of five women received postnatal care.

Figure 1 shows the percentage of different demographic events related to pregnancy and contraceptive use after having last birth. The proportion of mothers who did not adopt contraception after last birth was significantly high (40%). The figure clearly shows that 19% women have used any spacing method; 9% women used condom, 7% used pill, 3% adopted IUD, and rest of women used other form of modern spacing methods. Twenty percent mothers had used permanent method, although as expected, compared with male, the proportion of female was higher in adopting the limiting method. Eleven percent has used traditional contraceptive methods as their last delivery.

Seven percent women reported that they have not used any type of contraceptives after having birth and were again pregnant, and only 3% reported that after having last birth, they had experienced termination of birth. It was calculated that 17% pregnancies were mistimed, and 14% pregnancies were unwanted.

Table 2 shows that, among the women who had initiated contraceptive use after having birth, female sterilization was the dominant contraceptive method. Condom was the second most popular method choice among modern spacing methods. About 7% women adopted pill after having recent birth. Among the women who adapted traditional contraceptive, a majority of them practiced periodic abstinence. The analysis also shows that among mothers who did not adopt contraception after having last birth, 84% women reported that they have never used any type of contraceptives. Only 17% mothers used any form of contraceptives before having last birth. In the study sample, 382 mothers reported that they had delivered birth in the month of interview. Moreover, the proportion of contraceptive users among women who were at zero parity was around 8.01% (683 women).

Timing of Contraceptive Adoption

For examining the pattern of contraceptive use during the postpartum period, a comparison has been made among those women who adopted spacing, limiting, and traditional

Table 1. Percentage Distribution of Currently Married Women by Selected Background Characteristics, India, NFHS-2005-2006.

Background characteristics	%	Frequency
Regions		
Central	28.87	8,634
North	12.10	5,617
East	25.25	5,730
Northeast	4.01	6,700
West	12.93	4,112
South	16.84	5,322
Place of residence		
Rural	73.12	21,852
Urban	26.88	14,263
Religion		
Hindu	78.96	25,414
Muslim	16.33	5,742
Others	4.71	4,959
Caste of women		
Others	70.68	24,427
Scheduled caste	20.01	6,215
Scheduled tribe	9.32	5,473
Wealth index		
Poorest	23.92	5,990
Poorer	21.67	6,336
Middle	19.60	7,242
Richer	18.41	7,999
Richest	16.39	8,548
Age of the respondent		
15-24	41.12	13,163
25-29	32.51	12,188
30-34	16.90	6,884
35-49	9.47	3,880
Respondent education		
Illiterate	47.37	13,839
Literate but below primary	7.11	2,698
Primary but below middle	14.75	5,419
Middle but below high school	12.36	5,267
High school and above	18.42	8,891
Partner education		
Illiterate	28.60	8,452
Literate but below primary	7.39	2,656
Primary but below middle	15.25	5,417
Middle but below high school	16.78	6,468
High school and above	31.98	13,122
Child loss		
None	78.73	29,581
1+	21.27	6,534
Sex composition of living children		
No sons and no daughters	1.29	394
No. of sons greater than daughters	38.99	13,968
No. of sons less than daughters	38.68	14,097
Equal no. of sons and daughters	21.05	7,656
Birth order		
1-2	54.97	20,852
3-4	27.81	9,892

(continued)

Table 1. (continued)

Background characteristics	%	Frequency
5+	17.22	5,371
Desire for more number of children		
Wanted another children	35.90	13,025
Wanted no more	41.81	15,742
Sterilized or infecund	22.29	7,348
Wanted last child		
Wanted	77.94	28,262
Mistimed	9.49	3,759
Unwanted	12.58	4,094
Heard FP through mass media		
No exposure	68.06	24,843
Exposure through print media	2.59	1,125
Exposure through electronic media	29.35	10,147
Ever use FP		
No	41.31	14,025
Yes	58.69	22,090
Currently breastfeeding		
No	37.59	14,447
Yes	62.41	21,668
ANC visits		
No visits	23.45	7,038
1-2 visits	24.58	7,497
3+ visits	51.96	21,580
Institutional delivery		
No	58.46	18,711
Yes	41.54	17,404
Postnatal check up within 2 weeks		
No	59.93	19,486
Yes	40.07	16,629
Total	100.00	36,115

Note. Percentages are weighted and sample size based on unweighted.
 NFHS = National Family Health Survey; FP = family planning;
 ANC = antenatal care.

methods at five different postpartum periods (Table 3). Among women who had adopted contraceptives within 6 months after delivery, a majority of the women or their partner (46%) had adopted sterilization followed by the spacing methods (32%). This clearly implies that immediately after delivery, most of the couples were interested in adopting an effective contraceptive method. Around four out of 10 women preferred to use spacing methods during 7 to 12 months after having birth. Among the women who had adopted contraceptive after 1 year of delivery, 28% preferred to use the spacing methods.

Recent research asserted that short birth interval was associated with an adverse maternal and child health outcome. Higher risk of preeclampsia, preterm birth, low birth weight, early neonatal, and maternal deaths can be prevented if births are spaced more than 18 to 24 months apart (Cecatti, Correa-Silva, Milanez, Morais, & Souza, 2008; Conde-Agudelo et al., 2006; Conde-Agudelo, Rosas-Bermúdez, &

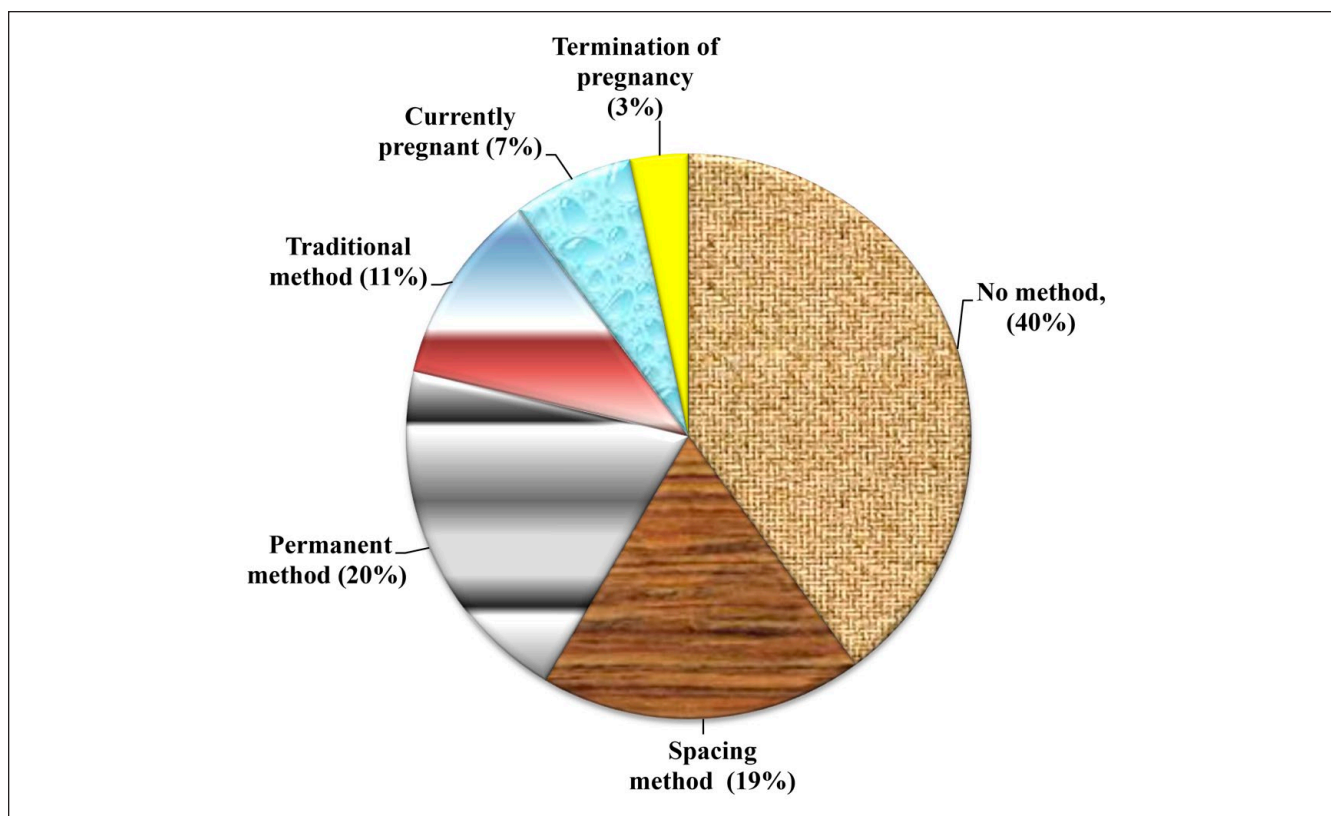


Figure 1. Percentage of different demographic events related to pregnancy and contraceptive use after having last birth, NFHS-2005-2006.

Note. NFHS = National Family Health Survey.

Kafury-Goeta, 2007). Table 3 clearly shows that around one third women reported that they were currently pregnant at the time of survey, and interval between last birth and current pregnancy was less than 18 months. One fifth of the women who had experienced termination of pregnancy after having birth had a pregnancy interval of less than 18 months.

Adjusted Effect of MCH Services Utilization on Initiation of Contraceptive Use

The present objective was undertaken to test the effectiveness of utilization of MCH services, that is, ANC, institutional delivery, and postnatal care services on early adoption of contraceptive methods. Initially, the dependent variable of the model was time to adopt any contraceptives (spacing, limiting, or traditional methods) versus no method, but at the time of discrete-time complementary log-log multilevel modeling, we have excluded those women who were using traditional or sterilization method. The possible reason could be at the time of MCH services utilization, health workers educate couples about early adoption of modern contraceptive methods to increase the interval between pregnancies. Therefore, we have excluded

women who have adopted traditional contraceptive methods after having birth. If women or their husbands were sterilized after having last birth, they were also excluded from the analysis. Research shows that couples adopt sterilization after completion of the desired number of children (Char, Saavala, & Kulmala, 2009; Padmadas, Hutter, & Willekens, 2004). Finally, the dependent variable was time to initiate any modern spacing methods versus no method.

Table 4 presents the results obtained from the discrete-time complementary log-log multilevel model on adoption of modern spacing methods in India during 2005-2006. As the previous studies have already shown that MCH indicators were interlinked, we have not included all studied MHC indicators in one model. Therefore, analysis has been carried out by considering each selected MCH indicators separately in the discrete-time multilevel models along with socioeconomic and demographic indicators. In Model 1, in addition to socioeconomic and demographic factors, visits for ANC; in Model 2, use of institution for delivery; and in Model 3, utilization of postnatal care services have been included.

Findings show that across all the three models, women from rural areas had a lower chance of early initiation of

Table 2. Percentage of Women Who Adopted Contraceptive Methods and Pregnancy Status After Having Birth During Last 5 Years Preceding the Survey, India, NFHS-2005-2006.

Adopted contraceptive methods after having birth	%
No method	40.47
Pill	6.63
IUD	2.62
Injections	0.21
Diaphragm	0.00
Condom	8.82
Female sterilization	19.84
Male sterilization	0.34
Periodic abstinence	7.31
Withdrawal	3.11
Female condom	0.01
Foam or jelly	0.01
Currently pregnant	6.85
Other traditional method	0.50
Termination of pregnancy	3.24
Total	100.00

Note. NFHS = National Family Health Survey.

modern contraceptive methods after having index birth. The absence of early initiation of modern methods was also found among women from non-Hindu/Muslim religion and who were more than 29 years of age. Moreover, Muslim religion was not associated with early adoption of modern contraceptive after controlling socioeconomic characteristics of women.

As expected, women from scheduled caste and tribe had a higher risk of not early initiation of modern contraceptive methods as compared with women from nonscheduled caste/tribe. Women and their partner's education were positively related to the early initiation of modern contraceptive methods. Household wealth had statistically significant association with contraceptive adoption.

The result also shows that chances of early contraceptive adoption were low among women who ever had child loss. Motivation to practice family planning as measured by exposure to print media failed to make a statistically significant difference. Women who had more than two ANC visits (coefficient = 0.28, *SE* = .02) were more likely to adopt modern contraceptive methods as compared with women who had a lower number of visits (coefficient = 0.16, *SE* = .02). Among programmatic factors, all the three maternal child health care indicators emerged as a significant predictor of early contraceptive adoption. An explanation for this might be that at the time of utilization of MCH services, the health workers provide the information about the availability and accessibility of various contraceptive methods. Once women come to know about the different types of birth control methods, the chances are higher than they would adopt contraceptive methods.

Discussion and Conclusion

Regardless of the various policies and programs to improve the availability of family planning services, high level of unmet need for family planning during postpartum period is still present in many developing countries including India (Westoff, 2006). At the London Summit on Family Planning, special attention was paid to postpartum family planning through the release of the "Statement for Collective Action for Postpartum Family Planning." This underscores the importance of emphasizing counseling and providing methods for postpartum women. The statement recognized postpartum family planning as the avoidance of unwanted/mistimed and closely spaced pregnancies during the first year after delivery.

A number of previous studies have focused on the level, trends, and differentials of contraceptive use. Some researchers have made an attempt to bring out the reasons for nonuse of contraceptives (Dixit, 2012; Sedgh, Hussain, Bankole, & Singh, 2007; Westoff, 2006). However, the linkage between the utilization of MCH services and early adoption of modern contraceptives remains relatively less explored. Therefore, this study aims to identify the influence of women's contact with the health workers during utilization of ANC, delivery care, and postnatal care on early initiation of contraceptive during the postpartum period. Particularly, the emphasis has been given to examining how utilization of MCH services affect type and timing of contraceptive initiation after having last birth. It was hypothesized that at the time of use of MCH services, women come into contact with the health workers and, therefore, receive education about the importance of healthy interpregnancy interval through early contraceptive adoption. A detailed examination was warranted, so that policy makers implement the intervention at MCH center, which was considered as the first entry point of women in the health center.

The result reflects that substantial, considerable proportion of mothers during the postpartum period did not use any contraceptives and became susceptible for early pregnancy. It was observed that only 32% women adopted spacing methods within 6 months of postpartum period. Moreover, one out of five women adopted traditional contraceptive methods within 6 months after having birth. The contributions of several socioeconomic and demographic characteristics that were important for family planning practice were also highlighted in this study. Models identified region and place of residence of women, religion, caste of women, wealth index of the households where women live, women's age, education, their partner's education, family size, and wanted status of the last child as the most important explanatory factors for contraceptive adoption after having birth.

After adjusting for the socioeconomic and demographic characteristics, the results clearly indicate that women's place of residence did reliably predict early initiation of modern spacing methods. Urban residents were more likely

Table 3. Percentage of Contraceptive Use After Having Recent Birth by Postpartum Time Period, India, NFHS-2005-2006.

Time from last birth to contraception (in months)	Type of contraceptives used and pregnancy outcome after having recent birth				
	Spacing method	Limiting method	Traditional method	Currently pregnant	Termination of pregnancy
1-6	31.90	46.11	19.01	1.27	1.71
7-12	38.88	22.05	21.33	9.66	8.08
13-18	27.69	17.26	22.20	23.57	9.28
19-24	22.17	17.14	10.76	38.09	11.84
25-59	16.24	13.68	6.92	47.49	15.68
Total	30.74	33.89	18.33	11.51	5.52

Note. NFHS = National Family Health Survey.

Table 4. Results Obtained From Discrete-Time Complementary Log-Log Multilevel Models on Modern Contraceptive Adoption by Selected Background Characteristics, India, 2005-2006.

Background characteristics	Model 1		Model 2		Model 3	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
Constant	-3.19	.10	-3.05	.10	-3.04	.10
Regions						
Central®						
North	0.11	.07	0.14	.07	0.13	.07
East	0.49	.07	0.51	.07	0.51	.07
Northeast	0.29	.06	0.30	.06	0.30	.06
West	-0.26	.07	-0.23	.07	-0.23	.07
South	-0.85	.07	-0.81	.07	-0.81	.07
Place of residence						
Rural®						
Urban	0.35	.04	0.36	.04	0.40	.04
Religion						
Hindu®						
Muslim	0.01	.02	0.00	.02	0.00	.02
Others	-0.15	.02	-0.15	.02	-0.15	.02
Caste						
Others®						
Scheduled caste	-0.07	.02	-0.08	.02	-0.08	.02
Scheduled tribe	-0.18	.02	-0.18	.02	-0.19	.02
Age of the respondent						
15-24®						
25-29	0.11	.01	0.12	.01	0.12	.01
30-34	-0.04	.02	-0.03	.02	-0.03	.02
35-49	-0.37	.02	-0.37	.02	-0.37	.02
Respondent's education						
Illiterate®						
Literate but below primary	0.23	.02	0.23	.02	0.23	.02
Primary but below middle	0.31	.02	0.32	.02	0.32	.02
Middle but below high school	0.40	.02	0.41	.02	0.41	.02
High school and above	0.57	.02	0.59	.02	0.59	.02
Partner's education						
Illiterate®						
Literate but below primary	0.07	.02	0.09	.02	0.08	.02
Primary but below middle	0.16	.02	0.18	.02	0.17	.02
Middle but below high school	0.21	.02	0.23	.02	0.23	.02
High school and above	0.24	.02	0.25	.02	0.25	.02

(continued)

Table 4. (continued)

Background characteristics	Model 1		Model 2		Model 3	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
Wealth index						
Poorest®						
Poorer	0.15	.02	0.16	.02	0.16	.02
Middle	0.39	.02	0.41	.02	0.41	.02
Richer	0.52	.02	0.54	.02	0.54	.02
Richest	0.62	.03	0.65	.03	0.65	.03
Child loss						
None®						
1+	−0.24	.01	−0.23	.01	−0.23	.01
Sex composition of living children						
No child®						
No. of sons greater than daughters	1.61	.08	1.60	.08	1.59	.08
No. of sons less than daughters	1.42	.08	1.42	.08	1.41	.08
Equal sons and daughters	1.77	.08	1.76	.08	1.75	.08
Mass media exposure						
No						
Print media	0.02	.03	0.03	.03	0.03	.03
Electronic media	0.08	.01	0.08	.01	0.08	.01
Child status						
Wanted						
Mistimed	0.23	.02	0.23	.02	0.23	.02
Unwanted	0.29	.02	0.28	.02	0.28	.02
Parity						
1-2						
3-4	0.24	.01	0.23	.01	0.22	.01
5+	0.54	.02	0.49	.02	0.49	.02
Breast feeding						
No						
Yes	−0.78	.01	−0.78	.01	−0.78	.01
ANC visits						
No						
1-2	0.16	.02				
3+	0.28	.02				
Place of delivery						
Home						
Institute			0.05	.01		
Postnatal care						
No						
Yes					0.05	.01
Random effects						
PSU level	1.30	.03	1.32	.03	1.31	.03

to early initiate contraceptives than their rural counterparts. The observed rural–urban variations in early adoption of spacing methods maybe attributed to the differences in the availability of social services such as education, information, and access to family planning services. Compared with the central region, women residing in the regions marked by low fertility like south and west did not early adopt spacing methods. This may reflect that couples reliance on early adoption

of nonreversible methods was especially high in these regions (Santhya, 2003).

By and large, the family planning behavior was found to be similar among the two caste groups: scheduled caste and scheduled tribe. Both the groups had a higher risk of not early initiation of modern contraceptives, and thus, there is considerable scope for encouraging the use of the spacing methods. Results demonstrate that older women as compared

with younger women were less likely to initiate early contraceptives. It was identified that most of younger women were newly married and did not have proper knowledge about contraceptive use. Furthermore, younger women had a higher coital frequency, so they were in need of spacing methods to reduce the risk of having unwanted/mistimed births. The late adoption of spacing method was also found among older women; this may be linked to their reduced coital frequency, and adoption of sterilization after achieving their desired family size. Similar findings have also been observed in other studies conducted in India (Stephenson & Tsui, 2002).

The analysis also shows that women and their husband's education was one of the major factors influencing the early adoption of contraceptives in India. Illiterates were at higher risk of not early initiating of contraceptives than women with any level of schooling. The educated women might have better abilities in expressing their fertility desires or might have received proper health education and services from providers (Schuler & Hossain, 1998). Meanwhile, a significant difference in the contraceptive adoption was also seen by their husband's education during the analysis period. A considerable difference has been observed in the early contraceptive adoption between the women belonging to the poorest and the richest households. Women from poor household could not either afford the cost of spacing methods or adopt sterilization which was associated with government incentive schemes when they have achieved their required family size.

Women who have experienced child loss should give their body a chance to recover before trying to conceive again, but the result shows that women who had experienced at least one child loss had a higher risk of not early adoption of modern contraceptives as compared with the women who did not experience any child loss. This maybe linked to their desire to replace a dead child or to ensure against childlessness.

Exposure to electronic mass media like television and radio has a significant positive influence on early initiation of contraceptive use after childbirth. Possibly, television and soap opera provide information about the range of contraceptive methods as well as help in breaking the cultural barriers to the uptake of contraceptive use.

Women who had one or more births during 5 years prior to the survey were enquired if their last birth was wanted at the time of birth, at a later time, or not at all. The experience of unplanned pregnancy makes women more conscious; therefore, in all three models, significant positive impact was found on early initiation of contraceptive methods among women who reported their last birth was unplanned. The result also shows that breastfeeding has significant negative effect on the adoption of contraceptive methods to space births during the postpartum period. In other words, women who continued breastfeeding were less likely to early adopt contraceptives as compared with those currently breastfeeding. An important finding of this study was that even after adjusting the other background factors, contraceptive

adoption during postpartum period was positively associated with all the three program factors that are as follows: ANC visits, institutional delivery, and postnatal care utilization. This relationship was in line with the earlier reported findings (Barber, 2007; Hotchkiss, Rous, Seiber, & Berruti, 2005). Moreover, the uptake of early contraceptive adoption would increase significantly if women had at least three ANC visits and had returned to the health center for postnatal care within 2 weeks of delivery. The argument was that the utilization of these services contributes to women's faith in the health systems and their contentment with the health care services, making them more likely to utilize the family planning services. This finding is in contrast with the study conducted in Thailand, which reported that the women who had utilized ANC did not necessarily adopt contraceptives after having index birth (Zerai & Tsui, 2001). However, similar to our finding, research in Mexico, Kenya, Indonesia, the Dominican Republic, and Peru found that the women who delivered in government or private health facilities were more likely to use postpartum contraceptive methods than those who delivered at home (Barber, 2007; Gebreselassie, Rutstein, & Mishra, 2008). The result indicates that antenatal, delivery, and postnatal care services were important windows of invaluable opportunity to educate women about where and when to go for contraceptives.

Finally, to identify the relative advantages of one MCH indicator over other, wald test has been performed. Findings show that compared with ANC visits, postnatal care did not emerge as a significant factor for contraceptive adoption. This implies that both ANC visits and postnatal care are equally important for contraceptive initiation. The finding was contradictory to the study done in Kenya and Zambia (Do & Hotchkiss, 2013). A key program implication of this study is that the proper utilization of ANC visits, institutional delivery, and postnatal care should be deemed as an important mechanism to encourage postpartum family planning use.

Author Contributions

P.D. conceived and designed the experiments. P.D. and L.K.D. analyzed the data and contributed reagents/materials/analysis tools. P.D. wrote the paper and A.G. edit the paper.

Authors' Note

The study is based on National Family Health Survey-III, which is a secondary data and available in public domain.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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