Journal of Urban Health: Bulletin of the New York Academy of Medicine, Vol. 89, No. 4
doi:10.1007/s11524-011-9667-1

Family Planning Use among Urban Poor Women from Six Cities of Uttar Pradesh, India

Ilene S. Speizer, Priya Nanda, Pranita Achyut, Gita Pillai, and David K. Guilkey

ABSTRACT *Family planning has widespread positive impacts for population health and well-being; contraceptive use not only decreases unintended pregnancies and reduces infant and maternal mortality and morbidity, but it is critical to the achievement of Millennium Development Goals. This study uses baseline, representative data from six cities in Uttar Pradesh, India to examine family planning use among the urban poor. Data were collected from about 3,000 currently married women in each city (Allahabad, Agra, Varanasi, Aligarh, Gorakhpur, and Moradabad) for a total sample size of 17,643 women. Participating women were asked about their fertility desires, family planning use, and reproductive health. The survey over-sampled slum residents; this permits in-depth analyses of the urban poor and their family planning use behaviors. Bivariate and multivariate analyses are used to examine the role of wealth and education on family planning use and unmet need for family planning. Across all of the cities, about 50% of women report modern method use. Women in slum areas generally report less family planning use and among those women who use, slum women are more likely to be sterilized than to use other methods, including condoms and hormonal methods. Across all cities, there is a higher unmet need for family planning to limit childbearing than for spacing births. Poorer women are more likely to have an unmet need than richer women in both the slum and non-slum samples; this effect is attenuated when education is included in the analysis. Programs seeking to target the urban poor in Uttar Pradesh and elsewhere in India may be better served to identify the less educated women and target these women with appropriate family planning messages and methods that meet their current and future fertility desire needs.*

KEYWORDS *Slum, Uttar Pradesh, India, Family planning, Unmet need, Urban poor*

INTRODUCTION

As the world becomes more urbanized, the health of urban populations, often assumed to be better than rural populations, takes on new relevance. As of 2010, more than half of the world population lives in urban areas and by 2050, it is projected that two-thirds of the population will be urban.[1] While Asia and Africa

Speizer is with the Gillings School of Global Public Health and Carolina Population Center, University of North Carolina at Chapel Hill, Chapel Hill, NC, USA; Nanda and Achyut are with the International Center for Research on Women (ICRW), Asia Regional Office, New Delhi, India; Pillai is with the FHI 360 Urban Health Initiative, New Delhi, India; Guilkey is with the Department of Economics and Carolina Population Center, University of North Carolina at Chapel Hill, Chapel Hill, NC, USA.

Correspondence: Ilene S. Speizer, Gillings School of Global Public Health and Carolina Population Center, University of North Carolina at Chapel Hill, Chapel Hill, NC, USA. (E-mail: ilene_speizer@unc.edu)

are currently less urban (40% and 42%) than other areas of the world, continued urbanization in these regions is on the horizon; these regions will catch up to their more urbanized counterparts over the next few decades.[2]

At the aggregate level, urban residents generally have better health than rural residents.[3,4] This aggregate health advantage stems from urban residents having greater access to health care services through both the public and private sectors.[4] The private sector is vibrant in many developing country urban centers, offering women, men, and families health care services often unattainable in rural areas.[1,5,6]

These aggregate urban health advantages are not equally distributed among all urban residents.[1,6] In some settings, the urban poor are equally disadvantaged as their rural counterparts due to over-crowding, high demand for limited resources, increased cost of services in urban settings, and lack of access to clean water and sanitation.[1,4] With continued rural to urban migration, urban centers often become over-burdened by people seeking employment, housing, and a better way of living. This has led to a rise in the number of people living in slum or informal settlements. Moreover, poor urban residents are often forced to use either overcrowded public health facilities or seek care at unregulated, often low quality private health services that offer care at a reduced price.[4]

As the developing world governments grapple with reducing poverty through implementing programs that address the Millennium Development Goals (MDG), it is important that the urban poor are not forgotten. Recent attention has been paid to the role of family planning (FP) programs for the attainment of the MDG. In particular, promoting women and men's reproductive rights and ensuring universal access to high quality voluntary FP services can directly reduce neonatal and maternal morbidity and mortality—addressing MDG 4 and MDG 5.[7,8] Moreover, addressing the voluntary FP needs of women, men, and couples can also help to address the other MDG,[8] leading to improved health status and reduced poverty overall.

Consideration of the FP and reproductive health needs of women, men, and couples in urban India is increasingly important, given the rapid growth in the number of people living in urban poor settings throughout India.[9] A recent study using the 2005/2006 National Family Health Survey (NFHS) for India showed that women living in slums were significantly less likely to use modern FP than women outside slums.[10] That study was limited by a small sample size that represented slums nationally, and thus the author was not able to speak to specific city-level differences in slum populations. This study fills an important gap in our understanding of urban FP needs of women from six cities in Uttar Pradesh India by examining the determinants of contraceptive use, method mix, and unmet need by city, by slum and non-slum area, by wealth group, and by education level within each city.

DATA AND METHODS

Context

Uttar Pradesh (UP), the most populous state in India, has an estimated population of 197 million people in 2010, accounting for approximately 17% of India's total population.[11] UP falls behind other Indian states with respect to health indicators; it has the highest infant mortality rate and the second highest fertility rate nationally.[12] Based on projections made from the 2001 Census, 43 million people, or 22% of UP's population, reside in UP's 704 towns and cities.[11,13] Additionally, 30.6% of

urban UP residents live below the poverty line,[14] which is the greatest number of urban residents in a single state living below the poverty line country-wide.[13]

There are important differences in the health and demographic situation for the urban poor and the urban non-poor in urban UP and it is important to understand these differences since they provide insights into how to reach this high need population. Analyses of the 2005–2006 NFHS data, have demonstrated the wide variability in health indicators between the urban poor and urban non-poor.[15] In particular, the urban poor marry earlier (60% marry before the legal age of marriage of 18) than the urban non-poor (22%). The urban poor also have their first child earlier (34% had a first birth by age 18), are less likely to attend regular antenatal care visits (21% had at least three visits), have more home deliveries (83%), and have less access to sanitary toilet facilities (54%) as compared to their urban non-poor counterparts (10% early birth, 53% antenatal care, 48% home delivery, and 96% with sanitary toilets).[15] Data on FP use among the urban poor and non-poor also indicate gaps in services for the urban poor of UP. The total unmet need—that is, the percentage of women who are fecund, sexually active, do not want to get pregnant in 2 years or ever (again), and are not using contraception—among the urban poor is 30% compared to 15% among the urban non-poor.[15] Notably, when each of these indicators are examined for overall urban UP, the distinctions between the poor and non-poor are lost; this is an important contribution of this study that delves deeper into the poor/non-poor situation across six major urban areas of UP and provides distinctions across these urban sites that are not found when all urban (including cities and small towns) are grouped.

The six cities included in this analysis come from varying parts of Uttar Pradesh. Agra, Aligarh, and Moradabad are in western UP, while Allahabad, Gorakhpur, and Varanasi are in eastern UP. The cities included were selected by the Urban Health Initiative in collaboration with the Government of Uttar Pradesh as cities where the Urban Health Initiative project would intervene (see details of the Urban Reproductive Health Initiative below). These cities vary in terms of size, main religions, and education levels. A brief summary of the six cities is provided here; those interested in more details on the Urban Health Initiative project and its study cities can visit the Urban Health Initiative website at: http://www.uhi-india.org. Among the project cities, Agra, is the largest followed by Varanasi and Allahabad; all three of these cities have an estimated 2011 population of over a million. The remaining cities are ranked in size as Aligarh and Moradabad (with about 900,000 population) and Gorakhpur with a population of about 690,000 inhabitants (population estimates from 2011 Census of India found at the following site: http://www.citypopulation.de/India-UttarPradesh.html#Stadt_gross). The overwhelming majority of the population in UP is Hindu (80%), and Muslims make up about 18% of the population.[16] In our study cities (see Table 1), the sample is similar to the overall UP distribution based on religion in Allahabad and Gorakhpur. Conversely, in Agra, there is only 13% that is Muslim (the remainder is Hindu), whereas in Moradabad and Aligarh, the percentage that is Muslim is higher at 37% and 33%, respectively. In Varanasi, there is slightly more Muslims than in the general population at 22%. Other important distinctions between the study cities (see Table 1) include that Allahabad has a more educated population followed by Gorakhpur; Aligarh has the least educated population. Across all study cities, multiple methods of FP are widely available in public sector facilities; more than 90% of public sector facilities have two or more FP methods and nearly all of the high volume (i.e., district hospitals) offer four or more methods, including female sterilization, IUD, contraceptive pill, and condoms, among others.[17]

TABLE 1 Demographic characteristics of full, slum, and non-slum female samples from six cities in India, 2010

	Agra			Aligarh			Allahabad		
Characteristic	Full	Slum	Non-slum	Full	Slum	Non-slum	Full	Slum	Non-slum
Age group:									
15–24	20.7	20.5	20.7	18.7	22.9	17.7	15.4	21.5	14.7
25–29	21.6	20.2	22.0	20.2	20.1	20.3	20.3	20.1	20.4
30–34	18.0	17.9	18.1	20.0	18.7	20.3	21.1	17.2	21.6
35–39	16.3	19.2	15.3	18.5	17.3	18.8	18.1	17.1	18.2
40+	23.5	22.2	23.9	22.6	21.0	23.0	25.1	24.1	25.2
Wealth quintile									
Poorest	18.0	27.6	14.7	17.5	20.8	16.7	14.6	32.1	12.5
Poor	19.5	23.1	18.4	19.4	22.9	18.6	18.3	25.5	17.4
Medium	19.9	22.0	19.2	20.5	23.8	19.7	22.0	21.4	22.1
Rich	21.1	14.5	23.3	20.7	20.5	20.8	23.4	12.7	24.7
Richest	21.5	12.8	24.4	21.9	12.0	24.2	21.8	8.4	23.4
Education									
None	38.1	53.6	32.9	42.3	51.6	40.1	22.0	34.7	20.5
1–11 years	35.8	34.6	36.2	30.1	35.2	28.9	32.5	39.6	31.7
12+ years	26.1	11.9	30.8	27.6	13.2	30.9	45.5	25.8	47.9
Muslim (vs. non-Muslim)	12.8	18.6	10.9	33.4	39.2	32.1	19.0	27.2	18.0
Caste									
Scheduled caste/tribe	30.9	43.8	26.6	20.9	27.8	19.3	15.3	24.1	14.2
Other backward/extreme backward caste	32.2	34.4	31.5	39.6	42.9	38.9	40.0	47.5	39.1
None	36.9	21.8	41.9	39.5	29.3	41.9	44.7	28.4	46.7
Spouse's work									
Professional	31.4	25.2	33.5	45.6	35.7	47.8	61.8	42.6	64.1
Service	15.1	8.2	17.4	3.0	5.4	2.5	5.5	8.2	5.2
Farmer/production industry	50.5	63.9	46.1	47.2	5.6	45.2	28.5	45.6	26.5
None/missing	3.0	2.7	3.1	4.2	2.8	4.5	4.2	3.6	4.3
Spouse's education									
None	19.3	29.9	15.8	21.4	28.0	19.8	10.3	19.5	9.2
1–11 years	43.2	50.6	40.7	39.8	47.1	38.2	32.2	44.5	30.8
12+ years	36.3	18.8	42.1	35.3	22.2	38.3	55.9	33.2	58.6
Don't know	1.2	0.7	1.4	3.5	2.7	3.7	1.5	2.9	1.4

Characteristic	Gorakhpur			Moradabad			Varanasi		
	Full	Slum	Non-slum	Full	Slum	Non-slum	Full	Slum	Non-slum
Age group:									
15–24	17.0	22.3	16.5	15.1	21.1	14.2	15.5	17.9	14.6
25–29	19.3	20.2	19.2	18.7	20.3	18.4	21.7	20.8	21.9
30–34	19.3	18.8	19.4	21.0	19.1	21.3	19.1	19.7	18.8
35–39	19.3	17.9	19.5	19.9	17.8	20.2	18.9	17.3	19.4
40+	25.0	20.8	25.5	25.4	21.7	25.9	25.0	24.3	25.3
Wealth quintile									
Poorest	18.3	42.5	15.7	17.5	30.0	15.6	19.0	25.3	16.8
Poor	20.2	24.0	19.8	19.1	23.3	18.5	19.1	25.2	16.9
Medium	20.0	16.0	20.4	20.1	17.9	20.4	20.2	23.7	18.9
Rich	21.2	10.9	22.3	20.9	16.1	21.7	20.3	13.6	22.7
Richest	20.4	6.6	21.9	22.3	12.7	23.8	21.5	12.3	24.7
Education									
None	26.9	44.2	25.1	36.0	52.7	33.5	32.1	38.2	30.0
1–11 years	34.3	37.1	33.9	34.1	32.8	34.3	39.8	40.3	39.6
12+ years	38.8	18.7	41.0	29.9	14.5	32.3	28.1	21.5	30.4
Muslim (vs. non-Muslim)	18.5	15.2	18.8	37.4	36.9	37.5	22.2	28.4	20.1
Caste									
Scheduled caste/tribe	12.8	23.6	11.6	13.7	14.7	13.5	12.4	16.7	10.9
Other backward/extreme backward caste	47.3	56.0	46.4	49.0	57.7	47.7	54.2	54.5	54.0
None	39.9	20.4	42.0	37.4	27.6	38.9	33.5	28.8	35.1
Spouse's work									
Professional	41.5	32.6	42.4	44.1	33.6	45.7	43.5	34.5	46.7
Service	22.3	13.3	23.3	5.5	4.0	5.7	13.0	11.5	13.5
Farmer/production industry	32.8	49.7	30.9	46.9	58.9	45.1	41.5	50.7	38.3
None/missing	3.5	4.3	3.4	3.5	3.5	3.5	2.0	3.3	1.6
Spouse's education									
None	11.0	22.1	9.8	22.1	36.5	19.9	19.9	25.0	18.2
1–11 years	38.3	49.4	37.1	40.7	41.1	40.6	42.1	44.5	41.2
12+ years	49.4	26.9	51.8	34.6	19.2	36.9	37.1	28.8	40.0
Don't know	1.3	1.7	1.3	2.6	3.2	2.6	0.9	1.7	0.6

Data

In 2009, the Bill & Melinda Gates Foundation launched the Urban Reproductive Health Initiative (URHI) to improve FP and reproductive health services of urban residents, particularly urban poor residents, in four countries: Kenya, Nigeria, Senegal, and the state of Uttar Pradesh, India. In each country, programs are implemented in an initial four cities (three in Kenya) and the plan is to expand programs to two to six cities after about 2 years of program implementation. At the same time that the programs were funded, the Measurement, Learning, & Evaluation project was initiated to undertake rigorous impact evaluation of the URHI programs. The impact evaluation design involves collecting longitudinal data from a large, representative sample of women in each intervention city plus two comparison cities in each country. Data are also collected from men (cross-sectional data) as well as from service delivery points in each city. This paper focuses on the women's baseline data from the six cities in Uttar Pradesh, India.

Data collection in India took place between January and July, 2010 in six cities: Agra, Aligarh, Allahabad, Gorakhpur, Moradabad, and Varanasi. For program implementation, the initial intervention cities are Agra, Allahabad, Aligarh, and Gorakhpur; Moradabad and Varanasi will serve as comparison cities for the evaluation. At baseline, prior to program implementation, the cities are similar in terms of prior FP and reproductive health programming, depending on prior commitments by the UP government in collaboration with various international donors.

Sampling

In each city, the objective was to collect a representative sample of about 3,000 women (and 1,500 men). To permit oversampling of the urban poor, this study employed a unique sampling approach based on a mapping of slums in each city. Using official lists of registered slums, spatial imagery, and ground truthing in each study city, a team of geographic information system (GIS) experts developed maps of where slums are located in each city. The methods used to identify slums for this study were slightly different than those used by Agarwal and colleagues.[18] Agarwal and colleagues first used lists of slums and then went through cities with local experts and mapped the approximate location of slums onto hand drawn maps. For this study, after mapping the coordinates of registered/known slums, we used high resolution spatial imagery to help identify areas that resembled slums (e.g., high density housing, roof types, and road/path networks). Once these locations were identified, teams visited the area to confirm or refute whether this was a slum to be included on the list. Because of time and resource constraints, it was not possible to do a full ground-based sweep of the cities as was done by Agarwal and colleagues.[18] The most slums were found in Agra, Varanasi, and Allahabad; fewer slums were found in Aligarh, Gorakhpur, and Moradabad.

Maps of the cities with slum GIS boundaries drawn on them were sent to the University of North Carolina for processing and sampling purposes. Using slum areas as a study domain, the identified slums were divided into smaller areas (of about 100–150 households each) that could be used as the slum primary sampling units (PSU). Each of the slum PSU were numbered for sample selection. The rest of the city (the parts that did not fall into identified slums) was similarly divided into smaller areas that could serve as non-slum PSU making up the non-slum domain. These too were numbered accordingly. Notably, the non-slum PSU may include

unregistered (or unidentified) slums and thus are considered to be more heterogeneous than the slum PSU.

Based on the list of slum and non-slum PSU, and the fact that it was assumed that the PSU were roughly the same size, in each city we selected a representative sample of 64 slum and 64 non-slum PSU using systematic sampling by domain. The sampling approach intentionally over-sampled slum PSU. This means that when we examine data at the city level, to make a representative sample, weights are used to adjust for the larger than expected sample of slum women. When weighted, the slum population makes up between 9.7% (Gorakhpur) and 26% (Varanasi) of the sampled women. That said, by oversampling the slum population, we can run stratified analyses on the slum (and non-slum) groups; this is a focus of this analysis.

In all selected slum and non-slum PSU, household listing and mapping exercises were undertaken to provide the list of residential households that were eligible for interview. Based on the list of eligible households from each PSU, a random sample of 30 households was selected. In selected households, the household head or his/her representative was approached for interview, after verbal consent was obtained. The household interview included detailed information on the demographic characteristics of the household head, household assets, and household consumption; this information permits the determination of poor and non-poor urban households by city.

Within selected households, all currently married women ages 15–49 years were eligible for interview. All eligible married women were approached and asked to give consent to participate in the interview. Prior to approaching eligible married women ages 15–17 years, permission was obtained from their parent or guardian (including husband, mother-in-law, or another adult in the household). Women who agreed to be interviewed were asked questions on demographics, reproduction, contraception, maternal and child health, fertility preferences, media access and use, and gender relations by a study interviewer. The interviews took about 1 hour to complete.

In total, 17,643 currently married women from the six cities were interviewed. This includes 3,007 women from Agra, 3,112 women from Aligarh, 2,670 women from Allahabad, 3,022 women from Gorakhpur, 2,817 women from Moradabad, and 3,015 women from Varanasi.

Variables

For this study, the key outcomes of interest are FP method use and unmet need for FP. For the analyses of current contraceptive use, the sample is reduced to include only non-pregnant, fecund women; this drops about 15% of the sample from each city. Non-pregnant fecund women were asked if they are currently using a method of FP and if they were using, they were asked which method they use. Responses from these two questions were coded into five groups: non-user of FP, sterilized, condom user, other modern method user, and traditional method user. Other modern methods include injections, pills, implant, and lactational amenorrhea (LAM); these methods were uncommon in the study cities. Traditional methods include rhythm, periodic abstinence, and withdrawal. For bivariate analyses, all modern methods were grouped together.

The second outcome variable is unmet need. Women who report that they are sexually active, fecund, want to delay a birth 2 or more years or do not want to have any (more) children and are not using a method of FP (modern or traditional) are said to have an unmet need for FP. Women who had an unmet need were coded as one. In addition, as done in standard Demographic and Health Surveys, women who

are currently pregnant but report the current pregnancy was too early or unwanted are coded as having an unmet need.* All other women are considered to not have an unmet need and are coded as zero on this outcome.† Unmet need can also be classified based on the timing of the desire for the next birth. Those women who want to delay their next birth 2 or more years and have an unmet need are considered to have an unmet need to space and those women who want to avoid another child are considered to have an unmet need to limit.

Included in the multivariate analyses are a number of demographic variables. The key variables of interest to this analysis are the wealth index and women's educational attainment. For this analysis that is stratified by city and type of residence (slum/non-slum), we calculated a wealth index by city. The choice to use a city-specific wealth index was based on the fact that all analyses are stratified by city and we were interested in knowing about FP use among the poorest 20% in each city; a multi-city wealth index would be biased toward cities where people had more assets, even if those assets are not common in the other cities. We computed the standard wealth index based on 27 available household assets reported as part of the household survey (these included the ownership of a toilet, piped water, electricity, type of floor, type of roof, and numerous durable goods), we undertook principal components analysis and developed a factor score for the first factor.[20] Once a factor score is obtained, the household sample is divided into weighted quintiles (groups of 20% each). The five groups are broadly called: poorest, poor, medium, rich, and richest. Household-level quintiles are attached to women to provide the individual-level wealth categorization.

A reviewer of this article suggested that some of the items that we included in the wealth index would not vary within our slum and non-slum strata and suggested dropping these public service goods (i.e., land ownership, number of rooms, whether there was a separate kitchen, fuel source, water source, and type of toilet) from the wealth index. We tested this hypothesis by dropping these items and creating a wealth index based on a reduced set of 21 assets. We then included these variables as separate predictors in the models along with the wealth index based on the reduced set of assets and tested whether the public service goods in fact had no effect after stratifying by slum and non-slum. For contraceptive use models across cities and domains, a joint chi-square test of the null hypothesis that these variables were zero was rejected (p values ranged from <0.001 to 0.15). Rather than present results with a 21-item wealth index and these separate assets, we chose to present results based on the more inclusive wealth index. It is interesting to find such heterogeneity in assets even in separate slum and non-slum domains.

*While not all women (including currently pregnant women) with an unmet need will use family planning if available,[19] unmet need serves as a programmatic indicator of who could be targeted with family planning methods and services.

†In some calculations of unmet need, women who are not using FP and are unsure of future childbearing or unsure of the timing of future childbearing are considered to have an unmet need; in this analysis, these women are not considered to have an unmet need since their fertility intentions are not firm. In addition, some calculations consider amenorrhoeic women who report their last pregnancy as mistimed or unwanted and are not using FP to have an unmet need for FP; we examine these women's current intentions and FP use and classify them accordingly rather than incorporating their last pregnancy intentions in the calculation. Differences in unmet need estimates including the above referenced women as having an unmet need would lead to greater unmet need by 0.0–0.4% across the cities.

Educational attainment was obtained through questions on whether the woman ever attended school and the highest grade she achieved. This variable was recoded into three categories: no education, 1–11 years education, and 12+ years of education. Other demographic factors included in the analysis are: age group (15–24, 25–29, 30–34, 35–39, 40–49 years); religion (Muslim vs. non-Muslim); caste (scheduled caste or tribe, other backward caste or extremely backward caste, none); spouse's work (professional sector, service, farmer/production, none/missing); and spouse's education (none, 1–11 years, 12+ years, don't know). For the multivariate analyses, all models include all of the demographic factors, although the only variables shown are wealth and education; the effects of the other variables were similar across cities and thus are not shown.

Analyses

All descriptive analyses (univariate and bivariate) are weighted and adjust for the clustering in the sample. To provide a representation of each city, the city-level full-sample weights are used. For univariate and bivariate analyses stratified by slum and non-slum areas, city-level domain specific weights were used; therefore, the slum sample is representative of slum residents in the city and the non-slum sample is representative of heterogeneous non-slum areas of the cities. All multivariate analyses are performed using robust standard errors (adjusting for clustering in the data) but without weights since we are exploring relationships between variables rather than trying to describe characteristics of a representative sample of women from a city. For the five category contraceptive use outcome, we perform multinomial logistic regression analyses. Comparisons are made between each of the use categories and non-use as well as each of the method choice categories and sterilization. For the unmet need analyses multivariate logistic regression is performed since the outcome has two categories (no unmet need and unmet need); similar analyses were performed with the three category unmet need variable and results are discussed as appropriate. All analyses were performed using Stata version 11.

RESULTS

In Table 1, the demographic characteristics of the full, slum, and non-slum samples are shown. The full sample is a weighted average of the slum and non-slum samples. As expected, across all cities in the full sample, the percentage of women in each of the wealth groups is close to 20%. When we examine the sample stratified by domain, a greater percentage of the slum sample tends to be in the "poorest" group. Similar to the wealth distinctions between slum and non-slum areas, there are also education differences by domain. In each city, a greater percentage of the slum sample has no education than the percentage of the non-slum sample with no education. These findings indicate that the sampling approach that distinguished slum areas and sampled separately from slum and non-slum areas seems to have successfully captured the poorer women in slum areas.

In five of the six cities, the percentage of women who are in the youngest age group is higher in the slum areas than in the non-slum areas; only in Agra this pattern is not observed. As mentioned earlier, Moradabad and Aligarh are the most Muslim cities; the smallest percentage Muslim is found in Agra. Generally speaking, there is a greater percentage of the slum sample that is in either of the two lower caste categories (scheduled caste/tribe or OBC/EBC) than the percentage in the non-

slum samples. Husband's education and husband's work follow a similar trend to women's education by city and slum and non-slum areas.

Table 2 presents contraceptive use among non-pregnant, fecund women in the full sample and by domain in each of the six cities. In Aligarh, only 45.9% of women use modern FP; in the other cities, the percentage using modern methods is between 54% and 61%. In four of six cities, more than a quarter of women use sterilization; sterilization use is lower in Moradabad (22%) and Aligarh (15.5%). In Moradabad, about a third of women use condoms; this percentage is closer to 20% in the other cities. While sterilization and condoms make up most of the modern FP use in these six Indian cities, there is still between 6% and 9% of women that use other modern FP methods including pills, injectables, and LAM. Finally, use of traditional methods is the highest in Aligarh at 23% and the lowest in Varanasi at 10%.

When comparing slum and non-slum women on FP use and method choice, some notable distinctions are found. Across all cities, a slightly greater proportion of the slum sample is in the non-user category. In terms of method use, when distinctions are found, with the exception of Varanasi, a greater percentage of the slum sample is using sterilization. Furthermore a greater proportion of the non-slum sample is using condoms and other modern methods, when differences are observed. The pattern for traditional method use is less clear across the cities and domains. Chi-square tests were performed to determine if the method use was similar in slum and non-slum areas within each city; use patterns were different and significant (at $p \leq 0.05$) in Allahabad, Gorakhpur, Moradabad, and Varanasi. In Agra, the difference between slum and non-slum areas was only marginally significant at $p = 0.09$.

Also presented in Table 2 is the percentage of women that have no unmet need, an unmet need to space, and an unmet need to limit. The city with the lowest unmet need is Moradabad, where 88% of women are classified as no unmet need; conversely, 12% of women have an unmet need. The city with the highest unmet need is Aligarh, where 20% of women are classified as having an unmet need. In Allahabad and Moradabad, a significantly greater percentage of women in the slum sample have an unmet need as compared to the non-slum sample. Across all cities, most of the unmet need is for limiting methods. This is true for both slum and non-slum samples.

Table 3 presents the bivariate distribution between wealth group and the outcomes of interest, stratified by slum and non-slum sample. In both the slum and non-slum samples across all cities, a greater percentage of women in the poorest wealth group are non-users than the percentage in the highest wealth group. Correspondingly, a greater percentage of women in the highest wealth group are modern method users than the percentage in the lowest wealth group. Again, the pattern for traditional method use is less clear. Also presented in Table 3 is the bivariate relationship between unmet need and wealth quintile. Across the cities, women in the poorest quintiles have a greater unmet need (space and limit) than women in the richer quintiles. Notably, the observed distinctions by wealth group may be related to education and other demographic differences that exist across varying domains and cities.

To better understand the patterns of contraceptive use and unmet need by wealth group and education, controlling for other key demographic factors, we undertook multivariate analyses. Table 4 presents the multinomial logistic regression analyses of contraceptive use stratified by slum and non-slum samples for Aligarh. Results from the model using the full sample are not shown (contact first author for copy). Only wealth and education are shown; however, all models also control for the

TABLE 2 Fertility and FP characteristics of full, slum and non-slum female samples from six cities in India, 2010

	Current use/method[a]						Unmet need for FP[b]			
Contraceptive use measures	Non-user	Sterilization	Condoms	Other modern	Traditional	Total (%)	No need	Need/Space	Need/Limit	Total (%)
Agra										
Full sample	26.9	25.5	22.5	7.8	17.3	100	83.9	5.0	11.1	100
Slum sample	29.4	28.1	19.7	6.2	16.7	100	81.8	5.9	12.3	100
Non-slum sample	26.1	24.7	23.4	8.3	17.6+	100	84.6	4.7	10.7	100
Aligarh										
Full sample	31.0	15.5	23.0	7.4	23.2	100	79.9	5.2	14.9	100
Slum sample	33.9	15.3	23.9	5.8	21.2	100	79.2	5.9	14.9	100
Non-slum sample	30.3	15.5	22.8	7.7	23.6	100	80.1	5.1	14.8	100
Allahabad										
Full sample	23.7	28.1	19.6	8.6	20.0	100	87.2	3.6	9.2	100
Slum sample	29.9	31.7	16.2	5.6	16.6	100	81.4	7.5	11.1	100
Non-slum sample	23.0	27.7	20.0	8.9	20.5***	100	87.9	3.1	9.0***	100
Gorakhpur										
Full sample	25.5	29.2	18.1	6.5	20.7	100	84.8	4.6	10.6	100
Slum sample	27.8	34.3	12.4	5.3	20.4	100	83.0	5.7	11.3	100
Non-slum sample	25.3	28.7	18.7	6.7	20.7**	100	85.0	4.5	10.5	100
Moradabad										
Full sample	23.7	22.0	32.6	5.9	15.9	100	88.0	4.1	7.9	100
Slum sample	29.9	24.7	25.1	6.4	13.9	100	81.8	7.3	10.8	100
Non-slum sample	22.7	21.6	33.7	5.8	16.2***	100	88.9	3.6	7.5***	100
Varanasi										
Full sample	28.5	33.0	19.0	9.4	10.2	100	82.2	5.3	12.6	100
Slum sample	31.3	29.0	17.5	8.8	13.4	100	79.5	5.5	15.0	100
Non-slum sample	27.5	34.4	19.6	9.5	9.1**	100	83.1	5.2	11.7	100

Significance between distribution for slum vs. non-slum sample within a city: $+p \leq 0.10$; $*p \leq 0.05$; $**p \leq 0.01$; $***p \leq .001$

[a]Current use is reported among women who are non-pregnant and fecund

[b]Unmet need calculated for women who are currently sexually active, want to delay (2+ years) or limit childbearing, and are non-pregnant. Those who are not using FP and want to delay—unmet need/space; those who are not using FP and want no more children—unmet need/limit; those using—no unmet need. Weighted *n*'s shown

TABLE 3 Cross-tabulations between FP outcomes and wealth group for slum and non-slum sample of women from six Indian cities, 2010

	FP use			FP use			% Unmet need (space or limit)	
	Slum sample			Non-slum sample				
	Non-user	Trad.	Mod.	Non-user	Trad.	Mod.	Slum	Non-slum
Agra								
Poorest	34.4	20.2	45.4	33.3	22.1	44.6	21.1	20.1
Poor	30.9	18.8	50.3	28.9	19.9	51.2	20.6	18.8
Medium	28.6	16.7	54.7	29.2	15.2	55.5	17.1	17.1
Rich	26.1	10.0	63.9	23.6	15.3	61.5	15.4	13.1
Richest	22.7	11.3	66.1	20.1	16.7	63.2	12.7	10.7
Aligarh								
Poorest	42.4	25.5	32.2	48.2	18.2	33.6	28.9	37.1
Poor	36.7	21.3	42.0	32.6	24.8	42.6	21.6	20.7
Medium	32.4	24.4	43.2	28.8	27.1	44.2	18.7	20.1
Rich	30.7	15.2	54.1	27.6	26.4	45.9	17.8	15.2
Richest	24.6	15.9	59.5	20.5	21.2	58.4	14.9	11.4
Allahabad								
Poorest	37.1	15.1	47.8	31.7	13.0	55.4	23.1	19.3
Poor	34.0	16.3	49.7	26.0	16.3	57.7	20.6	12.0
Medium	25.5	17.4	57.2	23.8	20.4	55.8	16.1	13.8
Rich	20.3	20.5	59.2	20.3	23.3	56.5	12.1	9.9
Richest	18.8	15.3	65.8	18.3	24.3	57.4	12.1	8.9
Gorakhpur								
Poorest	32.2	20.4	47.4	30.4	21.1	48.5	20.4	17.9
Poor	26.5	19.4	54.1	25.4	20.1	54.4	16.2	13.3
Medium	27.6	16.1	56.4	23.8	19.2	57.1	17.8	14.8
Rich	16.4	29.3	54.4	28.0	22.9	49.2	5.4	18.8
Richest	23.4	19.3	57.3	20.2	20.3	59.5	14.7	10.7
Moradabad								
Poorest	36.3	14.8	48.9	37.4	15.3	47.3	24.7	18.9
Poor	33.0	13.2	53.8	22.8	19.1	58.1	16.9	11.3
Medium	26.4	15.0	58.6	23.0	13.1	63.9	16.0	13.3
Rich	24.9	11.4	63.7	19.4	16.2	64.4	14.9	8.6
Richest	21.3	14.3	64.4	15.9	17.1	67.1	12.1	6.2
Varanasi								
Poorest	37.6	16.3	46.2	31.7	10.8	57.5	26.3	24.8
Poor	36.1	11.4	52.6	30.9	12.9	56.2	22.6	21.6
Medium	27.7	14.1	58.2	29.5	7.7	62.8	16.7	17.7
Rich	24.9	10.7	64.5	23.3	8.0	68.7	17.1	12.8
Richest	24.1	13.0	62.9	25.0	7.6	6.74	15.2	11.6

other demographic factors which generally performed in the expected directions. In the slum sample, education distinguishes use of sterilization from non-use and use of sterilization from the other methods. In particular, women who have no education or have 1–11 years of education are significantly more likely to be sterilized than to be a non-user (coefficient significant and greater than zero) than women with 12+ years of education. In the comparison between other methods and sterilization, women with none or less education are significantly less likely to be a condom user, to use other modern methods or to use traditional methods as compared to women who have 12+ years of education (conversely, less educated women are more likely

TABLE 4 Multinomial logistic regression findings for method choice among slum and non-slum female samples in Aligarh

	Sterilization vs. non-user	Condom vs. non-user	Other modern vs. non-user	Traditional vs. non-user	Condom vs. sterilization	Other modern vs. sterilization	Traditional vs. sterilization
Slum sample							
Wealth							
Poorest	−0.76 (0.41)+	−0.90 (0.33)**	−0.79 (0.64)	−0.07 (0.47)	−0.15 (0.44)	−0.03 (0.62)	0.69 (0.47)
Poor	−0.25 (0.40)	−0.63 (0.31)*	0.08 (0.55)	−0.11 (0.45)	−0.38 (0.43)	0.33 (0.52)	0.14 (0.47)
Medium	−0.40 (0.32)	−0.28 (0.26)	0.21 (0.44)	0.33 (0.41)	0.12 (0.32)	0.61 (0.38)	0.73 (0.40)+
High	−0.18 (0.37)	−0.33 (0.32)	−0.41 (0.41)	−0.19 (0.41)	−0.16 (0.44)	−0.23 (0.42)	−0.01 (0.44)
Highest (ref)	–	–	–	–	–	–	–
Education							
None	1.14 (0.42)**	−1.14 (0.28)***	−0.40 (0.50)	−0.32 (0.31)	−2.27 (0.41)***	−1.53 (0.57)**	−1.45 (0.45)***
1–11 years	1.30 (0.42)**	−0.65 (0.24)**	−0.26 (0.42)	−0.22 (0.31)	−1.95 (0.40)***	−1.56 (0.50)**	−1.52 (0.41)***
12+ years (ref)	–	–	–	–	–	–	–
Non-slum sample							
Wealth							
Poorest	−0.56 (0.38)	−1.11 (0.43)**	−1.01 (0.49)*	−0.85 (0.36)*	−0.55 (0.49)	−0.45 (0.47)	−0.30 (0.36)
Poor	0.02 (0.44)	−0.38 (0.37)	−0.61 (0.45)	−0.05 (0.33)	−0.40 (0.40)	−0.63 (0.50)	−0.07 (0.38)
Medium	−0.13 (0.39)	−0.35 (0.31)	−0.78 (0.40)*	−0.12 (0.31)	−0.22 (0.33)	−0.65 (0.47)	0.02 (0.30)
High	−0.31 (0.34)	−0.26 (0.26)	−0.50 (0.30)	−0.04 (0.26)	0.05 (0.28)	−0.18 (0.38)	0.27 (0.33)
Highest (ref)	–	–	–	–	–	–	–
Education							
None	0.14 (0.34)	−1.22 (0.27)***	−0.49 (0.43)	−0.18 (0.33)	−1.35 (0.36)***	−0.63 (0.49)	−0.32 (0.37)
1–11 years	−0.00 (0.30)	−0.89 (0.23)***	−0.35 (0.34)	−0.51 (0.25)+	−0.88 (0.32)**	−0.34 (0.41)	−0.51 (0.38)
12+ years (ref)	–	–	–	–	–	–	–

All models control for age, caste, religion, spouse's education, and spouse's occupation
+$p \leq 0.10$; *$p \leq 0.05$; **$p \leq 0.01$; ***$p \leq 0.001$

to be sterilized). In addition, less educated women are less likely to use condoms (and more likely to be non-users) than more educated women. The only wealth distinction found is in the comparison between condom users and non-users such that the poorest and poor women are significantly less likely to use condoms than to be non-users (i.e., they are more likely to be non-users) than their rich counterparts. The results in the non-slum sample are similar for condom use vs. non-user such that the poorest women and the less educated are less likely to use condoms and more likely to be non-users. Similarly, in the non-slum sample, the poorest women are less likely to use other modern methods and traditional methods and more likely to be non-users than their rich counterparts. Finally, less educated women are less likely to be condom users than be sterilized as compared to their more educated counterparts. In summary, in the slum sample, the main distinctions between users and non-users and by method are related to education for the women from Aligarh; however, for the non-slum sample that is more heterogenous, there are also a small number of significant differences by wealth group. In a likelihood ratio test of whether the results of the slum and non-slum model are different, we find a chi-square p-value greater than 0.05, suggesting that the findings are similar in slum and non-slum areas (test not shown).

The findings from the other five cities are not shown (contact first author for models); however, patterns worth noting are discussed. For the slum sample in Agra and Allahabad, the main distinction between the groups is by education level, as found Aligarh. In the slum sample for Gorakhpur and Varanasi, the education effects remain, however, there are also some distinctions in method use by wealth in the expected direction. Finally, in the slum sample for Moradabad, there are few educational differences and poorer women are more likely to be non-users than users of condoms or other modern methods than their richer counterparts.

In the non-slum sample, the findings from Allahabad and Moradabad are similar and indicate that wealth and education are significantly associated with condom use (vs. sterilization and vs. non-user); all of these patterns are in the expected direction. In the non-slum sample for the three remaining cities (Agra, Gorakhpur, and Varanasi), the main distinctions between the groups are education in the same direction as in Aligarh. In these cities, there are some wealth effects; however, they tend to be marginally significant. Likelihood ratios tests of whether the slum and non-slum results are different by city illustrate a significant difference ($p<0.05$) for Agra, Allahabad, Moradabad, and Varanasi and no difference in Gorakhpur as found in Aligarh.

Among the other demographic variables, a generally consistent finding across the cities and in slum and non-slum areas is that Muslim women are less likely to be sterilized than non-Muslim women; these women are more likely to be non-users or other method (including condoms) users than sterilized. The age pattern is also generally consistent such that younger women are less likely to be sterilized (more likely to be non-users or to be condom users or other modern method users) than their older counterparts. Across slum and non-slum areas, these effects generally hold as well.

In Table 5, the multivariate logistic regression findings for the slum and non-slum samples for unmet need are presented. In the slum sample for Agra, Aligarh, and Gorakhpur, women with no education are significantly more likely to have an unmet need than their more educated counterparts. Notably, in Allahabad, Moradabad and Varanasi, this education effect is not found; however, slum women in the poorest wealth group in Moradabad and Varanasi are significantly more likely

TABLE 5 Multivariate logistic regression findings for unmet need in slum and non-slum female samples by city

	Slum sample	Non-slum sample
	Unmet need vs. no unmet need	Unmet need vs. no unmet need
Agra		
Wealth		
Poorest	1.30 (0.68–2.47)	1.80 (1.04–3.12)*
Poor	1.30 (0.67–2.50)	1.47 (0.86–2.52)
Medium	1.07 (0.56–2.04)	1.34 (0.81–2.20)
High	1.10 (0.63–1.91)	1.10 (0.69–1.74)
Highest (ref)	1.0	1.0
Education		
None	2.04 (1.07–3.91)*	1.54 (0.92–2.57)+
1–11 years	1.21 (0.64–2.27)	1.18 (0.76–1.81)
12+ years (ref)	1.0	1.0
Aligarh		
Wealth		
Poorest	1.64 (0.93–2.87)+	2.82 (1.62–4.89)***
Poor	1.28 (0.77–2.14)	1.38 (0.76–2.54)
Medium	1.13 (0.69–1.86)	1.38 (0.78–2.45)
High	1.14 (0.72–1.80)	1.12 (0.70–1.80)
Highest (ref)	1.0	1.0
Education		
None	1.78 (1.14–2.79)*	2.02 (1.11–3.66)*
1–11 years	1.26 (0.82–1.94)	2.12 (1.32–3.42)**
12+ years (ref)	1.0	1.0
Allahabad		
Wealth		
Poorest	1.20 (0.57–2.52)	1.75 (0.91–3.37)+
Poor	1.20 (0.59–2.46)	1.02 (0.53–1.99)
Medium	1.08 (0.54–2.16)	1.49 (0.90–2.48)
High	0.78 (0.35–1.77)	1.05 (0.60–1.82)
Highest (ref)	1.0	1.0
Education		
None	1.32 (0.76–2.30)	1.22 (0.58–2.55)
1–11 years	1.09 (0.70–1.70)	0.82 (0.47–1.43)
12+ years (ref)	1.0	1.0
Gorakhpur		
Wealth		
Poorest	0.65 (0.32–1.30)	1.41 (0.69–2.89)
Poor	0.52 (0.25–1.08)+	1.29 (0.69–2.41)
Medium	0.66 (0.35–1.25)	1.42 (0.84–2.40)
High	0.25 (0.12–0.55)***	1.56 (1.02–2.39)*
Highest (ref)	1.0	1.0
Education		
None	2.47 (1.26–4.82)**	1.16 (0.69–1.94)
1–11 years	1.95 (1.04–3.68)*	0.82 (0.53–1.28)
12+ years (ref)	1.0	1.0
Moradabad		
Wealth		
Poorest	2.47 (1.37–4.45)**	2.91 (1.38–6.14)**
Poor	1.35 (0.78–2.32)	1.74 (0.97–3.13)+
Medium	1.43 (0.81–2.52)	1.90 (1.04–3.46)*
High	1.28 (0.76–2.18)	1.38 (0.72–2.65)
Highest (ref)	1.0	1.0
Education		
None	1.04 (0.66–1.64)	1.46 (0.81–2.62)
1–11 years	0.91 (0.57–1.46)	1.08 (0.64–1.82)
12+ years (ref)	1.0	1.0

TABLE 5 (continued)

	Slum sample	Non-slum sample
	Unmet need vs. no unmet need	Unmet need vs. no unmet need
Varanasi		
Wealth		
Poorest	2.16 (1.21–3.85)**	1.42 (0.87–2.33)
Poor	1.58 (0.93–2.67)+	1.40 (0.84–2.33)
Medium	0.96 (0.58–1.61)	1.09 (0.73–1.63)
High	1.05 (0.58–1.90)	1.04 (0.66–1.64)
Highest (ref)	1.0	1.0
Education		
None	0.88 (0.49–1.58)	0.73 (0.42–1.26)
1–11 years	0.89 (0.58–1.39)	0.74 (0.49–1.11)
12+ years (ref)	1.0	1.0

All models control for age, caste, religion, spouse's education, and spouse's occupation
+$p \leq 0.10$; *$p \leq 0.05$; **$p \leq 0.01$; ***$p \leq 0.001$

to have an unmet need than their richer counterparts. In the non-slum sample, the results for Agra and Aligarh are similar to each other such that both education and wealth are significant in the expected directions. In the non-slum sample of Moradabad, only wealth is significant in the expected direction. In Allahabad, the same effect is found; however, the effect is only marginally significant ($p<0.10$). In the Gorakhpur and Varanasi non-slum samples, neither low wealth nor education is significantly associated with unmet need controlling for the other demographic factors.* The likelihood ratio test that compares the slum and non-slum findings demonstrates that only in Gorakhpur and Moradabad are the slum and non-slum results significantly different from one another ($p<0.05$).

Across the cities, the contribution of the control variables is somewhat consistent. In particular, younger women are more likely to have an unmet need than their older counterparts. Moreover, in models that examine unmet need for spacing and limiting separately, the younger women are significantly more likely to have an unmet need for spacing than to have no unmet need or an unmet need for limiting (not shown). The other generally consistent finding across the cities and the domains is for religion. Muslim women in five out of six cities have a greater unmet need than non-Muslim women. The exception is Agra where there is no religion effect.

DISCUSSION

This study is unique because it provides a picture of six cities in UP with a large, representative sample from each of the cities. In addition, the sampling approach that over-sampled slum areas permits in-depth analysis of slum populations to better understand their FP use and unmet FP needs. Our findings revealed similarities and distinctions in use across the cities and between slum and non-slum segments of the populations within some cities.

*In non-slum models that removed education in these two cities, wealth remained non-significant and likewise for models that removed wealth, education remained non-significant (not shown). Thus, it is not thought that multicollinearity is affecting these findings.

In the six cities included, close to half of currently married, non-pregnant women are currently using modern FP. Across the cities, when there is a difference by slum and non-slum samples on method use, the common pattern is that the slum sample is more likely to be using sterilization or be non-users than the non-slum sample. Multivariate analyses of method use found that women living in slums who are less educated are more likely to be sterilized than their more educated counterparts. In some cities, a small number of wealth differences were also observed in the slum sample, but generally, education effects were more consistent. In the non-slum sample, both education and wealth effects were found in the expected directions; however, there was less consistency across the cities.

For the analyses of unmet need, we demonstrated that there is a higher unmet need for limiting than for spacing in all cities studied. Moreover, a greater percentage of poorer women have an unmet need (in the bivariate analyses) than richer women in both the slum and non-slum samples. Multivariate analyses demonstrated that controlling for all other factors, less educated women living in the slums are significantly more likely to have an unmet need than more educated women living in slums for three of the six cities. In the non-slum sample, wealth and education effects are found in the expected direction; however, the pattern is not consistent.

Our findings show both wealth and education distinctions in non-slum settings. As mentioned earlier, this may reflect the heterogeneity of the identified non-slum sites. This neighborhood heterogeneity is consistent with the analysis of neighborhood and household effects on urban FP use undertaken in 2005 by Montgomery and Hewett using Demographic and Health Survey (DHS) data from 85 countries.[21] In their analysis, the authors show that cross-nationally, persons living in urban areas from the lowest quartile do not necessarily live in neighborhoods surrounded by people in a similar wealth group. For example, in South Asia, they find that about 50% of the neighbors of the poorest urban residents are in the middle quartiles and about 10% are in the richest quartiles.[21] The authors show that in the South Asian context, there are more effects of household wealth on unmet need than neighborhood wealth on unmet need; this likely reflects this neighborhood heterogeneity. Since the DHS surveys do not generally provide information on type of setting (e.g., slum or non-slum), it is possible that the heterogeneity in the DHS samples is more similar to our non-slum sample than to our slum sample that was selected based on prior information on housing conditions.

In the comparison of our city-specific findings to the urban UP fertility and FP prevalence for married women found in the India NFHS, our findings show slightly greater modern FP use (46–61% using a modern method). Among urban married women from UP surveyed in the 2005/2006 NFHS, 42% are currently using modern FP method.[12] One reason for the distinction between our findings and the NFHS data is that in our analysis, we only examined FP among currently married women who are currently non-pregnant and fecund. The NFHS descriptive findings include all currently married women in the denominator. Notably, when we run our analysis with all currently married women in the denominator, we find that 38–53% of women are using a modern method in the six cities (not shown). The other distinction between the findings is that the NFHS Uttar Pradesh urban sites include both large cities and towns and does not have a large enough sample size to represent any specific urban setting. Our study includes some smaller cities (Aligarh, Gorakhpur, and Moradabad) and larger cities (Agra, Allahabad, and Varanasi). Our study did not include towns which would be classified as urban in the

NFHS and that would tend to have a lower contraceptive prevalence rate than large urban centers.

Our findings are also similar to those performed by Hazarika[10] that compared slum and non-slum areas in urban India using the 2005/2006 NFHS. For the NFHS, in a select number of cities throughout the country, slum and non-slum areas were identified based on the 2001 census classification of PSU. The analysis included 4,627 observations with about half from slum areas and half from non-slum areas in eight cities of India. The author demonstrates that women living in slum areas are less likely to use contraception and among users, they are less likely to use condoms. Multivariate analyses demonstrate a significant difference between current modern method users and all others based on slum residence (less likely to use) and education (lower education, less likely to use) among other factors. This is consistent with our findings related to the role of education in both slum and non-slum areas. Notably, the author does not recalculate the national wealth index specifically for urban areas and thus the majority of the slum and non-slum populations are classified in the higher (better off) wealth quintiles. Thus, wealth does not significantly distinguish modern contraceptive use in the multi-city NFHS analysis sample.[10]

In four of the six study cities, the main method of contraception is sterilization in both slum and non-slum areas and particularly among the lowest wealth quintile. If access to spacing methods is lacking for young, poor women in study cities, this may lead to higher fertility, intended and unintended. It is interesting to compare the contraceptive use patterns in India to those of India's neighbor, Bangladesh. The percentage of women using modern contraception in urban Bangladesh (52%) is similar to India however the most common method used in Bangladesh is the oral contraceptive pill which makes up more than half of all use.[22] The next most common method, the condom, accounts for about 20% of use, whereas injections and sterilization each make up about 10% of modern method users.[17] Few differences are observed in Bangladesh in pill use by wealth group.[17] This suggests that if in India spacing methods, such as the pill, are made more widely acceptable and available, women may choose to use them to space births and then sterilization can be used as a common limiting method. The current lack of variability in method use among urban, poor women in UP means high unmet need and suggests continued reliance on free, public-sector sterilization once women have completed childbearing.[12]

Our study has a number of limitations that are worth noting. The first limitation of this analysis is that, as mentioned earlier, the non-slum sample is a heterogeneous group and thus likely includes some slum areas within the non-slum domain. Based on our sampling approach, we are confident that the slum areas represent identified slums. The non-slum areas, however, are less distinct. A second limitation of this analysis is that the data are based on self-reported FP use behaviors. In settings where there are increasing programs for FP, women (and men) may over-report FP use if there is an expected "correct" answer. Conversely, women may under-report FP use if they are using covertly.

This study also has a number of strengths worth noting. First, this study includes a large, representative sample from six cities that permits an in-depth analysis of FP needs by city. Second, by over-sampling women that live in slum areas, it was possible to examine in more depth the factors associated with FP use and unmet need by city and specifically among women living in slums. While wealth indices are a useful tool to distinguish urban poor from non-poor, by having a slum

classification it is possible to isolate some of the community-context factors that may influence FP use.[21] We demonstrated that in the analysis of contraceptive use and unmet need, among the slum sample, education level is important. The women with the lowest education may be the most recent migrants who have the least knowledge and experience with FP use. Further analyses that examine the duration of residence and place of origin among the women in the slum sample by city will help to provide greater insights into how context influences FP use and unmet needs in these varying city settings. Moreover, the data collected in this study also include information on men and service delivery points. While presentation of those results is outside the scope of this paper, future analyses can link these three data sources to better understand the context of a specific city and explain gaps in FP use and strategies to fill those gaps.

To conclude, our study demonstrates that programs seeking to increase FP use in urban UP should consider the city context within which they are working. Current use patterns and unmet need for FP should be an indication of where the biggest gaps for services are. Targeting the urban poor with FP programs is a difficult endeavor since this group is not easy to identify. That said, targeting slums is one way to approach the urban poor, however, as demonstrated here, even the slum sample (and the non-slum sample) is diverse in terms of the demographic characteristics examined. Our results demonstrate that in slum areas (and non-slum areas), targeting uneducated women with approaches that they can understand and assuring their access to multiple methods, and not just sterilization, could lead to an increase in modern FP use and a reduction in the unmet need among the women most in need of FP across the multiple cities of Uttar Pradesh, India. Identifying strategies to assure that the urban poor in India are receiving the FP and reproductive health services they need is important given the projections for increasing urbanization and an increase in the urban poor in UP and throughout India.

ACKNOWLEDGEMENTS

This project was approved by the Futures Group India Institutional Review Board (in-country approval) as well as by the Institutional Review Boards at The University of North Carolina at Chapel Hill and the International Center for Research on Women (ICRW). Funding for this project comes from the Bill & Melinda Gates Foundation. The authors would like to thank Lisa Calhoun for her helpful insights into this paper.

REFERENCES

1. Montgomery MR. Urban poverty and health in developing countries. *Popul Bull*. 2009;64(2).
2. United Nations. *2009 Revision of World Urbanization Prospects*. New York, NY: United Nations; 2010.
3. Panel on Urban Population Dynamics. In Montgomery MR, Stren R, Cohen B, Reed HE, eds. *Cities Transformed: Demographic Change and its Implications in the Developing World*. Washington, DC: National Academies Press; 2003.
4. Matthews Z, Channon A, Neal S, Osrin D, Madise N, Stones W. Examining the "urban advantage" in maternal health care in developing countries. *PLoS Med*. 2010;7(9).

5. Vlahov D, Galea S, Freudenberg N. The urban health "advantage." *J Urban Health*. 2005;82(1):1-4.
6. Ezeh AC, Kodzi I, Emina J. Reaching the urban poor with family planning services. *Stud Fam Plann*. 2010;41(2):109-116.
7. Hogan MC, Foreman KJ, Naghavi M, et al. Maternal mortality for 181 countries, 1980-2008: a systematic analysis of progress towards Millennium Development Goal 5. *Lancet*. 2010;375(9726):1609-1623.
8. Cates W Jr. Family planning: the essential link to achieving all eight Millennium Development Goals. *Contraception*. 2010;81(6):460-461.
9. Census of India 2001. Metadata and Brief Highlights on Slum Population. http://censusindia.gov.in/Data_Products/Data_Highlights/Data_Highlights_link/metadata_highlights.pdf. Accessed September 11, 2009.
10. Hazarika I. Women's reproductive health in slum populations in India: evidence from NFHS-3. *J Urban Health*. 2010;87(2):264-277.
11. Office of the Registrar General and Census Commissioner (India). India Population and Housing Census 2001. New Delhi, India: Office of the Registrar General and Census Commissioner (India); 2006.
12. International Institute for Population Sciences (IIPS) and Macro International. *National Family Health Survey (NFHS-3), 2005–06: India, Volume I*. Mumbai, India: IIPS; 2007.
13. Ministry of Health and Family Welfare (Government of India). State of Urban Health in Uttar Pradesh. http://uhrc.in/module-ContentExpress-display-ceid-84.html. Accessed January 2, 2011.
14. Planning commission (Government of India). Poverty estimates for 2004–05. http://www.planningcommission.gov.in/news/prmar07.pdf. Accessed January 2, 2011.
15. Urban Health Resource Centre (UHRC). Key Indicators for Urban Poor in Uttar Pradesh from NFHS-3 and NFHS-2. http://uhrc.in/downloads/Factsheet-UP.pdf. Accessed November 15, 2011.
16. Census of India, 2001. Population by religious communities. Available at: http://www.censusindia.gov.in/Census_Data_2001/Census_data_finder/C_Series/Population_by_religious_communities.htm. Accessed November 15, 2011.
17. Nanda P, Achyut P, Mishra A, Calhoun L. Measurement, Learning and Evaluation of the Urban Health Initiative: Uttar Pradesh, India, Baseline Survey 2010 [TWP-3-2011]. Chapel Hill, NC: Measurement, Learning & Evaluation Project; 2011. http://www.urbanreproductivehealth.org/sites/default/files/MLE_TWP_%20INDIA_2011_7Oct_nh.pdf. Accessed November 15, 2011.
18. Agarwal S, Bhanot A, Goindi G. Understanding and addressing childhood immunization coverage in urban slums. *Indian Pediatr*. 2005;42:653-663.
19. Pritchett LH. Desired fertility and the impact of population policies. *Popul Dev Rev*. 1994;20(1):1-55.
20. Filmer D, Pritchett LH. Estimating wealth effects without expenditure data—or tears: an application to educational enrollments in states of India. *Demography*. 2001;38(1):115-132.
21. Montgomery MR, Hewett PC. Urban poverty and health in developing countries: Household and neighborhood effects. *Demography*. 2005;42(3):397-425.
22. National Institute of Population Research and Training (NIPORT) MaA, and Macro International. *Bangladesh Demographic and Health Survey 2007*. Dhaka, Bangladesh and Calverton, Maryland, USA: National Institute of Population Research and Training, Mitra and Associates, and Macro International; 2009.