UNDERSTANDING DISTRICT-LEVEL VARIATION IN FERTILITY RATES IN HIGH-FOCUS INDIAN STATES

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UNDERSTANDING DISTRICT-LEVEL VARIATION IN FERTILITY IN HIGH-FOCUS INDIAN STATES

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ACRONYMS

AHS	Annual Health Survey
ASHA	Accredited Social Health Activists
CCT	Conditional Cash Transfer
ECP	Emergency Contraception Pill
GoI	Government of India
IEC	Information, Education, and Communication
IUCD	Intrauterine Contraceptive Devices
LAM	Lactational Amenorrhea Method
mCPR	Modern Contraceptive Prevalence Rate
MP	Madhya Pradesh
MPV	Mission Parivar Vikas
NFHS	National Family Health Survey
NHM	National Health Mission
OLS	Ordinary Least Squares
SC	Scheduled Caste
SRS	Sample Registration System
ST	Scheduled Tribe
TFR	Total Fertility Rate
UP	Uttar Pradesh

EXECUTIVE SUMMARY

India is poised to become the most populous country in the world by 2020 (United Nations, 2017). Concerns about population levels and growth are long-standing and the Government of India has made significant investments over the past five decades to address population growth and reduce fertility. Family planning is one of the instruments used to tackle high fertility in India, but there is ample evidence that other factors, including improvements in girls' education, labor force participation, and norms relating to marriage have been important drivers of fertility decline. Total fertility has halved over the past five decades, but these declines have not been uniform, with the lowest gains in the northern belt of states including Bihar, Madhya Pradesh (MP), Rajasthan, and Uttar Pradesh (UP). Over the last decade, the focus has shifted from exclusively targeting fertility to a broader interest in reducing health risks from early child-bearing and poor birth spacing, through the National Health Mission (NHM). The NHM has made geographic inequities in fertility and health outcomes a priority and identified "high-focus" districts to deliver investments. In 2017, the Health Finance and Governance project in India assessed the drivers of fertility variations in high-focus districts to support improvements in targeting and investment for the NHM.

The assessment is based on secondary analysis of data from the Annual Health Survey (2012-13), which provides the most recent available survey data for the high-focus states and districts in India. High-focus districts in four states, Bihar, MP, Rajasthan, and UP, were selected to understand which factors explain the observed differences in fertility and contraceptive outcomes at the district level. Data on individual and household characteristics from 182 districts provide the units of observation for this analysis, while the unit of analysis is the district, since this is the focus of NHM health programming. Districts were categorized into low- and high-fertility groups, based on the NHM programmatic guidelines of total fertility rates (TFRs) of less than 3 (<3) and equal to or more than 3 (≥3). Both descriptive and multiple regression analyses were undertaken to evaluate drivers of variance in fertility and contraceptive use at the district level. Standard predictors of fertility and contraceptive use were examined along with India-specific predictors including categories of socially excluded populations whose health outcomes are worse than those of the general population. The assessment found a lot of variation in levels of fertility and contraceptive use in the high-focus districts. Over a quarter of all districts have a TFR of more than 3, which is the cut-off for distinguishing a high-fertility district from a low-fertility one under the NHM. Comparing states, low TFRs have been achieved at varying levels of contraceptive use and unmet need, and modern contraceptive use only partially explains variations in fertility by state.

Table ES-1 provides a summary of the results from multiple regression analyses, organized by the relative importance of the most important predictors and policy levers that can be used to improve outcomes. The results of these analyses reveal that variations in the TFR and the modern contraceptive prevalence rate (mCPR) at the district level are largely explained by specific program and socioeconomic factors. The ranking of relative importance is based on standardized beta coefficients, which allow comparison of the effects of significant independent variables on the dependent variable, when independent variables are of different scales and units.

Table ES-1: Summary Results, Predictors of Fertility, and Modern Contraceptive Use in High-Focus Districts, Four States

	District Predictors	Ranking by Relative Importance	District Predictors	Ranking by Relative Importance
	Negative Relationship with TFR		Positive Relationship with TFR	
Top six district-level predictors of TFR	Use of dominant limiting method: Female sterilization	1	Being poor: *Lowest wealth quintile (poorest)*	3
	Use of dominant spacing method: Condom use	2	Not being educated: *Illiteracy*	4
			Unmet need	5
			Being moderately wealthy: *Middle-income quintile*	6

	District Predictors	Ranking by relative importance	District Predictors	Ranking by relative importance
	Negative Relationship with mCPR		Positive Relationship with mCPR	
Top six district-level predictors of mCPR	Higher use of traditional methods	1	Being moderately wealthy: *Middle to second highest income quintile*	3
	Unmet need	2	Belonging to a Scheduled Tribe	4
	Not being educated: Illiteracy	5		
	Higher use of emergency contraception	6		

Female sterilization and condom use have the strongest and a negative effect on district-level fertility, while extreme relative poverty and illiteracy has a positive and strong effect on fertility. Less intuitively, districts where the mean household is in the middle-income quintile is also predictive of higher TFR. There is also a positive and strong relationship between total unmet need and district-level fertility. The analysis shows that increasing the use of modern contraception and addressing unmet need in high TFR districts is a useful policy lever and within the reach of the NHM. The relatively strong effect of extreme poverty and illiteracy on outcomes may reflect either lack of access to preferred contraceptive methods or different preferences about family size and gender make-up or both. These will require a more granular understanding of variation in access, service offer, and preferences at the district level.

A similar mix of program and socioeconomic factors helps predict modern contraceptive use variance at the district level. Much of the variance at the district level is affected by higher mean levels of traditional method use, and unmet need at this level. These factors have a strong and a negative effect on modern method use along with higher levels of illiteracy and use of emergency contraception. In contrast, districts where the average household belongs to a scheduled tribe do better on mCPR than those that do not with an independent and positive effect on mCPR. Female sterilization and condom use had no independent effect on district-level mCPR variation, nor did levels of extreme poverty – factors that were significant in explaining fertility variations.

Only two factors commonly explained variance in both district-level fertility and modern contraceptive use: levels of unmet need and illiteracy. Other factors, such as type of contraceptive methods used, relative wealth status, and belonging to a socially excluded class, had differential impacts on the two outcomes. For example, the method mix that delivers low district-level fertility is different from the ones that drive higher district mCPR. Districts with a higher relative proportion of the very poor had higher levels of fertility, but wealth status did not explain district-level mCPR variance. Some factors, like the proportion of Muslims or members of scheduled castes in the total district population and prevalence of abortions had no independent effect on either outcome.

The results of the analyses suggest that the policy choices are not straightforward in high-focus districts. We would expect to see improvements in *both* fertility and contraceptive use when unmet need and illiteracy levels are reduced. But unmet need may signal a range of factors relating to women's preferences and reasons for non-use (Sedgh and Hussain, 2014) and interventions needed will consequently vary. Districts that would like to see simultaneous improvements in the TFR and mCPR will have to obtain a better understanding of the drivers of unmet need, but they cannot stop there. TFR variations depend far more on socioeconomic factors when compared with mCPR variations at the district level. The analysis showed independent and differing impacts of poverty and illiteracy on the outcomes. The poverty effect is significant for TFR variation, and may signal constraints on the supply *and* demand side. That is, poor households may lack access to information and contraception to regulate fertility according to their intentions (Birdsall, 1985). Equally, there may be lower demand for fertility regulation among the very poor, and/or a higher demand for children, which is influenced by levels of child mortality, productive work for children (Easterlin, 1975; Bongaarts, 1993), and the demand for sons. Addressing the poverty effect will require multi-sectoral investments that combine reductions in child mortality (Liu, 2016), improvements in educational and labor opportunities for children and women, and a clearer understanding of how supply-side factors influence the availability of preferred methods of regulating fertility. Districts with low mCPR on the other hand will need to tackle demand-side constraints that result from the independent effects of illiteracy rather than conflating illiteracy with poverty. Here, instruments of free access may be less important than those that promote information and informed choice among women and men. Other instruments that target girls' education such as conditional cash transfers, conditional on delaying marriage, have shown impact on contraceptive use (Buchmann et al., 2016) but may need better implementation and governance to obtain results (Sekher, 2012).

A general limitation of this study is that district-level variables, such as infrastructure, health workers, and preferred method availability or stock-outs were not considered in this analysis. These variables have shown an impact on contraceptive use and on the use of health services in general (Wang et al., 2013). In terms of fertility, governance of programs targeting early marriage and fertility have been known to have an impact on outcomes. Financing of health and education programs, district-level leadership, and availability of opportunities for women to improve returns from education (Jensen, 2012) may vary by district, which could influence the variance in fertility outcomes.

1. BACKGROUND

1.1 Fertility Variations in India: Context and Trends

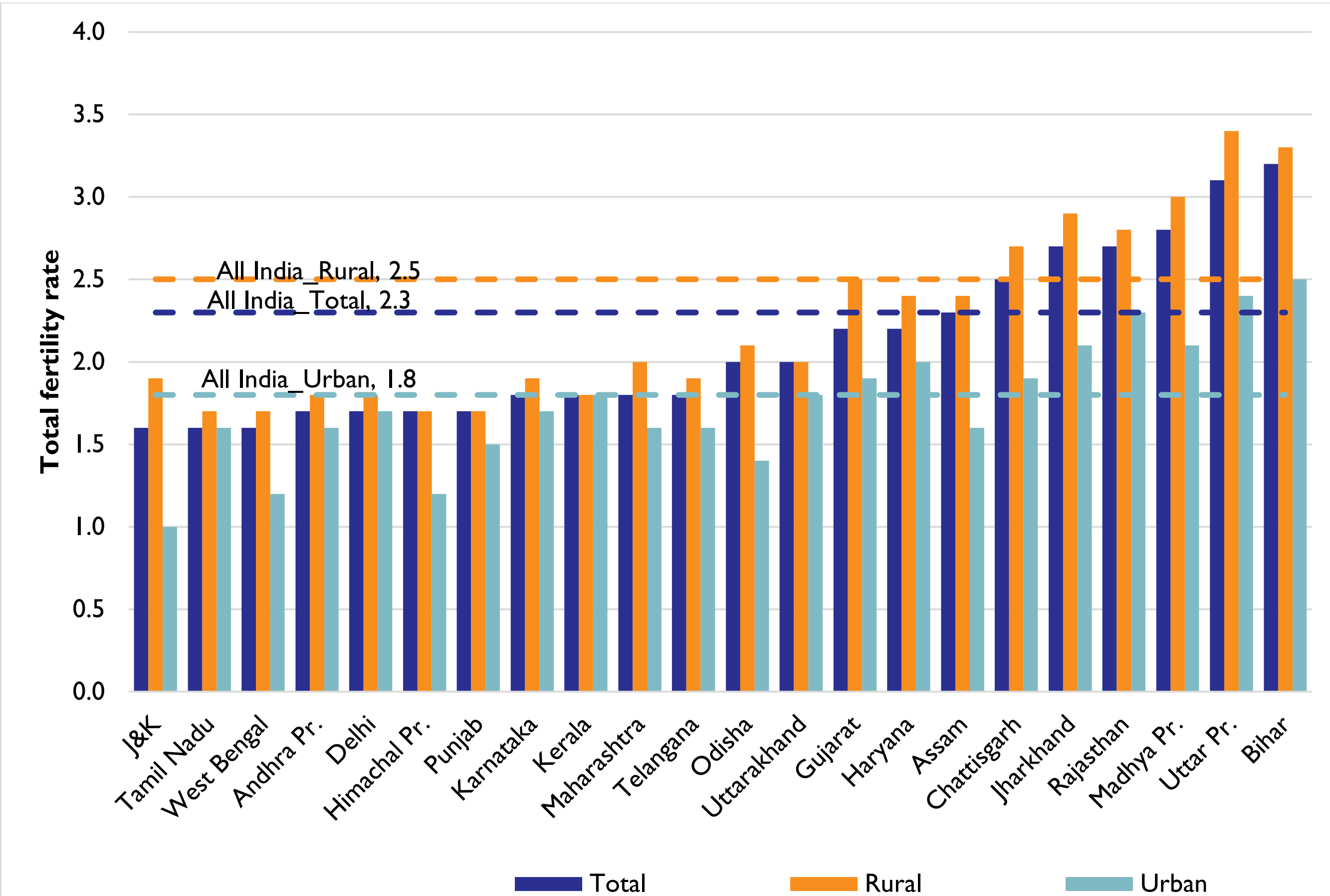
Fertility in India shows strong regional patterns; fertility declines began in southern India and fertility levels there now are much lower. Fertility levels vary from 1.6 children per woman in West Bengal to 3.5 in Uttar Pradesh (UP), with 24 states having achieved replacement-level fertility (2.1 births per woman) and below (Office of the Registrar General and Census Commissioner, 2016, henceforth referenced as Sample Registration System (SRS), 2015). Variations in fertility in India are closely linked to differences in the "social centrality of marriage" where marriage and childbearing form the most important aspect of a girl's life (Dyson, 2006). Expanded access to education and wage employment for women have widened the opportunity to make marriage, especially early marriage, less central to women's life choices, and wage income has affected preferences on family size and timing of births. These expansions in opportunity have not occurred uniformly but vary significantly by geography: southern versus northern regions, by individual states and by urban/rural residence. They have also played a role in reducing the impact of son-preference on fertility behavior.

1.2 The Changing Face of Family Planning in India

India's national family planning program has been largely driven by demographic imperatives. Curbing population growth by achieving replacement-level fertility has been the primary focus of the program for over five decades, with female sterilization used as the instrument to deliver replacement-level fertility. The total fertility rate (TFR) declined substantially from slightly over 5.0 children per woman in 1971 to 2.7 in 2005 and then more slowly to 2.3 in 2015 (SRS, 2015). Recent declines in fertility, however, are not uniform across the states and have slowed. To accelerate declines in fertility, the Government of India (GoI) has made specific investments to identify and target high-fertility states and districts for support with extra resources and initiatives. In 2016, the GoI launched a new strategy for family planning, the "Mission Parivar Vikas" (MPV), to focus on 145 districts in seven states that have the highest TFR levels in India. The purpose of the strategy is to substainlly increase access to family planning in order to bring fertility levels to replacement (2.1) by 2025 (MOHFW, 2016). In addition to concerns about variations in fertility, policy priorities in family planning have recently shifted. The National Health Mission (NHM) has moved from the government's exclusive focus on sterilization to expanding spacing-method use to address health risks faced by young married women. In the public health sector, spacing methods are being expanded from condoms and oral contraceptives to include injectables, intrauterine contraceptive devices (IUCDs), and post-partum IUCDs along with emergency contraception. Also included in modern spacing methods are the standard days method but not the lactational amenorrhea method (LAM), which is considered a traditional method by the Annual Health Survey (AHS). The heterogeneity in recent declines in TFR, and changes in policy priorities in family planning, have led to a renewed interest in understanding the relationship between the modern contraceptive prevalence rate (mCPR) and TFR. This is especially the case in the high-focus districts of the NHM, which have poor reproductive, maternal, and child health outcomes.

Five states, Bihar, Madhya Pradesh (MP), Rajasthan, UP, and Jharkhand, stand out in terms of their TFRs. The current study focuses on districts in the first four of these states (i.e., Jharkhand is not included). Rural UP and rural Bihar have the highest TFRs in the country (3.4 and 3.6, respectively), followed by rural Rajasthan and rural MP (both at 3.1) (Figure 1). These four high-priority states have a total of 197 districts (Bihar 38, MP 51, Rajasthan 33, and UP 75) and 132 are among the 145 MPV districts described above. Although all 132 are high-priority districts, there is considerable variation in observed TFR across these districts.

Figure 1: Total Fertility Rates, by State, Rural and Urban, 2015



Source: SRS, 2015

1.3 Study Objectives

The purpose of this assessment is to investigate the underlying factors that are responsible for variations in TFR across districts within the MPV high-priority states. We are particularly interested in identifying factors that best explain the variations in the TFR across districts to a level of precision that is policy relevant for different stakeholders. The cut-off for the TFR of 3 or higher (≥3) is based on MPV objectives.

Specific study objectives are:

- Understanding the characteristics of the 132 districts in the four study states with a TFR of ≥3 and comparing them with the 52 districts with a TFR of less than 3 (<3) with respect to geographic, socioeconomic, demographic, family planning, and fertility outcomes.
- Identifying socioeconomic factors that differ significantly between districts with TFRs above and below 3.
- Identifying changes over time in major family planning outcomes in three AHS.

2. METHODS

2.1 Data Sources and Analysis

Survey data from three AHS were used to evaluate differences in fertility outcomes. The AHSs were a baseline survey (2010-11), first update (2011-12), and second update (2012-13) (Office of the Registrar General and Census Commissioner, 2013, henceforth referenced as AHS, 2013). The study team focused on the second update for this study to understand variance in fertility and contraceptive use at the district level but the team used data from all three rounds of the AHS to examine changes over time in key family planning outcomes.

We reorganized data for the most recent AHS analysis for descriptive and multivariate analyses by computing mean values of each variable of interest at the district level. Reorganization was done using districts as the unit of observation to create a total sample size for the new dataset of 182 districts. For the trend analysis, we used state-level fertility and family planning outcomes from the three rounds. Districts were categorized into low- and high-fertility groups (TFRs <3 and TFRs ≥3) in order to facilitate the multivariate and descriptive analyses. Table 1 shows the number of women surveyed for each AHS and the districts this implies to explain the scale of the original dataset from which the 182 district sample size is drawn.

The AHSs use a uni-stage stratified simple random sample without replacement except in the case of larger villages in rural areas, where a two-stage stratified sampling was applied. The sample units are Census Enumeration Blocks in urban areas and villages in rural areas. In rural areas, villages have been divided into two strata, with stratum I, which comprises villages with a population less than 2,000, and stratum II, villages with a population 2,000 or more. AHS-3 (2012-13) covered 182 of the 197 currently existing districts in the four focus states, namely, Bihar (36/38), MP (45/51), Rajasthan (32/33), and UP (69/75). This is because the AHS-3 sampling frame was based on the Census 2001, when there were fewer districts. Some districts were bifurcated later, and so the current number of districts is greater. Table 1 provides the sampling details of the three rounds of AHS.

Table 1: Sample Sizes from Three Rounds of Annual Health Surveys

State	AHS 2010-11	AHS 2011-12	AHS 2012-13	Total Women	Number of Districts in 2012-13
Bihar	576,004	2011-12	540,882	1,116,886	36
Uttar Pradesh	803,832	600,534	786,590	1,590,422	69
Madhya Pradesh	452,476	822,504	466,816	919,292	45
Rajastan	348,529	465,496	346,481	695,010	32
Total	2,180,841	344,585	2,140,769	4,321,610	182

Source: Office of the Registrar General and Census Commissioner, India. Annual Health Surveys 1-3 (2013).

This study employed two types of analyses: descriptive and multivariate. The descriptive analysis focused on distinguishing the characteristics of high-TFR districts from low-TFR districts. Districts with a TFR equal to or greater than 3 are compared with those with a TFR <3 on family planning outcomes and socioeconomic status. We wanted to identify the degree to which variation in the districts across different factors explains the variation in the main outcome of TFR. To predict/infer underlying factors associated with levels of fertility and contraceptive prevalence in these districts, ordinary least squares (OLS) regression was used. The biggest advantage of using an OLS model is that we can predict TFRs and mCPRs for districts and validate the grouping of districts into low/high TFR that the NHM did using AHS values. To maximize the predictive nature of the model, we used Akaike Information Criteria (AIC) when choosing best predictors from a host of variables that are available in the dataset.

Predictors that were reviewed for the AIC include standard predictors of TFR and mCPR from the literature. These include women's ages grouped into seven five-year categories, educational attainment in 10 categories ranging from illiteracy to being literate with differing levels of school completion, religion in six categories, social exclusion status including belonging to a scheduled caste (SC)/ scheduled tribe (ST) versus non-exclusion category, wealth index in five quintiles, and employment status including type of employment in 16 categories, modern method use in eight categories, traditional method use of five types, and presence of unmet need by need for spacing, limiting, and all. The AIC algorithm helps to reduce multi-collinearity among predictors and maximizes likelihood function. To interpret the relative value or importance of variables, we also evaluated standardized coefficients of the variables in the regression.

Information on wealth status is based on AHS construction of wealth quintiles. The AHS constructs a household wealth index at the state level using principal component analysis that combines 33 assets and housing characteristics (AHS, 2013). Households are assigned to quintiles with an equal number of households in each based on their wealth index. Thus, 20 percent of the household sample for each state is in a given quintile, although this is not true at the district level, where more or less than 20 percent could be in the lowest quintile. Additional details on quintile construction can be found in the AHS reports for each state (AHS, 2013).

3. RESULTS

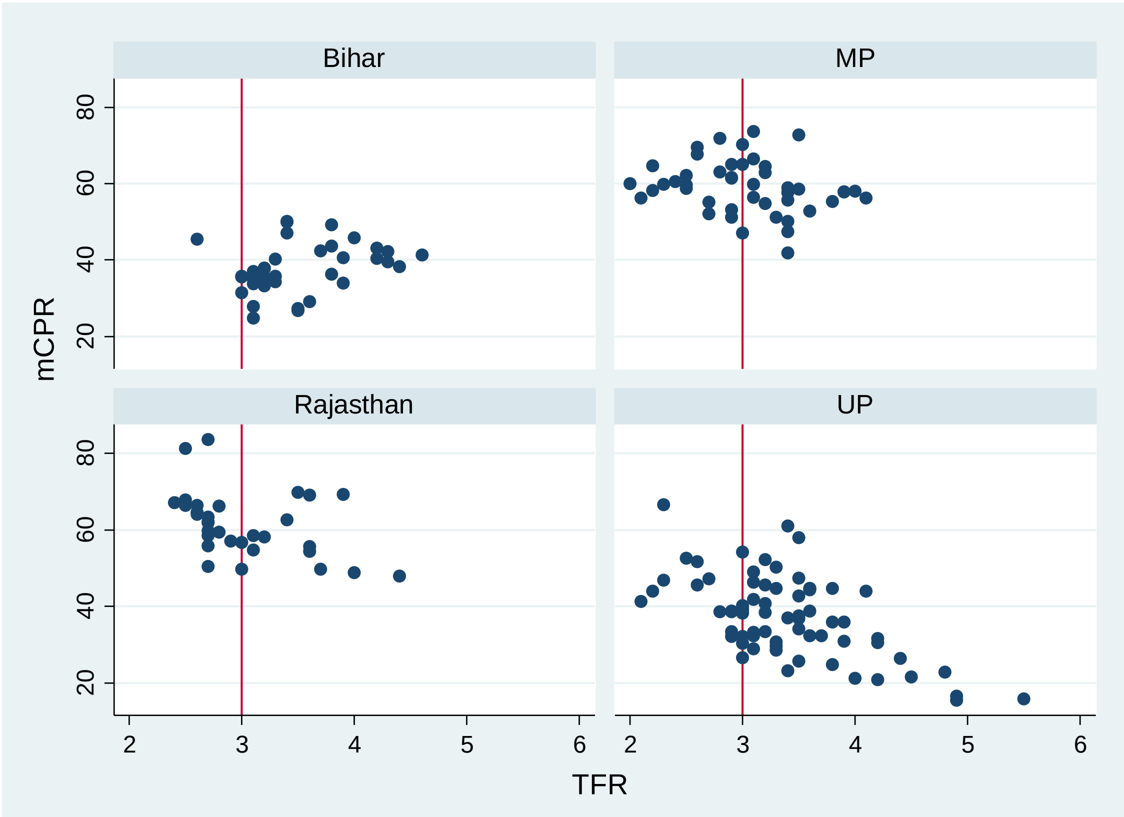
3.1 Descriptive Analysis

Data from AHS 2012-13 were used in the descriptive analysis of 182 districts in the four high-focus states, Bihar, MP, Rajasthan, and UP. These districts represent a significant proportion of the "high-focus" districts of the MPV, where health outcomes have been identified as needing urgent action. These districts vary, however, on many socioeconomic and demographic variables with no patterns easily discernable by the high- and low-fertility categories. On average, one-fifth of the population in these states belong to SCs, with the highest concentrations in UP, followed by Bihar. The majority of the populations in the four states are Hindu (>90 percent), with higher concentrations in UP. MP has the smallest proportion of Muslims in the examined districts (<7 percent). A quarter of the population in these states and nearly two-fifths in Bihar are from the lowest wealth quintile of their respective states. Education is one of the few socioeconomic variables associated with fertility, with high-fertility districts carrying a larger burden of illiteracy than low-fertility districts. Overall, over half of the population in these districts is illiterate relative to literacy levels within their states, with the highest levels of illiteracy observed in Rajasthan. Districts are very diverse within states and across states in terms of fertility levels and contraceptive use. While some districts in each state have "good" performance in terms of lower fertility rates and higher mCPR, other districts in the same state are among the worst performers in fertility and contraceptive use.

Based on AHS estimates of fertility in 2012-13 and following the convention of the MPV the 182 districts were classified as either low (TFR <3) or high fertility (TFR ≥3). In Bihar, 35 of the 36 districts covered in the AHS are in the high-fertility group; only one is classified as low fertility. MP and Rajasthan are more evenly balanced. Forty-four percent of districts in MP (20/45) and 56 percent of districts in Rajasthan (18/32) are in the low-fertility category. Most of the districts in UP (56/69 districts) are in the high-fertility group; only 13 districts in UP meet the criteria for low fertility.

Figure 2 shows district-level TFRs and mCPRs in the four states: 52 districts (28.6 percent) fall into the low-fertility category (TFR <3) and 130 districts (71.4 percent) fall into the high-fertility category (TFR >=3). All districts with an mCPR below 20 have a TFR of more than 3 (>3). Some districts with a TFR >3 have an mCPR of 60 percent while some districts with a TFR <3 have an mCPR as low as 25 percent (additional details shown in Annex A, Tables A1-A4). While there is a clear relationship between mCPR and TFR, the figure shows that mCPR only partially explains district-level variations in TFR (R^2 = -0.49).

Figure 2: Relationship between mCPR and TFR in Four States, by District, 2012-13



District-level fertility differentials were observed between and within states. The TFR in four states ranges from a high of 5.5 in Shrawasti district (UP) to a low of 2.0 in Bhopal (MP). In Bihar, Patna district recorded the lowest TFR of 2.6 and Sheohar recorded the highest TFR, 4.6. In MP, Panna district has the highest TFR at 4.1. In Rajasthan, the lowest fertility rate (2.4) was recorded in Kota district and the highest (4.4) was recorded in Barmer. Twenty-three districts in these four states have a TFR of 4.0 and higher: 11 districts are in UP, eight in Bihar, and two each in MP and Rajasthan.

Similar to fertility, the use of modern contraception is unevenly distributed within and across states. Overall, mCPR ranges from 16 percent in Balrampur district in UP to 84 percent in Hanumangarh district in Rajasthan. The three districts that show an mCPR of less than 20 percent are all in UP. At the other end of the spectrum, mCPR exceeds 60 percent in 36 districts, 18 in MP, 16 in Rajasthan, and 2 in UP. There is a similar wide variation within states: mCPRs in Bihar range from a low of 24.8 percent in Nawada district to 50.2 percent in Muzaffarpur district. In MP, mCPRs range from a low of 41.9 percent in Raisen to a high of 73.6 percent in Narisimhapur, in UP from 23.2 percent in Mainpuri to 66.7 percent in Jhansi, and in Rajasthan from 47.9 percent in Barmer to 83.7 percent in Hanumangarh.

Table 2 provides both state- and district-level comparisons of family planning indicators by high/low TFR groups. Comparing states, low TFRs are achieved in states at varying levels of mCPR, tubectomy, and unmet need. For example, districts in Bihar with an mCPR of 46 percent fall into a low TFR category, whereas districts with similar mCPRs in MP and Rajasthan would not. Similarly, districts in UP have achieved low TFR status at much lower levels of tubectomy prevalence than districts in Bihar, Rajasthan, and MP. Equally, levels of unmet need in themselves do not tell us what they imply for low/high TFR groupings. Hence, levels of key family planning indicators in themselves are not sufficient signals of state-wise TFR differences.

Table 2: Profile of Sample Districts, by High/Low Fertility in Four States, AHS 2012-13

Indicator	Bihar		Madhya Pradesh		Rajastan		Uttar Pradesh	
	High TFR	Low TFR	High TFR	Low TFR	High TFR	Low TFR	High TFR	Low TFR
CPR (Mean)	42.84	50.6	62.68	63.45	64.73	71.48	58.74	61.49
mCPR	37.76	45.5	58.14	60.62	57.54	64.25	35.89	44.48
Method mix								
Tubectomy	84.45	82.86	85.12	81.56	75.84	76.56	49.99	51.84
Vasectomy	0.85	0.66	1.48	2.77	0.33	0.81	0.7	0.7
IUCD	1.75	4.18	0.62	0.45	2.5	1.48	2.98	3.33
Pills	3.47	5.93	2.46	2	4.15	3.7	10.09	7.71
Condoms	7.79	5.27	9.77	13.03	16.86	16.98	33.99	33.77
ECPs	0.4	0	0.27	0.09	0.12	0.21	1.31	1.75
Unmet need								
Spacing	18.46	11.4	11.49	9.24	9.31	6.92	12.24	9.36
Limiting	16.63	9.3	13.04	13.57	7.59	6.62	10.74	8.71
Total unmet need	35.09	20.7	24.53	22.82	16.9	13.52	22.99	18.08
Number of districts	35	1	25	20	14	18	56	13

Note: ECP=emergency contraceptive pill

Examining the data by district allows us to see that some family planning indicators do marginally signal within-state differentials in TFR. The analysis finds small differences in mean mCPR between high- and low-TFR districts at the state level. Mean mCPR is higher in low-TFR districts for all states, as expected. Total unmet need is greater in high-TFR districts in low-TFR districts and unmet need for spacing is higher in high-TFR districts for three states. But there is no clear pattern in method mix by TFR group: method mix looks similar in high- and low-TFR districts. UP has the greatest diversity in method mix, with lower prevalence of sterilization than in the other states.

3.2 Trends in Major Family Planning Indicators

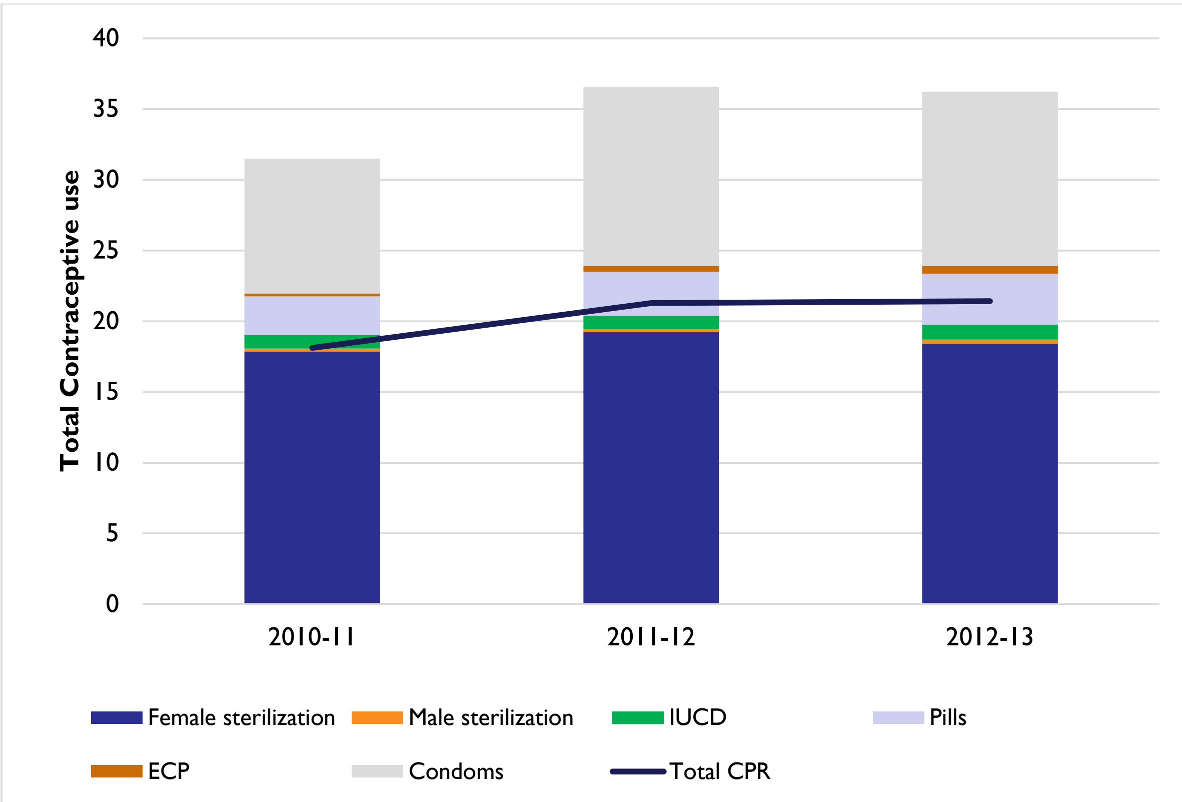
Table 3 describes the trends in major family planning indicators for the four focus states during each AHS period. According to AHS results, use of contraceptive methods – both all methods and modern methods – increased over the entire survey period. UP recorded the largest increase (9.1 percent) in all-CPR from AHS-1 to AHS-3, followed by Rajasthan (5.7 percent) and Bihar (3.6 percent). Use of modern contraceptives also increased across all the states during this period, but the magnitude of change varied by state. The largest increase in both all-method and modern-method use was also observed in UP (5.8 percentage points), followed by Rajasthan (3.6 percentage points), Bihar (2.6 percentage points), and MP (2.4 percentage points) over the three years. Between 2011 and 2013, unmet need for family planning decreased across the states. The largest decline in unmet need for family planning was in UP (9.1 percent) followed by Bihar (7.7 percent) and Rajasthan (6.5 percent) during the period.

Table 3: Trends in Family Planning Indicators in Four States, 2011-13

Indicator	Bihar			Madhya Pradesh			Rajastan			Uttar Pradesh		
	AHS 2010-11	AHS 2011-12	AHS 2012-13	AHS 2010-11	AHS 2011-12	AHS 2012-13	AHS 2010-11	AHS 2011-12	AHS 2012-13	AHS 2010-11	AHS 2011-12	AHS 2012-13
Method Use												
All-CPR	37.6	43.0	41.2	61.2	63.4	63.2	64.5	66.4	70.2	49.9	58.6	59.0
m-CPR	33.9	38.2	36.5	57.0	59.3	59.4	58.8	59.4	62.4	31.8	37.3	37.6
Method-mix (100%)												
Female sterilization	78.3	73.7	75.8	79.2	78.1	78.4	70.6	69.8	69.3	35.8	32.8	31.2
Male sterilization	0.9	0.8	0.8	1.5	1.4	1.9	0.7	0.6	0.6	0.4	0.4	0.5
IUCD	1.7	2.0	1.6	0.7	0.6	0.5	1.6	1.8	1.6	1.9	1.6	1.8
Pills	4.6	3.8	3.1	3.0	2.6	2.2	4.4	3.9	3.4	5.5	5.3	6.1
ECP	0.2	0.4	0.4	0.3	0.2	0.2	0.1	0.2	0.2	0.4	0.7	0.9
Condoms	4.0	7.4	6.4	8.6	10.6	10.7	13.4	13.5	14.1	19.1	21.6	20.9
Traditional methods	9.8	11.2	11.4	6.9	6.5	6.0	8.8	10.5	11.1	36.3	36.3	36.3
Unmet need												
for Spacing	21.3	17.3	17.3	13.8	10.8	9.5	11.9	8.1	7.3	17.2	12.4	11.2
for Limiting	17.9	16.2	14.2	8.6	10.7	12.1	7.6	4.5	5.7	12.6	11.6	9.5
Total	39.2	33.5	31.5	22.4	21.5	21.6	19.5	12.6	13.0	29.8	24.0	20.7

Figure 3 shows changes in CPR and the composition of CPR for UP, where there were the largest increases in use. The increase in CPR was driven especially by increases in traditional method prevalence, from 18.1 percent to 21.4 percent, and condom use, from 9.5 percent to 12.3 percent and more modestly by female sterilization, from 17.8 percent to 18.4 percent. Traditional method use also increased in Rajasthan (by 2.1 percentage points) and Bihar (by 1 percentage point) but declined in MP (by 0.4 percentage point). The largest increase in female sterilization was observed in Rajasthan (3.1 percentage points), followed by Bihar (1.8 percentage points), which drove these states' increases in CPR. In MP, increases in condom use (1.25 percentage points) along with sterilization (1.1 percentage points) drove CPR increases. In all states except UP, pill use declined modestly, while condom use increased.

Figure 3: Changes by Method Prevalence and Total CPR, 2010-2013, UP AHS



3.3 Factors Associated with District-Level Fertility Variation

In addition to the descriptive analysis on the distribution of family planning characteristics by fertility, this study also examined common predictors of variation in fertility, summarized at the district level. Mean values were calculated for each independent variable by district for the total sample of 182 districts.

Our analysis suggests that among different socioeconomic variables, literacy, religion, caste, and household economic status are significant predictors of fertility. Overall, the model explained 70 percent of the (R^2 =0.70) variability in district-level fertility. Districts where the average woman was illiterate, Muslim, of an ST, and having unmet need for contraception had higher fertility than other districts. The effects of wealth status are more ambiguous when controlling for other socioeconomic variables. While districts with more people in the poorest quintile have higher fertility, districts with more people in the middle quintile are also likely to have higher fertility. That is, wealth status does not have a consistently inverse relationship with fertility at the district level, as both having more in the poorest quintile as well as in the middle-income quintile is predictive of higher fertility.

The results also show that fertility levels are strongly associated with the use of particular modern contraceptive methods. Fertility is negatively associated in these priority districts with use of female sterilization and male condoms and the associations are highly significant. Use of emergency contraception is moderately and negatively associated with fertility. There is no association between traditional method use and fertility for women in these districts. Association between use of any contraceptive method and fertility is found to be modestly "positive," i.e., fertility is found to be higher in those districts with higher proportions of use of *any* contraceptive methods. The association between fertility and *any* contraceptive use is contrary to expectation and is evaluated further in the discussion section.

3.4 Factors Associated with District-level Modern Contraceptive Prevalence Variation

The analysis also identified factors associated with district-level variations in contraceptive use. The regression model is able to explain over 95 percent (R2 =0.96) of variability in district-level mCPRs with the set of predictors as independent variables. Results from the OLS regression used to predict underlying factors associated with levels of high/low-fertility groupings and high/low mCPRs in the 182 districts are presented in Table 4. OLS regression analysis suggests that among different socioeconomic variables, literacy, religion, caste, and household economic status are significant predictors of fertility at the aggregate level or district level in deciding whether a district falls in the low- or high-fertility group. Overall, the model explained 70 percent of the (R2 =0.70) variability in categorization of district fertility.

Districts with a higher proportion of illiterate women are more likely to have grouped into the high-fertility group than the low-fertility group of districts. Similarly, an increase in the proportion of Muslim women in a district increases the chance of that district falling into a higher fertility category. Similarly, districts with higher levels of unmet need for contraception are likely to have higher fertility levels. The effects of wealth status at the household levels are more heterogeneous. Districts with a higher proportion of households in the lowest and middle quintiles are more likely to be categorized among higher-fertility districts, whereas other wealth quintile indices do not pose significant effect on fertility.

The results also show that whether a district falls into the high-fertility or low-fertility group is strongly associated with the overall mCPRs of that district. A higher proportion of women using modern contraceptive methods is likely to restrict fertility of that district by appropriately planning their family sizes. Further, method mix appears to play a role. Districts with a higher proportion of women using female sterilization are more likely to be in the low-fertility group and the association is highly significant. Similarly, increased use of other modern methods like emergency contraception and condoms also have a significant effect on whether a district is grouped as low fertility. Association between use of any contraceptive method and fertility is found to be "positive," i.e., districts with a higher proportion of women using any contraceptive methods are likely to be categorized as districts with higher fertility.

Table 4: Predictors of Variations in TFR and mCPR, at the District (Aggregate) Level

Predictors	TFR		mCPR	
	OLS coefficients	t-statistic	OLS coefficients	t-statistic
Women's education (Illiterate)	0.14***	3.53	-0.51**	-2.30
Women's education (literate but without formal education)	0.018*	1.96	0.48	0.68
Women's religion (Muslims)	0.12***	3.33	-.0.04	-0.16
Women's caste (ST)	0.005	1.66	0.46**	2.42
Women's caste (SC)	0.002	1.34	0.46	1.10
Household asset index (Lowest group)	0.015***	3.58	-1.76	-0.52
Household asset index (Second lowest group)	0.005	1.31	0.06	0.16
Household asset index (Middle group)	0.029**	3.08	0.15**	2.69
Household asset index (Fourth lowest group)	0.009	0.09	0.92	1.36
Unmet need for contraception	0.017***	3.84	-0.13***	-3.89
Contraceptive prevalence (Any - CPR)	0.12*	2.58	1.03***	23.4
Use of contraceptive methods – Female sterilization	-0.025***	-4.19	-0.03	-0.83
Use of emergency contraceptive method	-0.11**	-2.79	-0.73**	-2.45
Use of condoms	-0.028***	-3.69	0.19	0.18
Use of traditional methods	-0.18	-1.34	-1.22***	-11.55
Number of abortions/stillbirths	-0.34	-1.34	1.24	0.70
R^2	**0.70**		**0.96**	
N	**182**		**182**	

* p<0.05; ** p<0.01; *** p<0.001

To examine the relative value of the significant predictors of fertility, we used standardized coefficients. Table 5 provides a summary of standardized betas obtained for variables that showed a significant association with fertility and with mCPR from the OLS regression. The results show that use of sterilization and condoms, unmet need, household poverty, and female illiteracy are the top five factors explaining differences in district-level fertility. The use of any method, use of traditional methods, and belonging to an ST emerge as the top three factors explaining differences in district-level modern contraceptive prevalence.

Table 5: Standardized Beta Coefficients TFR and mCPR*, at the District (Aggregate) Level

Predictors	Standardized Beta coefficients	
	TFR	mCPR
Women's education (Illiterate)	0.312	-0. 049
Women's education (Literate but without formal education)	0.111	
Women's religion (Muslims)	0.197	
Women's caste (ST)		0.47
Women's caste (SC)		
Household asset index (Lowest group)	0.373	
Household asset index (Second lowest group)		
Household asset index (Middle group)	0.243	0. 051
Household asset index (Fourth lowest group)		
Unmet need for contraception	0. 287	-0. 091
Contraceptive prevalence (Any - CPR)	0. 186	0.703
Use of contraceptive methods – Female sterilization	-0. 985	
Use of emergency contraceptive method	-0. 151	-0. 042
Use of condoms	-0. 401	
Use of traditional methods		-0.681
Number of abortions/stillbirths		

* Significantly associated (p≤.05)

3.5 District-level Predicted TFRs and mCPRs

Using the best derived OLS regression model, TFRs and mCPRs are predicted at the district level and classified according to low/high TFR and mCPR groups. For comparison purposes, districts are similarly classified using observed TFRs and mCPRs. Districts with a TFR <3 are treated as low fertility district and districts with a TFR >=3 are classified as high-fertility districts. Similarly, districts with less than 40 percent mCPR are classified as low-prevalence districts and districts with an mCPR of more than or equal to 40 percent are classified as high-prevalence districts.

Tables 6a and 6b provides the result of this grouping analysis. It is interesting to see that the numbers of districts in each cell in these two tables are nearly matched, except that five districts in low mCPR and low TFR groups from Table 2 are shifted to other cells under the predicted scenario. As evident from the previous section, *model predicted mCPRs* are more likely to match observed mCPR as the number of districts falling into low/high mCPR groups is the same. However, according to TFR categorization, six districts are shifted from the low-fertility group (TFR <3) to high-fertility group (TFR >=3) after imposing model-predicted TFR values.

Table 6a: Distribution of Districts according to AHS Survey Reported Values of <3/ ≥3 TFR, 2012-2013

Observed Values from AHS				
		mCPR		
		Low (<40%)	High (>=40%)	Total
TFR	Low (<3)	5	47	52
	High (>=3)	59	71	130
Total		64	118	182

Table 6b: Distribution of Districts per Model-Predicted Values of Low/High TFR

Predicted Values from the Model				
		mCPR		Total
		Low (<40%)	High (>=40%)	
TFR	Low (<3)	0	46	46
	High (>=3)	63	73	136
Total		63	119	182

Figure 2, shown earlier, identified that, while there was a relationship between mCPR and fertility in the study districts, mCPR only partially explained variation in fertility. Only half (R^2=.49) of the total variation in district-level TFRs was explained by levels of district mCPRs. The analysis was extended to identify districts that do not belong to the conventional notions, i.e., high mCPRs at the same time as high TFRs. Table 7 shows that in a small group of districts, the TFR-mCPR relationship is not in the expected direction. A total of 38 districts have high contraceptive prevalence (mCPR >= 50 percent) and high fertility (TFR >=3). Annex A provides additional details on the distribution of districts by state, on TFR and mCPR. Of the 38 districts, 22 are in MP, 10 in Rajasthan, 5 in UP, and 1 in Bihar. Five districts have low fertility (TFR >3) and low prevalence (mCPR <40 percent). All five of these districts are in UP (Table 7).

Table 7: Districts with Low mCPR and Low TFR Group (mCPR <40% and TFR<3)

District	TFR = 2.8	TFR = 2.9
	mCPR	mCPR
Jaunpur		38.7
Kanpur Dehat	38.7	
Mau		32.2
Pratapgarh		33.5
Sant Ravidas Nagar Bhadohi		38.9

4. DISCUSSION

4.1 Contraceptive Use Alone Not a Sufficient Explanation of District-Fertility Variation

The purpose of this study was to support the NHM in improving its targeting of services to "high-priority districts" identified through the MPV initiative. Under the MPV, a total of 145 districts in seven states are identified as high fertility or TFR ≥3, and account for 28 percent of India's population, 30 percent of maternal deaths, and almost half all infant deaths in India (MOHFW, 2016). The initiative sees a direct link between fertility and contraceptive use, and its instruments are focused on expanding contraceptive use in these districts.

The first question for this study is whether differences in contraceptive use alone differentiated districts from the low-fertility group from the high-fertility group. We studied districts in four of the seven priority states to answer this question. The landscape analysis showed an inverse relationship between the mCPR and TFR, which is moderately significant. However, we found that prevalence alone does not fully explain differences between high- and low-fertility districts. Districts with a high TFR (≥3) have a broad range in modern method prevalence (mCPR 15.5–73.6 percent). Our analysis showed that slightly less than half of the variance in fertility is explained by modern contraceptive use.

To better understand factors that explained variance in fertility at the district level, we created mean estimates of socioeconomic and demographic predictors of fertility, based on individual survey responses. Each district was a unit of observation with mean (proportion of) wealth status, literacy status, SC, ST, religion, unmet need, and method-specific prevalence. We conducted descriptive and multivariate analyses using these constructed mean variables. Results from the multivariate analysis was used to predict underlying factors associated with placing into a high- or low-fertility group and high/low mCPR.

The most important finding was that *distinguishing between modern methods* does not matter, in understanding whether a district placed into a high- versus a low-fertility group. Distinguishing between types of method matters when it comes to the relative importance of the method in explaining fertility level. All modern methods included in the analysis had a negative association with fertility. Female sterilization use was significantly and negatively associated with fertility and overwhelmed other factors in relative importance. Condom use was also significantly and negatively associated with fertility and the second most important factor in explaining district-level variation. Socioeconomic factors including extreme poverty and illiteracy, emerged as being nearly equally important followed by levels of unmet need in explaining variance in fertility. Use of emergency contraception was negatively associated with fertility but relatively less important. The use of traditional methods, which included LAM, had no independent effect on fertility variation. Any method use has a very modest, but positive association with fertility and of least relative importance. This relationship is not consistent with the expected relationship between contraceptive use and fertility, which is usually negative. The positive association between any method use and fertility may reflect the effect of traditional method use and incorrect LAM use, which is associated with higher failure, and inconsistent use of methods. Users of any method may include a larger proportion of users who are using methods inconsistently and may be willing to risk an unintended pregnancy based on family composition and son preferences (Calhoun et al., 2013).

4.2 Policy Implications for NHM

The independent and strong effects of illiteracy and poverty at the district level on fertility have important policy implications for the MPV and the NHM. The robust association between female literacy and fertility has substantial evidence (Pradhan and Canning, 2013) in India (Jejeebhoy, 1995; Jejeebhoy and Kulkarni, 1989), and was observed at the district level (Drèze and Murthi, 2001). The mechanisms by which literacy operates could be many including improving labor market prospects and wage income, which could either delay marriage or be a function of delayed age of marriage. Improved education can also influence desired family size, and knowledge and use of contraception to prevent unintended pregnancies. The role of poverty in fertility is also well documented (Schultz, 2005). Current initiatives therefore will need to go beyond increasing the supply of family planning services and the supply of sterilization and condoms to address the conditions that impact desired family size (Jayaraman et al., 2009). The instruments that the NHM has to address are desired family size community-based demand creation through Accredited Social Health Activists (ASHAs) and information, education, and communication (IEC) activities coordinated through national- and state-level programs. Evaluation of ASHAs by the GoI show that existing incentives drives the content of their work, such that they focus primarily on encouraging institutional deliveries (National Health System Resource Centre, 2015). Outside of the NHM, conditional cash transfer programs (CCTs) have a long history in India but evaluations of them have shown that they have heavy documentation burdens and significant implementation gaps (Sekher, 2012). There is growing evidence that offering CCTs to young women can improve the returns to education and improve health outcomes including delaying marriage, sexual debut, and use of contraception to protect against pregnancy (Buchman et al., 2016; Baird, McIntosh, and Özler 2009).

In general, the ranking of predictors shows that the more important predictors are clustered in two groups: those immediately actionable through NHM instruments and those that require multi-sectoral interventions. The finding that high levels of sterilization explain variations in fertility and are actionable does not mean that this policy lever should be used. There are significant welfare implications to women and children from sterilization at an early age, low-use of female-controlled methods, and lack of spacing between births. Studies on contraceptive use by young married women, and poor women in India show higher levels of unmet need among the poor and non-use of methods until childbearing is complete (Pallikadavath et al., 2016; Ram, 2009; Speizer et al., 2012). Higher dependence on sterilization by young women in the lowest income quintile implies that they face a larger burden of unintended pregnancies until they complete childbearing, which may lead to higher than desired fertility and potentially the use of abortion to manage their fertility. Both of these outcomes, constrict women's ability to participate in wage labor, and have important health consequences for women and infants, through short birth intervals and mechanisms of maternal depletion (Kozuki and Walker, 2013). India has one of the highest levels of anemia among young women, estimated at 56 percent prevalence in 2013, with distinct patterns of higher prevalence among rural and poorer women (Aguayo et al., 2013). Early childbearing and poor spacing place increased burdens on iron-stores and lead to poor fetal and infant outcomes with significant social costs (Plessow et al., 2015).

Thus, although higher use of sterilization may lead to lower fertility, the health and disempowerment costs are significant from delaying use of temporary methods until desired family size is reached. On the other hand, the association between lack of female education and fertility is both actionable and comes with positive welfare benefits to the woman and the household. Higher access to skills that translate into wage employment, especially for adolescent girls, has been shown to have effects on both fertility and household welfare (Wodon et al., 2017).

The inconsistent relationship between the TFR and the mCPR is not unique to these districts or to India; it also is observed in Bangladesh, Malawi, and Ghana. In Bangladesh, contraceptive prevalence increased by nine percentage points over a decade with no change in fertility (Saha and Bairagi, 2007). Son preference and heightened concerns relating to infant mortality played a role in explaining inconsistent fertility-contraceptive use relationships in Bangladesh. Son preference is common in India, especially in the northern belt states that include the high-priority districts of the MPV initiative (Mutharayappa et al., 1997). In Malawi, age of childbearing and parity at time of first use have been identified as significant (Jain et al., 2014). In Ghana, higher contraceptive use would have been expected given levels of modern contraceptive use. An analysis of three rounds of Demographic and Health Surveys (Blanc and Grey, 2000) examined multiple factors including under-reporting of methods, changes in age of marriage and first sex, changes in the composition of contraceptive use, changes in postpartum insusceptibility, and changes in induced abortion. The authors concluded that proximate determinants do not fully explain the large decline in fertility coexisting with low prevalence. The authors suggest that factors like coital frequency that is not captured in standard surveys may partially explain the lower than expected decline in fertility given modern contraceptive prevalence.

For the high-focus districts in India, regression results suggest an impressive model predictability of more than 70 percent in explaining the district-level fertility variations. Similarly, the model power increased to over 95 percent while explaining district-level mCPR variability. Association between modern contraceptive use and fertility at the aggregate level is along expected lines. High levels of traditional method use signal interest in fertility regulation and represent a latent demand for effective fertility regulation. Differences between wanted and completed fertility rates by socioeconomic status from the National Family Health Service-3 (2005-06) data (IIPS and Macro International, 2007) provide additional signals about demand for contraception. Wanted fertility rates range from 2.4 among women in the lowest wealth quintile to 1.6 among women in the highest wealth group. In lower income quintiles, higher fertility desires reflect both household preferences and cultural norms relating to the demand for children but also are closely linked to levels of child mortality (World Bank, 2010). A recent analysis using AHS data from the second update identified a significant "coverage gap" for maternal and child health interventions in the high-focus districts that showed a clear wealth gradient (Awasthi et al., 2016). The authors measured gaps in coverage based on levels of immunization, family planning, skilled birth attendance and antenatal care, and coverage for key sick-child health interventions to measure the gap between need and actual coverage. The findings of high coverage gaps in these areas provide insight into the results of our analysis of the independent effects of poverty on fertility and identify the role of poor child health outcomes in these high-priority districts. The policy implications are actionable within the instruments of the NHM, which provide substantial financial and technical resource transfers to states to address the determinants of child mortality in the high-focus districts (MOHFW, 2017).

The strong relationship between socioeconomic variables, fertility, and contraceptive use is both observed in this study and well-established in the broader health literature (World Bank, 2004). Governments have used multiple policy instruments to address inequities in health outcomes from broad primary care-driven investments such as the Female Health Worker program in Bangladesh to the Health Extension Program in Ethiopia (Portner et al., 2011). Micro-level experimental data using randomized trials have provided much-needed evidence on alternative policy levers to reduce child marriage and delay teenage childbearing, both outcomes that have significant effect on fertility. A randomized control trial in Bangladesh found that providing modest incentives conditional on marriage, not education, showed a large impact in delaying marriage and teenage childbearing and increasing schooling among girls (Buchmann et al., 2016). In Uganda, delivering bundled interventions of hard and soft skills with significantly reduced childbearing among adolescents increased income from self-employment and created new aspirations relating to childbirth, labor force participation, and marriage (Bandiera et al., 2010). Skill development focused both on income generation skills or hard skills and those that improve life skills including interpersonal abilities and workplace readiness. Randomized control trials such as these, provide the highest level of evidence to test policy options. More recently, evidence from these trials have been scaled up in a joint World Bank-GoI scheme in Jharkhand, India, delivering interventions to adolescent girls and young women age 14-24 years (World Bank, 2016). Current evidence is clear that much can be done to alter the effects of low socioeconomic status on fertility and contraceptive use. The focus of the MPV initiative therefore should be broader than expanding availability of methods and range of methods to address the joint constraints of limited skills and limited economic opportunities for women in the high-priority districts. In addition, the MPV initiative should incorporate the findings on child survival and fertility preferences to continue strong investment in reducing infant and child mortality in these districts. This analysis of the variations in fertility show that shifting high-fertility districts to low requires a move from the pure supply of contraceptive services to addressing demand-side constraints, especially for the poor.

4.3 Limitations and Opportunities for Further Research

The current analysis was conducted to identify sources of variation in the TFR across 182 priority districts in four states. The analysis was conducted on the AHS-3 data, where the woman's (respondent's) demographic characteristics, her economic status represented by household-level asset index, and her family planning choices are represented as mean percentages for the district to which she belongs.

At the district level, we focus entirely on the demand-side aspects of family planning choices: the socio-demographic and the economic status of women and households at the district level. The limitations of such an approach is that it does not take into consideration supply-side factors that might have considerable explanatory power in the variation of modern contraceptive rates across districts and hence drive the differentials in TFRs. Such supply-side factors may include the penetration of health services at the district level, the availability of counseling services from community health workers, the public health finances at the district level, and the district infrastructure index. Such an approach was used for example in the study on the coverage gap in high-priority districts, discussed earlier (Awasthi et al., 2016). The supply-side factors at the district level are enablers for representative women to utilize services at their disposal; in many ways they are the first order or necessary conditions. A further analysis at the district level, which takes into account a much more comprehensive range of factors, is a natural next step.

Another limitation of this study is an inability to understand interaction effects between variables since the unit of analysis is the district. Interactions between some of the variables of interest such as poverty and membership in a socially excluded group, parity, and type of method used may well explain some of the results. For example, the effect of female sterilization on the TFR may be different depending on whether women are of zero/low parity or parity greater than two. Method type may have no effect on TFR for those with low parity, in which case investments to address norms relating to childbearing may be more effective than expansion of one type of method. Associations of being Muslim on the TFR or belonging to an ST may change by poverty. This implies that the policy prescriptions would focus on bundling economic empowerment for girls with services rather than on targeting a specific group with IEC and specialized services. Such interaction effects can only be evaluated when the unit of analysis is the individual rather than the district.

4.4 Recommendations

1. Districts should be the focal points in planning and implementation of schemes since large geographical variations in fertility and mCPR exist within states. Empowering districts to experiment using the NHM, with incentives conditional on marriage or CCTs for expanding labor market-ready skills and improving governance and implementation of current CCTs for girls and young women will be critical to reach populations with low demand for fertility regulation.
2. The NHM should use existing evidence on the gaps in coverage for critical child and maternal health interventions to improve child mortality levels in high-focus districts.
3. Targeting socially excluded groups with programs that combine skill building for girls with access to contraception may help address low levels of contraceptive use and high fertility in those districts with high concentrations of SC/STs and poor Muslim populations.
4. This study did not explore how differences in range of methods available beyond sterilization and condoms may explain variations in the use of modern contraception. The NHM has recently launched new methods including the injectable and progesterone-only pills up to the district level. The introduction of new methods offers a new opportunity to evaluate if current methods are not meeting women's preferences and if expanding the range would increase contraceptive use in the high-priority districts, as has been recommended based on global evidence (Ross and Stover, 2013).

ANNEX A: DISTRIBUTION OF DISTRICTS, BY TFR AND mCPR

Table A1: Distribution of Districts by TFR and mCPR, Bihar, AHS 2012-2013

Bihar							
TFR	mCPR (%)						Total
	< 20.0	20.0 – 29.9	30.0 – 39.9	40.0 – 49.9	50.0 – 59.9	60.0 and above	
< = 2.1							
2.2 – 2.4							
2.5 – 2.9				Patna			1
3.0 – 3.4		Nalanda Nawada	Aurangabad Banka Begusarai Bhagalpur Bhojpur Buxar Gaya Jamui Jehanabad Kaimur (Bhabua) Lakhisarai Munger Saran	Madhubani Rohtas Vaishali	Muzaffarpur		19
3.5 – 3.9		Gopalganj Sheikhpura Siwan	Katihar Samastipur	Darbhanga Purnia Sitamarhi Supaul			9
4.0 – 4.5			Araria Kishanganj	Khagaria Madhepura Pashchim Champaran Purba Champaran Saharsa			7
4.6 and above				Sheohar			1
Total Districts		5	17	14	1	0	37

Note - Madhepur data is missing in AHS-3 databse

Table A2: Distribution of Districts by TFR and mCPR, Madhya Pradesh, AHS 2012-2013

Madhya Pradesh							
TFR	mCPR (%)						Total
	< 20.0	20.0 – 29.9	30.0 – 39.9	40.0 – 49.9	50.0 – 59.9	60.0 and above	
< = 2.1					Gwalior	Bhopal	2
2.2 – 2.4					Datia Mandsaur	Indore Jabalpur	4
2.5 – 2.9					Bhind Hoshangabad Jhabua Neemuch Shahdol Sheopur	Balaghat Betul Chhindwara Dewas Dhar Harda Mandla Ujjain	14
3.0 – 3.4				Morena Raisen Rewa	Dindori Guna Katni Rajgarh Ratlam Sagar Sidhi Umaria	East Nimar Narsimhapur Seoni Shajapur Tikamgarh West Nimar	17
3.5 – 3.9					Barwani Chhatarpur Satna Sehore Vidisha	Damoh	6
4.0 – 4.5					Panna Shivpuri		2
4.6 and above							
Total Districts				3	24	18	45

Table A3: Distribution of Districts by TFR and mCPR, Rajasthan, AHS 2012-2013

Rajasthan							
TFR	mCPR (%)						Total
	< 20.0	20.0 – 29.9	30.0 – 39.9	40.0 – 49.9	50.0 – 59.9	60.0 and above	
< = 2.1							
2.2 – 2.4						Kota	1
2.5 – 2.9					Ajmer Bhilwara Bundi Dausa Jhalawar Tonk	Alwar Bikaner Chittaurgarh Churu Ganganagar Hanumangarh Jaipur Jhunjhunun Jodhpur Nagaur Sikar	17
3.0 – 3.4				Bharatpur	Baran Jaisalmer Pali Sirohi	Rajsamand	6
3.5 – 3.9				Karauli	Jalor Sawai Madhopur	Banswara Dungarpur Udaipur	6
4.0 – 4.5				Barmer Dhaulpur			2
4.6 and above							
Total Districts				4	12	16	32

Table A4: Distribution of Districts by TFR and mCPR, Uttar Pradesh, AHS 2012-2013

Uttar Pradesh							
TFR	mCPR (%)						Total
	< 20.0	20.0 – 29.9	30.0 – 39.9	40.0 – 49.9	50.0 – 59.9	60.0 and above	
< = 2.1				Kanpur Nagar			1
2.2 – 2.4				Lucknow Varanasi		Jhansi	3
2.5 – 2.9			Jaunpur Kanpur Dehat Mau Pratapgarh S R Nagar (Bhadohi)	Gorakhpur Mirzapur	G B Nagar Ghaziabad		9
3.0 – 3.4		Ambedkar Nagar Deoria Kannauj Mainpuri Rae Bareli	Agra Azamgarh Ballia Bulandshahar Faizabad Ghazipur Hathras Kushinagar Maharajganj Sultanpur Unnao	Allahabad Chandauli Etawah Jalaun Mathura Meerut Muzaffarnagar	Baghpat Bijnor Saharanpur	Lalitpur	27
3.5 – 3.9		Basti Sant Kabir Nagar	Aligarh Auraiya Barabanki Farrukhabad Firozabad Hamirpur Kaushambi Kheri Moradabad Rampur	Bareilly Chitrakoot Fatehpur J P Nagar Pilibhit Sonbhadra	Mahoba		19
4.0 – 4.5		Etah Gonda Sitapur	Hardoi Shahjahanpur	Banda			6
4.6 and above	Bahraich Balrampur Shrawasti	Budaun Siddharthnagar					5
Total Districts	3	12	28	19	6	2	70

ANNEX B: REFERENCES

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