

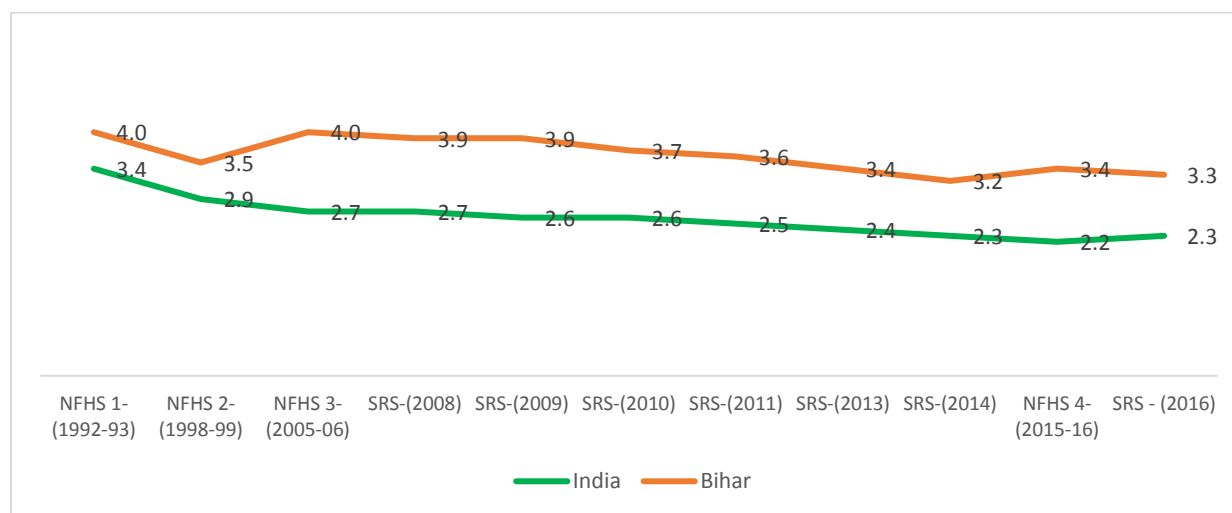
Introduction

As the third most populous state in India, Bihar also has the highest proportion of people under the age of 25 (58%) and the lowest proportion of people residing in urban areas (11%) of any Indian state [1]. With Bihar having the highest rate of male outmigration of any state in India, Job-related migration often begins while young, even among males as young as 15 years of age [2]. The needs of a largely young, rural, and migrating population place increasing pressure for social and health sector support in the state.

A decade ago, the total fertility rate (TFR) in Bihar dropped to 3.9 children per woman (Figure 1). Since 2015, TFR appears to have stagnated around 3.4, which is the highest of any Indian state (India's national average for TFR is 2.3) [3]. Between 2011 to 2013, Annual Health Survey data from Bihar also indicated stagnation around a 37% modern contraceptive prevalence rate [4].

From 2005 to 2015 in Bihar, the proportion of girls aged 11-14 years attending secondary school increased from 56% to 89% [5, 6]. In the meantime, female literacy in the state increased from 37% to 50% [5, 6]. Programs such as the Bihar Cycle Program (conditional transfer of bicycles contingent upon secondary school enrollment) showed increases in age-appropriate enrollment in secondary school from implementation in 2006 to 2008 [7].

Figure 1. Total Fertility Rate in Bihar Compared to India Average (1992-2016)



In the backdrop of these changes, the Government of Bihar and CARE India sought to understand the landscape of family planning across the state. Prior to 2017, hormonal oral contraceptive pills and intrauterine devices were the only modern spacing methods available in the public health sector to the population, in addition to condoms, female and male sterilization, and emergency contraceptive pills [8]. To address the needs of a large population (more than 110 million according to the 2011 Census [1]) through the public sector, a nuanced understanding of family planning parameters remained crucial. To better understand the family planning situation in Bihar, CARE India conducted a large-scale cross-sectional survey in all 38 districts of Bihar.

The intention of this survey was to provide programmatically relevant data on family planning parameters in the state, including total fertility rate, modern contraceptive use, and frontline worker interaction, among other relevant factors. This paper presents the key findings on sexual and reproductive health milestones.

Materials and Methods

Program Background

Since 2014, CARE India, a non-governmental organization, has worked in all 38 districts of Bihar as the nodal development partner supporting the State Government of Bihar and under financial patronage of the Bill and Melinda Gates Foundation. CARE functions as a Technical Support Unit (TSU) to provide catalytic support to the Health and Social Welfare Departments of Government of Bihar (GoB) for systems strengthening in maternal and child health, family planning and nutrition interventions. Prior to 2014, CARE worked in eight districts of Bihar to implement a core set of reproductive, maternal, newborn, and child health interventions as part of the Integrated Family Health Initiative [9, 10]. In 2014, this support was expanded to a Technical Support Unit (TSU) that supports the Government of Bihar at state, district and block levels for technical support to the government's health programs and integrated child development services (ICDS) at health facility and health outreach levels [10].

The TSU works closely with the Department of Health and State Health Society in Bihar on strategy formulation and implementation, strengthening linkages between health outreach activities and health facilities, identifying and addressing systems gaps, improving contracting and payment mechanisms with private sector providers, and improving the use of data-driven program management at the state, district, and block levels in Bihar. This support included strengthening of family planning services and outreach, aligned with the health and development goals of the Government of Bihar.

Survey Design and Approach

CARE's Concurrent Measurement and Learning Unit conducts regular data collection on an ongoing basis to inform programs. From April to July 2016, the Concurrent Measurement and Learning Unit conducted a large multi-stage cluster sample survey across all 38 districts of Bihar from April to July 2016. Eligible women were selected using a three-stage sampling strategy. Blocks (sub-districts) served as the primary sampling units (PSUs), with *anganwadi* centers and municipal wards serving as the secondary sampling units for rural and urban areas, respectively. An *anganwadi* center (AWC) is a village level unit under the Integrated Child Development Services scheme, responsible for providing maternal and child health and nutrition services. Five blocks were selected from each district using cluster random sampling, with SSUs selected using 'Probability Proportional to Size (PPS)' sampling based on reported population of the SSUs. In blocks with both rural and urban settlements, the required number of AWC areas and wards were determined based on the urban-rural allocation (using proportional allocation) in these blocks per the 2011 Census.

This survey utilized *anganwadi* centers as the sampling frame to reflect functional local units rather than census enumeration blocks employed by NFHS-4 survey [11]. The sampling design was structured to mimic the structure of public health delivery at the last mile for alignment with health programming. The current survey involved data collection from April to June 2016, providing more recent data compared to NFHS-4 (which collected data from March to August 2015) [11].

The sample size, powered on calculating estimates of modern contraceptive prevalence (mCPR), was 600 women per district, for a total sample size of 22,800 women. The population included in the survey was currently married women of reproductive age (15 to 49 years) who had been living in the surveyed household for at least 3 months and who had been married (or started living with husband) for at least 3 months. Women were excluded if they were visitors or guests of the surveyed household, if they were widowed, divorced, or separated, and if they were living in a hostel instead of a household.

The survey tool was developed in Hindi and pre-tested. Data were collected by approximately 150 female data collectors fluent in the local language and minimum requirement of a bachelor's degree. Data collectors received an 18-day training on standardization, approach, and field practice from a team of trainers with graduate-level education on quantitative data collection. Quality control of data collectors was conducted through monitoring visits by CARE's block monitoring learning and evaluation coordinators (minimum requirements of bachelor's level education).

The current study was approved by the Ashirwad Ethics Committee, Ashirwad Hospital and Research Center, Ulhasnagar, India (ashirwadethicscommittee@gmail.com). Verbal informed consent was collected from each agreeing participant before the interview, after explaining the details of the study in Hindi.

Analysis

The survey included sections on fertility behavior, sociodemographic indicators, family planning knowledge and information, access to health and family planning services, and frontline worker interaction. The estimates were obtained using survey analysis methods that incorporated appropriate parameters for multi-stage sampling and sampling weights (based on 2011's census population for 15-49 year old females). Taylor series expansion method was used for variance estimates. Descriptive analysis was carried out to determine the distribution of socio-demographic characteristics. Results were disaggregated by age category, parity, and sex and birth order of children. SAS version 9.4 was used for analysis.

Results

Data from the MWRA survey show timing of major milestones related to sexual and reproductive health for currently married women between the ages of 15 to 49 years. Across the state of Bihar, the mean age of first marriage was 16.2 years. From the age of marriage, women reported an average 9 year gap to initiation of modern contraception use (mean age of first contraceptive use reported as 25.1 years) (Figure 2; Table 1). Women reported an average of two

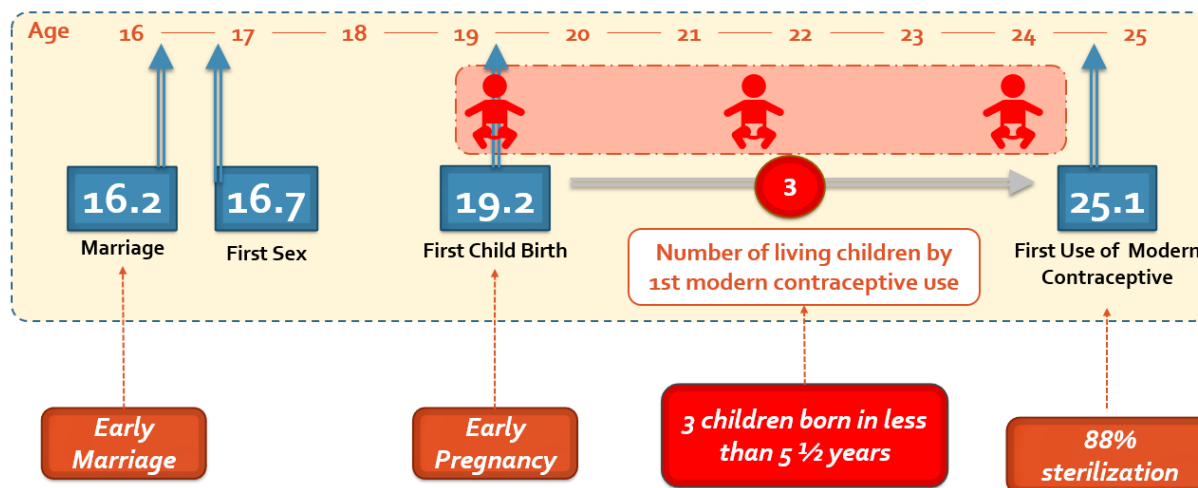
and a half years gap between their first and second births (Table 1). At the time of first contraceptive use, women had a mean of 2.74 children (Table 1). Sixty-one percent of surveyed women were married before the age of 18, with 41% of women having their first birth by age 18 (data not shown).

Table 1. Distribution of sexual and reproductive health milestones, overall and by age bin, Survey on Currently Married Women of Reproductive Age, Bihar, 2016 [N=22,800]

Indicator	Age bin (years) Mean (95% CI) [Median]				
	All study participants N= 22,800*	15-19 n=1,519*	20-24 n=4,955*	25-34 n=9,148*	35-49 n=7,178*
Age at first marriage (in years)	16.22 (16.19-16.25) [16]	15.74 (15.65-15.83)	16.67 (16.61-16.74)	16.26 (16.38-17.10)	15.88 (15.81-15.94)
Age at first sex (in years)	16.69 (16.66-16.72) [17]	15.87 (15.79-15.96)	16.89 (16.84-16.95)	16.79 (16.74-16.84)	16.60 (16.54-16.66)
Age at first birth (in years)	19.24 (19.20-19.38) [19]	16.77 (16.67-16.86)	18.52 (18.46-18.58)	19.33 (19.27-19.38)	19.85 (19.78-19.92)
Age at first contraceptive use (in years)	25.11 (25.01-25.21) [25]	17.18 (17.01-17.35)	20.33 (20.23-20.43)	24.30 (24.20-24.41)	28.10 (27.93-28.27)
Age at female sterilization (in years)	26.83 (26.71-26.96) [27]	17.33 (16.62-18.05)	21.08 (20.90-21.25)	25.22 (24.20-24.41)	29.39 (29.20-29.59)
Number of living children at first contraceptive use	2.74 (2.71-2.77)	0.80 (0.69-0.90)	1.66 (1.60-1.72)	2.69 (2.65-2.73)	3.27 (3.22-3.33)
Spacing between 1 st & 2 nd birth (in months)	30.81 (30.39-31.22)	19.21 (18.04-20.38)	24.39 (23.93-24.86)	31.73 (31.18-32.28)	37.87 (36.63-39.12)
Interval between marriage and first contraceptive use (in months)	109.07 (107.78-110.36)	21.90 (19.23-24.57)	49.15 (47.53-50.78)	98.39 (96.64-99.84)	146.44 (144.20-148.68)

*Missing responses were excluded (as applicable)

Figure 2. Trajectory of Sexual and Reproductive Milestones, Survey on Currently Married Women of Reproductive Age, Bihar, 2016



Among surveyed women, modern contraceptive prevalence rate (mCPR) was reported as 38.2% (Table 2). Modern contraceptive prevalence was found to rise drastically with age group, with women in younger age groups reporting the lowest use of modern contraception (4.4% among married women aged 15 to 19 years (Table 2)). At the same time, the youngest age groups also

reported the highest unmet need for spacing (20.4% among women aged 15 to 19 years and 19.1% among women aged 20 to 24 years) (Table 2)). Among women who have been pregnant once up to a viable gestational age (one parity women), unmet need is highest overall (38.8% among one parity women compared to 28.1% average unmet need) as well as for spacing (32.1% unmet need among one parity women compared to 7.2% average) (Table 2a). Values for unmet need are practically zero for nulliparous women (Table 2a).

Ideal family size was reported by women to be an average of three children, with two sons preferred (Table 2). One parity and two parity women reported an ideal family size of two children, with one son preferred (Table 2a).

Table 2. Key Family Planning Behavioral Indicators, Overall and by Age Bin, Survey on Currently Married Women of Reproductive Age, Bihar, 2016 [N=22,800]

Indicator	Age bin (years) Proportion (95% CI)				
	All study participants N= 22,800**	15-19 n=1,519**	20-24 n=4,955**	25-34 n=9,148**	35-49 n=7,178**
Contraceptive Prevalence Rate	43.84 (43.20-44.49)	8.23 (6.85-9.61)	22.22 (21.06-23.37)	50.30 (49.28-51.33)	58.08 (56.94-59.22)
Modern Contraceptive Prevalence Rate	38.25 (37.61-38.88)	4.41 (3.38-5.44)	15.98 (14.96-17.00)	44.70 (43.68-45.72)	52.55 (51.39-53.70)
<i>Denominator</i>	n=18,074 (fecund women not currently pregnant)				
Unmet Need (Overall)	28.09 (27.43-28.74)	25.65 (23.05-28.25)	34.01 (32.48-35.55)	27.37 (26.38-28.36)	25.64 (24.49-26.80)
Unmet Need for Limiting	20.93 (20.33-21.52)	5.26 (3.93-6.59)	14.89 (13.74-16.05)	23.01 (22.08-23.95)	25.06 (23.92-26.21)
Unmet Need for Spacing	7.16 (6.78-7.54)	20.39 (17.99-22.79)	19.12 (17.85-20.40)	4.36 (3.90-4.81)	0.58 (0.38-0.78)
Ideal Number of Children*	2.88 (2.86-2.89)	2.61 (2.56-2.66)	2.64 (2.61-2.66)	2.85 (2.83-2.88)	3.10 (3.08-3.13)
Ideal Number of Male Children*	1.61 (1.60-1.62)	1.42 (1.37-1.46)	1.45 (1.43-1.48)	1.60 (1.59-1.62)	1.74 (1.72-1.76)

*Regardless of the number of existing children

** Missing responses were excluded (as applicable)

Table 2a. Key Family Planning Behavioral Indicators, Overall and by Parity, Survey on Currently Married Women of Reproductive Age, Bihar, 2016 [N=22,800]

Indicator	Parity categories Proportion (95% CI)				
	All study participants N= 22,800**	0 parity n=1,676**	1 parity n=2,668**	2 parity n=4,329**	>2 parity n=14,127**
Contraceptive Prevalence Rate	43.84 (43.20-44.49)	2.92 (2.12-3.73)	13.60 (12.30-14.91)	40.51 (39.05-41.97)	55.43 (54.61-56.25)
Modern Contraceptive Prevalence Rate	38.25 (37.61-38.88)	1.55 (0.96-2.14)	6.75 (5.79-7.70)	32.94 (31.54-34.34)	50.17 (49.35-51.00)
<i>Denominator</i>	n=18,074 (fecund women not currently pregnant)				
Unmet Need (Overall)	28.09 (27.43-28.74)	0.64 (0.20-1.08)	38.80 (36.65-40.94)	32.98 (31.42-34.54)	27.74 (26.91-28.56)
Unmet Need for Limiting	20.93 (20.33-21.52)	0.08 (0.00-0.24)	6.68 (5.59-7.78)	21.79 (20.42-23.15)	25.48 (24.67-26.28)
Unmet Need for Spacing	7.16 (6.78-7.54)	0.56 (0.15-0.97)	32.11 (30.06-34.16)	11.19 (10.15-12.24)	2.26 (1.99-2.53)
Ideal Number of Children*	2.88 (2.86-2.89)	2.35 (2.25-2.45)	2.36 (2.33-2.39)	2.39 (2.37-2.41)	3.15 (3.13-3.16)
Ideal Number of Male Children*	1.61 (1.60-1.62)	1.18 (1.09-1.26)	1.24 (1.22-1.27)	1.32 (1.30-1.34)	1.78 (1.77-1.79)

*Regardless of the number of existing children
 ** Missing responses were excluded (as applicable)

Among women reporting that they had at least one son, mCPR was reported to be more than 20 percentage points higher (30.2%) compared to those who reported having no sons and daughters only (9.5%) (Table 2b). Use of modern contraception was also reported to be twice as high among women reporting having more than one son (61.4%) compared to those having only one son (37.5%). Report of any abortion was not found to differ across the groups (Table 2b).

Table 2b. Key Family Planning Behavioral Indicators, By Birth Order and Sex Composition, Survey on Currently Married Women of Reproductive Age, Bihar, 2016 [N=22,800]

Indicator	Categories of participants according to birth order and sex composition of child*				
	Proportion (95% CI)				
	All Women N=22,800	Zero parity/ nulliparous n=1,676	Childbearing women with no son & only daughter(s) (irrespective of the number of daughters) n=2,591	Childbearing women with 1 son n=7,431	Childbearing women with more than 1 son (irrespective of the number of daughters) n=10,963
CPR	43.84 (43.20-44.49)	2.92 (2.12-3.73)	16.25 (14.82-17.67)	37.54 (36.44-38.64)	61.39 (60.48-62.30)
mCPR	38.25 (37.61-38.88)	1.55 (0.96-2.14)	9.53 (8.40-10.66)	30.22 (29.18-31.27)	56.55 (55.63-57.48)
Unmet Need (Overall)	28.09 (27.43-28.74)	0.64 (0.20-1.08)	37.49 (35.29-39.69)	35.24 (34.01-36.46)	25.52 (24.62-26.42)
Unmet Need for Limiting	7.16 (6.78-7.54)	0.56 (0.15-0.97)	28.25 (26.20-30.29)	10.80 (10.00-11.59)	1.35 (1.12-1.59)
Unmet Need for Spacing	20.93 (20.33-21.52)	0.08 (0.00-0.24)	9.24 (7.92-10.56)	24.44 (23.34-25.54)	24.17 (23.28-25.05)
Report of any abortion (spontaneous or induced)	17.5 (17.05-17.94)	8.77 (7.42-10.13)	12.47 (11.20-13.74)	9.25 (8.59-9.90)	5.91 (5.47-6.35)

Missing responses were excluded (as applicable)

Of the modern method mix, 88% was accounted for by female sterilization, with male condoms accounting for 3%, and hormonal oral contraceptive pills and intrauterine device each for 2%. Injectable contraceptives, accounting for 1% of the method mix, had been available from private sector sources prior to public sector introduction which took place after this study. Across the state, only 22 women reported that their husbands had been sterilized, which accounted for only 1% of the method mix (Table 3). Any traditional method use was reported at 6.6%, accounted for mainly by rhythm (72% of traditional method use) and withdrawal (28% of traditional method use).

Even among 15-19 year-olds, use of permanent methods accounted for 33% of the method mix, rising to 66% of the method mix among 20-24 year olds (Table 1). Use of long-acting reversible contraception was approximately 1% among all age groups (Table 3). A higher proportion of

women in each age group used traditional methods compared to modern spacing methods (Table 3).

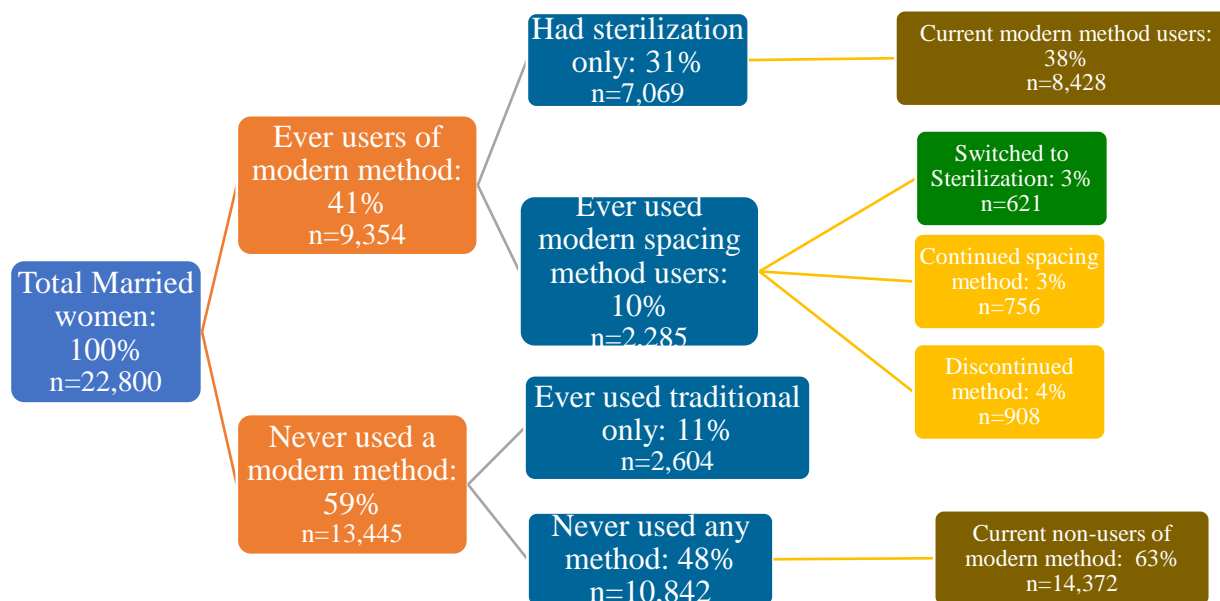
Table 3. Contraceptive Method Mix, Overall and by Age Bin, Survey on Currently Married Women of Reproductive Age, Bihar, 2016 [N=22,800]

Indicator	Age bin (years)				
	All Women N= 22,800	15-19 n=1,519	20-24 n=4,955	25-34 n=9,148	35-49 n=7,178
Contraceptive Prevalence Rate	43.84 (43.20-44.49)	8.23 (6.85-9.61)	22.22 (21.06-23.37)	50.30 (49.28-51.33)	58.08 (56.94-59.22)
Any current traditional method use	6.64 (6.32-6.96)	4.48 (3.44-5.52)	6.74 (6.04-7.44)	6.75 (6.23-7.26)	6.90 (6.31-7.48)
<i>Rhythm</i>	4.82 (4.55-5.10)	3.09 (2.22-3.97)	4.66 (4.07-5.25)	4.94 (4.50-5.38)	5.15 (4.64-5.66)
<i>Withdrawal</i>	1.85 (1.68-2.03)	1.38 (0.79-1.97)	2.28 (1.86-2.70)	1.84 (1.56-2.11)	1.67 (1.37-1.97)
<i>Other</i>	0.19 (0.14-0.25)	0.0 (0.0-0.0)	0.08 (0.00-0.16)	0.22 (0.12-0.31)	0.28 (0.16-0.40)
Modern contraceptive prevalence rate	38.25 (37.61-38.88)	4.41 (3.38-5.44)	15.98 (14.96-17.00)	44.70 (43.68-45.72)	52.55 (51.39-53.70)
Any permanent FP method use	33.73 (33.11-34.34)	1.51 (0.90-2.13)	10.98 (10.11-11.85)	38.86 (37.86-39.86)	49.71 (48.55-50.86)
<i>Female sterilization</i>	33.53 (32.92-34.14)	1.51 (0.90-2.13)	10.98 (10.11-11.85)	38.69 (37.69-39.68)	49.30 (48.15-50.46)
<i>Male sterilization (n=22)</i>	0.28 (0.21-0.35)	0.13 (0.00-0.31)	0.0 (0.00-0.00)	0.28 (0.18-0.39)	0.50 (0.34-0.67)
Any long-acting reversible methods use	1.04 (0.91-1.17)	0.53 (0.16-0.89)	1.03 (0.75-1.31)	1.42 (1.18-1.66)	0.67 (0.48-0.86)
<i>Intrauterine Device (IUCD)/Postpartum IUCD</i>	0.60 (0.50-0.70)	0.32 (0.07-0.58)	0.58 (0.37-0.78)	0.79 (0.61-0.97)	0.44 (0.28-0.60)
<i>Injectables</i>	0.43 (0.35-0.52)	0.26 (0.01-0.52)	0.32 (0.16-0.48)	0.61 (0.45-0.77)	0.32 (0.19-0.45)
Any short-acting methods use	3.66 (3.42-3.91)	2.44 (1.66-2.31)	3.90 (3.36-4.43)	4.62 (4.19-5.05)	2.54 (2.17-2.90)
<i>Male condom</i>	1.32 (1.17-1.47)	0.92 (0.44-1.40)	1.23 (0.92-1.54)	1.89 (1.61-2.17)	0.74 (0.54-0.94)
<i>Daily Oral contraceptive Pills</i>	0.95 (0.82-1.07)	0.0 (0.0-0.0)	0.77 (0.52-1.01)	1.24 (1.01-1.46)	0.91 (0.69-1.12)
<i>Emergency contraception</i>	0.02 (0.00-0.04)	0.0 (0.0-0.0)	0.02 (0.00-0.06)	0.02 (0.00-0.05)	0.05 (0.00-0.10)
<i>Lactational amenorrhoea method</i>	0.90 (0.78-1.03)	1.05 (0.54-1.57)	1.47 (1.14-1.81)	0.91 (0.71-1.10)	0.47 (0.31-0.63)
<i>Standard days method</i>	0.54 (0.45-0.64)	0.46 (0.12-0.80)	0.48 (0.29-0.68)	0.64 (0.48-0.81)	0.47 (0.31-0.63)

Among surveyed women, the majority had heard about female sterilization (93%), oral contraceptive pills (62%), male sterilization (61%), intrauterine contraceptive device (61%), injectables (55%), male condom (54%). A lower proportion had heard about emergency contraception (16%) and female condom (6%). The private sector was the main source of contraception for injectables (61%) and abortions (86%), with the public sector as the main source for female sterilization and intrauterine devices. Pharmacies were the main source for hormonal oral contraceptive pills (68%) and condoms (75%).

Of all women surveyed, more than half of all women (59%, n=13,445) had never used a modern family planning method, with 11% of women using traditional methods only (Figure 3). Thirty one percent of women reported undergoing female sterilization without using any other modern method previously, while 10% of women reported that they ever used some modern spacing methods. Of the women ever using a modern spacing method, only 3% (n=756 women) continued using spacing methods, with 4% discontinuing and 3% switching to female sterilization (Figure 3).

Figure 3. Composition of current users and non-users of modern contraceptive methods (Percentage breakdown among 22,800 surveyed women)



Of the 1325 women who had a delivery in the two years prior to the survey and had ever used modern spacing methods, 45% (n=620) reported that they had discontinued their method. Top reasons for discontinuation included infrequent sex or the respondent's husband living away (25%), wanting to become pregnant (23%), health concerns (12%), concern with disruption of bodily processes (9%), husband's disapproval (9%), and fear of side effects (7%).

Among women desiring to delay their next pregnancy by two years (n=1233), 46% (n=571) were not using modern spacing methods. Top reasons for non-use included infrequent sex or husband not living at home (26%), belief that family planning is up to God (23%), husband's opposition (16%), health concerns (11%), currently breastfeeding (11%), fear of side effects (10%), not menstruating since last birth (8%), not knowing any source of FP methods (6%), and concern with disruption of bodily processes (5%). Overall rates of discontinuation were highest for male condom (77%), oral contraceptive pills (52%), injectables (40%), and intrauterine devices (39%).

Among all surveyed women, about a quarter reported having interaction with a frontline worker regarding family planning in the previous year, with a quarter of women also reporting attending a Village Health and Sanitation Day (VHSND) session in the previous year (Table 4). A third of

women reported accepting a modern family planning method, with almost a third of women reporting that family planning had been discussed at a VHSND event (Table 4a).

Women in the 15-19 age group reported the lowest percentages of frontline worker interaction on FP and modern method acceptance compared to other age groups (Table 4). Parity-wise, nulliparous women reported the lowest percentages of frontline worker interaction and VHSND attendance, with one parity women reporting the highest percentage of VHSND attendance (Table 4a).

The method information index (percent of FP users who reported receiving information about other FP methods at the time of adoption of current/most recent method, side effects, and ways to mitigate side effects) was reported as 3.3%. A quarter of surveyed women reported recent exposure to family planning related information via mass media (TV, radio, newspaper).

Table 4. Respondents' exposure to family planning through platform and from any source, by age bin, Survey on Currently Married Women of Reproductive Age, Bihar, 2016

Indicator	Age bin (years)				
	Proportion (95% CI)				
	All Women N= 22,800	15-19 n=1,519	20-24 n=4,955	25-34 n=9,148	35-49 n=7,178
Frontline worker interaction on FP in previous 12 months	23.7 (23.0-24.5)	15.41 (12.83-17.98)	22.66 (21.17-24.14)	27.49 (26.13-28.85)	21.65 (19.82-23.49)
Acceptance of modern FP method	32.4 (31.0-33.7)	9.29 (5.88-12.69)	21.72 (19.73-23.71)	41.57 (39.57-43.57)	38.17 (33.56-42.78)
Attended VHSND (Village Health Sanitation and Nutrition) in last 12 months	23.4 (22.9-24.0)	31.34 (29.00-33.67)	39.68 (38.31-41.04)	24.67 (23.79-25.56)	8.97 (8.31-9.63)
Any discussion on FP took place during VHSND (Village Health Sanitation and Nutrition)	30.0 (28.8-31.2)	20.17 (16.56-23.77)	26.91 (24.95-28.87)	33.01 (31.07-34.95)	36.02 (32.32-39.73)
Received information about places from which FP services could be availed	74.4 (72.3-76.5)	61.46 (51.71-71.20)	74.10 (70.37-77.84)	75.30 (72.20-78.40)	77.59 (72.21-82.96)

Table 4a. Respondents' exposure to family planning through platform and from any source, by parity, Survey on Currently Married Women of Reproductive Age, Bihar, 2016

Indicator	Parity categories				
	Proportion (95% CI)				
	All Women N= 22,800	0 parity n=1,676	1 parity n=2,668	2 parity n=4,329	>2 parity n=14,127
Frontline worker interaction on FP in previous 12 months	23.7 (23.0-24.5)	10.11 (7.55-12.67)	16.33 (14.49-18.17)	23.41 (21.62-25.20)	27.53 (26.36-28.69)
Acceptance of modern FP method	32.4 (31.0-33.7)	---	8.18 (6.29-10.07)	25.39 (22.82-27.95)	42.14 (40.31-43.98)
Attended VHSND in last 12 months	23.4 (22.9-24.0)	11.22 (9.71-12.73)	35.76 (33.94-37.58)	28.90 (27.55-30.25)	20.88 (20.21-21.55)
Any discussion on FP took place during VHSND	30.0 (28.8-31.2)	20.21 (14.47-25.96)	22.64 (19.98-25.30)	29.10 (26.58-31.61)	33.36 (31.65-35.06)
Received information about places from which FP services could be availed	74.4 (72.3-76.5)	60.53 (44.97-76.08)	70.83 (64.77-76.90)	73.08 (68.52-77.64)	76.22 (73.56-78.88)

Discussion

These survey results indicate high prevalence of early marriage and early childbearing across the state of Bihar. The median age at first marriage of 16.6 years is well below India's average of marriage of 19 years [11]. Forty-one percent of women had their first childbirth by 18 years in Bihar, compared to the national average of 8% [11, 12]. These behaviors persist despite increased female secondary school attendance rates over the past decade. The lack of employment opportunities and viable economic alternatives to marriage may be contributing to persistently high early marriage rates, among other factors [12]. In Bihar, only 16% of women reported being employed with either cash or in-kind payment in the previous year, a proportion which has remained unchanged since 2005 [5, 6].

Women report a gap of two and a half years between first and second births, which meets the criteria for healthy spacing of 24 months between births [13]. However, these data indicate that spacing behaviors may be differential based on the sex of the child. The early initiation of childbearing continues to have developmental consequences for young women and girls, including adverse nutritional, health, lower autonomy and household decision-making as well as risk for violence [14-16]. Only 10% of surveyed women ever use any modern spacing methods, with a higher proportion of women using traditional methods rather than modern spacing methods. These data suggest that modified traditional methods or spousal separation resulting from male migration rather than the use of modern methods may contribute to spacing between births.

Unmet need in Bihar is twice as high as the average for India [11, 12]. Younger women reported the highest unmet need, particularly for spacing methods. Women who have been pregnant once up to viable gestational age (one parity women) reported the highest rates of unmet overall and for modern spacing. The data indicate a latent demand for spacing methods that is not being met by the current available FP services, especially among lower parity women. One parity and two parity women report an ideal family size of two children, with one son preferred, indicating demand for lower fertility among these groups compared to the overall population.

Use of modern contraception in Bihar is below India's average of 48% [11, 12]. However, the higher proportion of women reporting use of modern contraception if their first child was a son or last child was a son indicates gender dynamics underlying FP practices. Data across India have documented strong pressure across families for bearing of sons due to perceived greater economic value and security compared to daughters [17, 18]. While reported abortion did not differ by birth order and sex composition, the stigma around abortion and the illegality of sex-selective abortion may limit reported behaviors [17, 18]. The 2015-16 National Family Health Survey (NFHS-4) in Bihar shows that pregnant women with no sons were more likely to have an ultrasound compared to women who had at least one son. Women with two daughters and no sons who had an ultrasound test during their subsequent pregnancy were almost twice as likely to have a son as to have a daughter for their third child [11]. Reports indicate that abortion and specifically sex-selective abortion may affect family planning behaviors in Bihar [17, 18].

Demand remains low among nulliparous women, indicating persistent barriers in delaying first births among young, newly married couples [19, 20]. Programmatic learnings from Bihar

indicate that intentional programming on healthy timing and spacing among young couples can contribute to sustained increased in modern contraceptive prevalence and couple communication [19, 20]. The national average for modern contraceptive use among 15-19 year old married adolescents is 10% whereas it is only 4% in Bihar [11]. Demographic and Health (DHS) surveys in Bangladesh, Nepal, and Pakistan show that approximately 47%, 15% and 7% of 15 to 19-year-old married adolescents report use of modern contraception [21]. While these surveys used different sampling techniques, results are indicative that use of modern contraception in Bihar is low for the South Asia region.

The highly skewed method mix indicates a family planning program dominated by a single method, female sterilization. These results are on par with the earlier 2012-2013 Annual Health Survey, which showed the method mix among married women aged 15-49 to be dominated by female sterilization [3]. While sampling methods differed from NFHS-4 in the current survey, overall patterns between the two surveys consistently reflect low use of modern contraceptive methods among younger age groups and a skew towards female sterilization across surveys [6].

The main government public sector health outreach platforms are frontline workers and Village Health and Sanitation Days (VHSND), which are centered around child immunization but provide opportunities for integration of other services such as family planning methods [22]. Given that a third of women interact with frontline workers and VHSND attendance is highest among one parity women, strengthening these platforms provides an opportunity to reach younger women with expanded family planning services. Given the high rates of unmet need among low parity women, a focus on low parity women may help address latent demand. Special attention is needed for nulliparous women given low rates of unmet need and contraceptive uptake among this group.

Programmatic Implications

Use of traditional methods may represent an opportunity for building on understanding of reproduction and menstruation for use of effective methods for spacing. Women report infrequent sex and husbands living away as top reasons for both method discontinuation and non-use. Reports indicate many migrant males return periodically depending on their job profile and location of migration [2]. A secondary analysis of 2014 DHS data of Nepal, neighboring Bihar to the north, shows male migration as a contributing factor to non-use of contraception [23]. With nearly one-third of women of reproductive age separated from their husbands, many do not use family planning methods on a regular basis because they do not perceive an immediate risk of pregnancy [24]. Women in Nepal show a preference for emergency contraception and barrier methods over long-acting methods, reflecting that they might be sexually active for short periods of time when their husbands visit at home [23]. In Bihar, high male migration may also be playing a role in contraceptive dynamics and preferences.

Greater understanding of the key drivers of migration and association with reproductive behaviors is needed for identification of programmatic interventions. In addition, an in-depth understanding of additional reasons underlying contraceptive non-use and discontinuation is needed to identify programmatic gaps. The differential use of contraception by sex of child also

indicates the importance of addressing underlying gender perceptions and value placed on sex of children as a potential driver of family planning behavior within programming.

As of the timing of this survey in 2016, the ‘basket of contraceptive choice’ available in the public sector in Bihar (and India overall) was extremely limited. While injectable contraception has been available in other countries of South Asia and from private providers in India from the 1980s [6], this method was introduced in the Indian public health system in 2017 [7]. Implants, which are available in every country of South Asia, are not yet available via India’s public health channel [10]. These data indicated the need for structured technical assistance to address the family planning needs of this large state. Against the backdrop of an expanded contraceptive method mix in 2017, these data helped to inform the rollout and implementation to address programmatic gaps [26].

This current study identifies programming opportunities to reach the modern spacing needs of young married couples, which are largely being missed by the current public sector program. In addition, the study highlights knowledge gaps as the basis for planning future studies. Use of age-disaggregated data and understanding of the family planning situation remains crucial to address supply and demand-side barriers to family planning in Bihar.

Limitations

The quantitative nature of this survey provides limited understanding of the reasons underlying family planning behaviors from this data alone. Given the sensitive nature of the questions, reporting of contraceptive usage and other FP behaviors and awareness may have been affected by social desirability bias. However, use of vernacular speaking female data collectors is expected to have minimized the extent of social desirability bias. Given its cross-sectional nature, recall errors could be present in reporting of past behaviors and practices. Nevertheless, as there were no specific incentives related to recall, any error in recall is likely to be non-differential and unlikely to result in information bias.

Conclusions

This survey provides representative, population-based data to understand family planning status, use, and preferences among married women of reproductive age. These data indicate that family planning has been largely addressing the needs of women who have achieved or exceeded desired family size but missing the needs of modern spacing, especially among younger couples. In the context of an expanded basket of contraceptive choices, continued focus is needed to meet the modern spacing needs of younger and lower parity couples. Learnings from other programs suggest that demand-side programming among newly married and nulliparous couples may help couples achieve their goals for family size and spacing goals. Intentional focus should be given to underlying gender perceptions and value placed on sex of children as a potential driver of family planning behavior within programming.

Acknowledgements

We would like to CARE India's program team on family planning for technical support to the Government of Bihar's family planning program. We also recognize the work of the block monitoring learning coordinators who played a coordination and supervisory role. Special acknowledgment goes for Indian Market Research Bureau (IMRB) as the firm contracted for data collection. We thank our government counterparts for family planning for continued partnership. Finally, we appreciate the time and willingness of women across the state of Bihar as participants in this survey.

References

1. Office of Registrar General & Census Commissioner. (2011). Census of India 2011. New Delhi: India Ministry of Home Affairs.
2. Mahapatra B. (2018). Migration and Family Planning in Bihar, India. New Delhi, India: Population Council.
3. Office of Registrar General & Census Commissioner. Sample Registration System Bulletins. New Delhi: Office of Registrar General & Census Commissioner, Ministry of Home Affairs.
4. Office of Registrar General & Census Commissioner. (2012-2013). Annual Health Survey 2012-13. New Delhi: Indian Ministry of Home Affairs.
5. International Institute for Population Sciences (IIPS) and ICF. (2006). National Family Health Survey (NFHS-3), Bihar State Report, 2005-06: Bihar. Mumbai: IIPS.
6. International Institute for Population Sciences (IIPS) and ICF. (2017). National Family Health Survey (NFHS-4), Bihar State Report, 2015-16: Bihar. Mumbai: IIPS.
7. Muralidharan K, Prakash N. (2017). Cycling to School: Increasing Secondary School Enrollment for Girls in India. *American Economic Journal: Applied Economics*. 9. 321-350. 10.1257/app.20160004.
8. Pachauri S. (2014). Priority strategies for India's family planning programme. *Indian J Med Research* 140 (Suppl 1): S137–S146.
9. CARE India. (2013). Integrated Family Health Initiative: Catalysing change for health communities. New Delhi. Available from: http://www.care.org/sites/default/files/documents/MH-2013-BIHAR_IFHI_Program%20Summary.pdf.
10. Bihar Technical Support Programme: Overview. (2018). CARE India. Retrieved from: https://www.care.org/sites/default/files/bihar_tsp_overview_brief_sept2018.pdf
11. International Institute for Population Sciences (IIPS) and ICF. (2017). National Family Health Survey (NFHS-4), India, 2015-16: India. Mumbai: IIPS.

12. Lee-Rife S, et al. (2012). What Works to Prevent Child Marriage: A Review of the Evidence. *Studies in Family Planning* 43 (4): 287-303.
13. Report of a WHO Technical Consultation on Birth Spacing. (2006). World Health Organization.
14. Wodon Q. (2017). Early Childbirths and Maternal Mortality. *Education Global Practice*. Washington, DC: The World Bank.
15. Onagoruwa AO, Wodon Q. (2017). Impact of Child Marriage on Women's Decision Making Ability across Multiple Countries. *Education Global Practice*. Washington, DC: The World Bank.
16. World Health Organization (WHO), UNODC, and UNDP. (2014). *Global Status Report on Violence Prevention*, Geneva: World health Organization.
17. Ganatra B, Visaria L, Kalyanwala S, Ramachandran V (2004). Abortion in India. *Economic and Political Weekly*. Vol. 39, Issue No. 46-47.
18. Ranjana K, Awdhesh Y. Role of Gender in Contraceptive Use among Currently Married Women in Uttar Pradesh and Bihar. *Research on Humanities and Social Sciences* Vol.2, No.2, 2012
19. Jeejeebhoy S, et al (2016): Meeting Contraceptive Needs: Long-Term Associations of the PRACHAR Project with Married Women's Awareness and Behavior in Bihar. *International Perspectives on Sexual and Reproductive Health*; 41 (3): 115-125.
20. Subramanian L, Simon C, Daniel E (2018). Increasing Contraceptive Use among Young Married Couples in Bihar, India: Evidence from a Decade of Implementation of the PRACHAR Project. *Global Health Science & Practice*: 6 (27).
21. ICF. (2018, July 18). The DHS Program STATcompiler. Retrieved from <http://www.statcompiler.com>
22. Kumar A. Improving the Coverage and Quality of Village Health Sanitation and Nutrition Days in Bihar-India: An Evidence from Sector Wide Approach to Strengthen Health. *IOSR Journal Of Humanities And Social Science (IOSR-JHSS)*, 22 (10).
23. Khanal M. N., et al. (2013). *Impact of Male Migration on Contraceptive Use, Unmet Need and Fertility in Nepal*. Calverton, Maryland, USA: Nepal Ministry of Health and Population, New ERA, and ICF International.
24. Ban, B. S. (2012.). Spousal Separation and Interpretation of Contraceptive Use and Unmet Need in Rural Nepal. *International Perspectives on Sexual and Reproductive Health*, 38(1): 43-47.
25. Ministry of Health & Family Welfare: Government of India. <https://humdo.nhp.gov.in/>
26. Changes in Family Planning Behaviors in Bihar, India from 2016 to 2018. In Press.

