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WHAT HUSBANDS IN NORTHERN INDIA KNOW ABOUT REPRODUCTIVE HEALTH: CORRELATES OF KNOWLEDGE ABOUT PREGNANCY AND MATERNAL AND SEXUAL HEALTH

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Summary. Women in India suffer from a high incidence of reproductive disease, disability and death. Very little work has been done on men, but a much higher incidence of sexual experience outside marriage and sexually transmitted diseases (STDs) among males than previously expected for this population is now being documented. In north India, women are dependent on their husbands and other family members for health-related decisions. Therefore, the behaviour, knowledge and attitudes of men are integral to the reproductive health status of couples there. This study explores knowledge about three distinct areas of reproductive health among 6549 married men in five districts of the northern state of Uttar Pradesh, India. Factors contributing to men's knowledge in the areas of fertility, maternal health and STDs were investigated. Results showed that very few men had basic knowledge in any of these areas. The likelihood of reporting knowledge was associated with a set of determinants that differed in their magnitude and effect across the areas of reproductive health explored. In particular, men's belief about the ability of an individual to prevent pregnancy demonstrated an independent association with men's knowledge. After controlling for factors such as age, parity and educational and economic status, men who believed it not possible to prevent a pregnancy were less likely to know when during the menstrual cycle women would become pregnant and certain facts about STDs, but they were more likely to be able to name two or more symptoms of serious maternal health conditions. Possible explanations for this trend are discussed.

Introduction

At the International Conference on Population and Development, Cairo, 1994, the consensus on the definition of reproductive health and well-being stressed three major points: all pregnancies should be intended, all births should be healthy, and sexual

activity should be free of coercion and infection (United Nations, 1995). While these goals are ideal and may not be attainable in practice, they serve as the reference point towards which research and programmatic efforts in developing countries have turned. Progress towards these goals requires information on a variety of issues, including sexual behaviour, level of awareness and understanding among individuals, prevalence of reproductive health conditions and preventive and associated treatment-seeking behaviour.

Recent research has shown that reproductive health outcomes in India are poor in general, but particularly in less developed regions such as the northern state of Uttar Pradesh. Maternal mortality is unacceptably high: the national maternal mortality ratio was estimated at 437 deaths per 100,000 live births (IIPS, 1995), and in Uttar Pradesh the number was considerably higher, at 599 deaths per 100,000 live births (unpublished estimate from Tsui *et al.*, 1996). Community-based studies conducted in various regions in India have all shown that the prevalence of reproductive and maternal morbidity among women is very high (Bang *et al.*, 1989; Bhatia *et al.*, 1997; Datta *et al.*, 1980; Koenig *et al.*, 1996; Kumar *et al.*, 1995). The timely use of reproductive health services for both maternal complications and reproductive tract infections is essential in preventing the escalation of conditions which can result in death or permanent disability (Dixon-Mueller & Wasserheit, 1991; Thaddeus & Maine, 1994). While many factors contribute to the utilization of care, health-seeking behaviour can only take place if individuals possess a certain amount of knowledge about both illness and the benefits of care (Janz & Becker, 1984). Results of a study conducted in Haryana, India, showed that 54% of the maternal mortality cases were not referred to a hospital because family members were not aware of the severity of the symptoms (Kumar *et al.*, 1995). Apart from the social stigma that makes it difficult for individuals to seek treatment for reproductive tract infections in developing countries, the lack of awareness about these illnesses as health conditions which require care has been identified as a major problem (Dixon-Mueller & Wasserheit, 1991). Therefore, it is important to understand what factors enhance various types of reproductive health knowledge among individuals.

Women in developing countries have long been the subjects of studies focusing on fertility, and much more recently, in research on reproductive morbidity. However, very little work in this area has focused on men. The biological and social interdependence between couples *vis-à-vis* their individual reproductive health status makes the importance of including men in reproductive health investigations apparent. Researchers have recommended involving husbands to improve women's access to health care (Santow, 1995). More specifically, excluding men has been observed to weaken reproductive health programmes in various parts of the world (Mbizvo & Bassett, 1996). In India, male involvement was found to enhance both the use of antenatal care (Bhalerao *et al.*, 1984) and contraception (Karra, Stark & Wolf, 1997) by women. Exploring men's reproductive health knowledge is particularly important in places such as north India, where most women have limited interpersonal control over their lives and are dependent on their husbands and older family members for health-related decision-making (Jeffery, Jeffery & Lyon, 1989; Koenig & Foo, 1992). Poor knowledge of reproductive health issues among males may pose barriers for women to seek care for these problems.

This study investigated the determinants of three different types of reproductive health knowledge among 6549 married men, living in five districts of the north Indian state of Uttar Pradesh. Factors contributing to men's knowledge in the areas of fertility, maternal health and STDs were explored. These are not only three distinctive areas of reproductive health, but existing knowledge in each may have been acquired differently. For example, information about maternal complications may be passed through the community after a maternal death, whereas knowing when during the menstrual cycle a woman will most likely become pregnant as well as facts about STDs most likely results from exposure to individuals such as health practitioners or programmatic campaigns that intend to impart that information.

The factors associated with the likelihood of men's basic knowledge in these areas were explored. Of particular interest was whether or not the sociodemographic determinants of these areas of knowledge differed among these men. Also of interest was whether or not men's attitudes about the ability of individuals to exert control over preventing a pregnancy would have an independent effect on the likelihood of men having basic knowledge in these three areas, after controlling for other factors. Belief that a pregnancy can be prevented shows at least a base-level understanding that individuals have the capacity to make an impact on a physiological process. Therefore, men who do not feel this way may be less apt to value and acquire health-related knowledge. Specifically, it was hypothesized that men who reported a fatalistic mode of thought would be less likely to exhibit knowledge of reproductive health in the three areas examined.

Data and methods

Data for the present study were collected for the Uttar Pradesh Male Reproductive Health Survey (MRHS) from November 1995 to April 1996 (de Graft-Johnson *et al.*, 1997). The MRHS was designed and supported by the EVALUATION Project of the Carolina Population Center, University of North Carolina at Chapel Hill, in collaboration with the Centre for Population and Development Studies (CPDS)/Hyderabad. The objective of the MRHS was to interview a probability sample survey of men regarding sexual and reproductive health knowledge and behaviour in five districts of Uttar Pradesh that represent the five major regions of the state. The MRHS was the second phase survey of the Program Evaluation Review for Organizational Resource Management (PERFORM) System of Indicators Survey, which had been conducted from June to September 1995. The 1991 population of Uttar Pradesh was 139 million (Government of India, 1992), the largest of any state in India. The districts selected for the MRHS were Nainital, Aligarh, Kanpur Nagar, Gonda and Banda, representing the Hill, Western, Central, Eastern and Bundelkhand regions, respectively. Kanpur Nagar is predominantly urban and includes one of the largest cities in the state, Kanpur, with 2·1 million inhabitants according to the 1991 Census (Government of India, 1992). The other four districts are primarily rural.

The sampling strategy for the MRHS – based on that of the PERFORM survey – is explained in detail elsewhere (Singh *et al.*, 1998). Fieldworkers returned to the same households sampled for the PERFORM survey in the five selected districts to interview eligible husbands who were identified from the household listing and enumeration. Men were eligible for the MRHS if they were currently married and between the ages

of 15 and 59. In total, 8296 husbands were contacted for interview and 6727 were successfully interviewed (83·2%). The major reason some husbands were not interviewed was because they were temporarily absent from the household (7·4%). Other reasons (8·0%) included no longer residing at the household or not being contacted after three standard attempts. The response rates varied by region: the highest coverage was for Nainital, where 93·1% of husbands were successfully interviewed, and the lowest was in Aligarh (71·8%). The selected districts were based on a convenience sampling procedure and the results of these analyses cannot be generalized to represent eligible husbands for the state of Uttar Pradesh. Despite this limitation, the MRHS is the first large-scale survey of its kind in India. The sample size of 6549 for the present study resulted from excluding those men who had not started cohabitation with their wives by the time of interview.

The fieldwork was carried out by the organizations that were responsible for the PERFORM survey, who were assigned the same districts they had previously completed. Field teams were composed of three to four male interviewers, an editor and a supervisor. External field supervision was carried out by three independent supervisors who monitored ongoing fieldwork logistics and data quality during the data collection period. ISSA software (Integrated System for Survey Analysis) was used for data entry and cleaning in India.

The questionnaire, developed jointly by the EVALUATION Project and CPDS/Hyderabad, covered a variety of areas pertaining to reproductive health. Basic sociodemographic characteristics and detailed questions pertaining to knowledge and use of contraceptives were recorded for each husband. Men were also asked about their beliefs regarding the ability to control fertility and attitudes regarding social norms around wives. The last sections of the questionnaire addressed men's reproductive health knowledge, the occurrence of sexual morbidity symptoms and sexual activity.

Statistical analyses

Three indicators were used to model men's reproductive health knowledge. The first pertained to the physiological process of fertility. Men were asked whether or not they could state when during the menstrual cycle women were most likely to become pregnant. The correct response was about 2 weeks after their menstrual period begins; all others were classified as not knowing. For the second indicator of maternal health, men were asked to name all signs or symptoms of complications women could experience during pregnancy or childbirth that they knew. Men who could name at least two of the following danger signs were classified together, versus those who could name only one or none at all: vaginal bleeding, high fever, abdominal pain, swelling of the hands and face, hard labour for more than 12 hours, and convulsions. The third indicator related to the correlates of knowledge about sexually transmitted diseases. Men were asked to state, unprompted, if they agreed or disagreed with the following four statements: 1. After contracting gonorrhoea once, a person becomes immune to the disease. 2. Syphilis can be treated with penicillin and other antibiotics. 3. STDs can be passed from a mother to her baby either before or during birth. 4. Some people who have STDs show no symptoms at all. Men who responded correctly for at least two of these statements were categorized together, versus all others.

A number of covariates were examined in the analyses. The proxy measure used to

indicate men's attitudes about the ability of individuals to exert any control over their physical health was based on a question men were asked regarding a person's ability to prevent a pregnancy. Men were asked whether or not they agreed to the following statement: 'Most often it is not possible to prevent a pregnancy. If a woman is meant to be pregnant, she will be pregnant.' Men who agreed were classified as expressing a fatalistic attitude towards pregnancy avoidance, versus those with less fatalistic feelings about the issue.

Other covariates investigated included district and urban versus rural residence. As a proxy for household economic level, the presence of various possessions in the household was used to create a scale of assets (0–6). The six groups of particular items were based on the following: 1. clock or watch; 2. fan; 3. radio or transistor; 4. television; 5. bicycle; 6. any motorized vehicles (motorcycle, scooter, car or tractor). A score of one was assigned for each group if the household possessed the item(s) listed. Scores were summed and categorized into three levels: zero to one, two to four, and five or more. Occupation was based on husbands' self-report, with the following categories: agricultural labourer, farmer, blue collar, business, and professional including white collar. Men were categorized into four age groups: 15–24, 25–34, 35–44 and 45–59. Parity was a dichotomous variable indicating whether or not the man's wife had given birth at least once. Years completed in school was modelled as a continuous variable.

Preliminary analyses studied the bivariate relationships between the predictor of interest, men's attitudes about control over reproductive physiology, and the other covariates using the Chi-square test. The marginal associations between the three reproductive health knowledge outcomes and all the covariates were then examined, also using the Chi-square test. Next, logistic regression models including all the sociodemographic covariates – deemed as important controls in the study – were fitted to investigate the factors that predict men's reproductive health knowledge in each of the three contexts. Then, the factor pertaining to men's attitudes was added to each of the models and log-likelihood tests were conducted to assess whether the addition of this variable helped to predict men's reproductive health knowledge (Agresti, 1996). Tests for relevant interactions were conducted, particularly with region and the other sociodemographic factors, and these terms were included if they met the criteria mentioned. Goodness-of-fit tests were conducted to assess the appropriateness of the final models, using classification tables to estimate the proportion of cases correctly predicted by each of the three models (Hosmer & Lemeshow, 1989). Statistical analyses were conducted using SAS version 6.12 (SAS Institute, 1997).

Results

Among the three areas of reproductive health examined (results not shown), men were least likely to know when during the menstrual cycle women were most likely to get pregnant (21·4%, $n=1402$). Slightly more men could name two or more warning signs of pregnancy (28·2%, $n=1849$), but the proportions of men who named each sign were very small. Only 4·4% ($n=287$) of men named convulsions as one of the danger signs, while a larger number named vaginal bleeding (18·9%, $n=1241$) or fever (17·5%, $n=1145$). Men were much more informed about STDs, as a much larger proportion was able to respond correctly about two or more of the statements (44·2%, $n=2893$).

Table 1. Sociodemographic correlates of men's beliefs regarding whether or not they have the ability to control their own fertility ($n = 6549$)

Characteristics	No.	Believes pregnancy can be prevented (%)	
		Yes ($n = 3330$)	No ($n = 3219$)
District			
Banda	1713	28·2	71·8*
Gonda	1190	71·2	28·8
Nainital	1406	29·6	70·4
Kanpur	1120	50·3	49·7
Aligarh	1120	91·2	8·8
Urban residence			
Yes	2177	50·4	49·6
No	4372	51·1	48·9
Number of household assets			
0–1	1820	47·3	52·7*
2–4	3092	49·6	50·4
5–6	1637	57·3	42·7
Occupation			
Agricultural labourer	442	45·3	54·7*
Farmer	2398	51·0	49·0
Blue collar	1127	41·4	58·6
Business	1888	53·7	46·3
Professional	694	61·5	38·5
Years of age			
15–24	825	52·1	47·9
25–34	2103	51·1	48·9
35–44	1987	51·0	49·0
45–59	1634	49·6	50·4
Years completed in school			
None	1922	44·5	55·5*
1–5	1057	44·5	55·5
6–10	2127	53·5	46·5
10 or more	1443	60·2	39·8
At least one birth			
Yes	5926	51·1	48·9
No	623	48·5	51·5

*$p < 0{\cdot}001$, based on Chi-square or Wilcoxon rank sum tests.

Among the four facts about STDs, the largest proportion of men knew that perinatal transmission was possible (53·4%, $n = 3499$) and the smallest proportion answered correctly that a person could not become immune to gonorrhoea (20·5%, $n = 1340$).

The effects of sociodemographic correlates on men's attitudes regarding whether or not pregnancy can be prevented are shown in Table 1. Statistically significant

differences were observed by district, number of household assets, occupation and mean years of education. A much higher proportion of men from Nainital (70·4%) and Banda (71·8%) felt the occurrence of a pregnancy could not be controlled, as compared with the proportions in the remaining districts; the vast majority of men in Aligarh (91·2%) reported that they believed pregnancy could be prevented. As expected, men from households with the highest number of assets (57·3%) were more likely to feel that they could prevent a pregnancy. A larger proportion of men in professional or white collar occupations (61·5%), which also indicates higher education, felt that a pregnancy could be prevented. As expected, larger proportions of men with higher educational levels tended to feel that pregnancy could be prevented. There were very few differences by urban versus rural residence, age and whether or not the man's wife had given birth.

Table 2 shows the association between background characteristics and men's beliefs regarding the ability to prevent pregnancy and the three areas of reproductive health knowledge. Overall, a low proportion of men had an understanding of all three areas of reproductive health. Statistically significant differences were observed for all the covariates of interest. There were some inconsistencies across districts between the proportions of men who exhibited knowledge in the three different areas. While a small proportion of men in Banda knew the time in the menstrual cycle when pregnancy would most likely occur (15·6%) and responded correctly to two or more of the questions pertaining to STDs (19·4%), men from this district constituted the highest proportion who could name two or more signs of serious maternal complications. Men who lived in urban areas, had a higher number of household assets and whose wives had given birth at least once tended to exhibit more knowledge in all three areas. Larger proportions of men in professional or white collar occupations demonstrated knowledge in all three areas than in the remaining groups. Again, more educated men knew more about reproductive health matters than less educated men. However, while considerably more men who felt that pregnancy could be prevented responded correctly about the time when a pregnancy would most likely occur and to at least two of the statements on STDs, the opposite trend was observed for knowing two or more signs of maternal complications. About one-third (31·9%) of men who reported a fatalistic mode of thought named two or more warning signs as compared with about one-quarter (24·5%) of the men who could not.

The coefficient estimates and associated odds ratios from multivariate logistic regression models for all three areas of reproductive health knowledge are shown in Table 3. Controlling for all other factors, district differentials are observed in the three areas of reproductive health. While men in Banda were less likely than men in the other four districts to correctly name the correct period in the menstrual cycle or at least two facts about STDs, they were more likely to know two or more signs of maternal complications. In the model for the fertile period, an interaction was observed between urban residence and the number of household assets. In urban areas, there was very little difference (0·02) in the predicted probability of men knowing when women would become pregnant between those with two to four household assets versus those with five or six. In rural areas, this difference was relatively greater (0·08), meaning that the additional economic status made a much greater difference to men's knowledge in this area, in rural households. No such interaction was observed in the fitted models for knowledge about STDs and maternal mortality. Urban residence and more household

Table 2. Men's profile of knowledge in three areas of reproductive health as a function of sociodemographic characteristics and belief about being able to prevent a pregnancy ($n = 6549$)

Characteristics	Knows time when pregnancy likely (%) ($n = 1402$)	Knows 2+ signs of mat. complications (%) ($n = 1849$)	Knows 2+ facts about STDs (%) ($n = 2893$)
Total	21·4	28·2	44·2
District			
Banda	15·6**	42·6**	19·4**
Gonda	16·5	9·7	57·7
Nainital	20·4	22·9	55·0
Kanpur	25·5	28·0	43·1
Aligarh	32·7	32·9	55·2
Urban residence			
Yes	23·3*	33·2**	49·8**
No	20·5	25·8	41·4
Number of household assets			
0–1	15·7**	22·1**	34·7**
2–4	21·2	28·2	43·8
5–6	28·2	35·1	55·5
Occupation			
Agricultural labourer	13·6**	23·1**	30·5**
Farmer	18·9	24·0	39·9
Blue collar	20·6	30·0	42·4
Business	23·0	27·7	46·7
Professional	34·6	45·0	63·7
Years of age			
15–24	14·2**	22·6**	39·8*
25–34	22·2	28·7	42·7
35–44	24·0	29·7	46·5
45–59	20·9	28·6	45·5
Years completed in school			
None	14·9**	18·2**	33·9**
1–5	18·5	24·6	41·0
6–10	22·4	30·6	45·1
10 or more	30·7	40·9	58·8
At least one birth			
Yes	22·0**	29·1**	44·5†
No	15·7	20·1	40·6
Believes pregnancy can be prevented			
Yes	25·0**	24·5**	52·5**
No	17·7	31·9	35·6

*$p < 0{\cdot}01$; **$p < 0{\cdot}001$; †$p < 0{\cdot}10$ based on Chi-square tests.

Table 3. Determinants of men's reproductive health knowledge in three areas: knowing the time in women's menstrual cycle when they are most likely to become pregnant, knowing at least two signs of pregnancy and birth complications, and knowing two or more facts about sexually transmitted diseases (regression coefficients and odds ratios from logistic regression models, $n = 6549$ men)

	Knows time when pregnancy likely		Knows 2+ signs of mat. complications		Knows 2+ facts about STDs	
Determinants	Coefficient	OR	Coefficient	OR	Coefficient	OR
District						
Banda (ref.)	—	1·00	—	1·00	—	1·00
Gonda	0·108	1·11	−1·728***	0·18	1·840***	6·30
Nainital	0·208*	1·23	−1·085***	0·34	1·641***	5·16
Kanpur	0·503***	1·65	−1·027***	0·36	0·801***	2·23
Aligarh	0·819***	2·27	−0·312**	0·73	1·433***	4·19
Urban residence						
Yes	0·153	1·17	0·216**	1·24	0·023	1·02
No (ref.)	—	1·00	—	1·00	—	1·00
Number of household assets						
0–1 (ref.)	—	1·00	—	1·00	—	1·00
2–4	0·244**	1·28	0·183*	1·20	0·181**	1·20
5–6	0·653***	1·92	0·294**	1·34	0·259**	1·30
Interaction terms						
Urban residence/2–4 assets	−0·327	0·72	N/A		N/A	
Urban residence/5+ assets	−0·863***	0·42				
Occupation						
Agricultural labourer (ref.)	—	1·00	—	1·00	—	1·00
Farmer	0·215	1·24	−0·040	0·96	0·003	1·00
Blue collar	0·408*	1·50	0·285*	1·33	0·247†	1·28
Business	0·326*	1·39	−0·043	0·96	0·180	1·20
Professional	0·657***	1·93	0·376*	1·46	0·476**	1·61
Years of age						
15–24 (ref.)	—	1·00	—	1·00	—	1·00
25–34	0·455***	1·58	0·094	1·10	0·092	1·10
35–44	0·578***	1·78	0·151	1·16	0·271**	1·31
45–59	0·382**	1·47	0·100	1·11	0·291**	1·34
At least one birth						
Yes	0·156	1·69	0·556***	1·74	−0·056	0·95
No (ref.)	—	1·00	—	1·00	—	1·00
Year completed in school	0·042***	1·04	0·065***	1·07	0·068***	1·07
Believes pregnancy can be prevented						
Yes	0·142†	1·15	−0·395***	0·67	0·317***	1·37
No (ref.)	—	1·00	—	1·00	—	1·00

*$p < 0·05$; **$p < 0·01$; ***$p < 0·001$; †$p < 0·10$.

assets were consistently associated with a greater probability of reproductive health knowledge in both areas, but the effects for both factors on knowing two or more facts about STDs were not significant.

Men's occupations still remained statistically significant for some of the categories, but after controlling for household assets and education, these effects were somewhat diminished, as expected, since they are more or less proxies for economic and educational status. Older men were more likely to know more about reproductive health than younger ones, but the magnitude of the difference between the age categories was not remarkable. This was particularly true for the likelihood of knowing signs of maternal complications, where no statistically significant effects of age were observed. The experience of having at least one birth had a positive, statistically significant effect on the likelihood of knowing about maternal morbidity symptoms. After controlling for all other factors in the model, men whose wives had at least one birth had an estimated odds of knowing at least two of these signs that was almost two times higher than men with no births (OR = 1·74, 95% CI = 1·38, 2·21). However, this factor did not demonstrate a significant effect in the other two models, and husbands with a birth were less knowledgeable about STDs than those without one. As expected, education demonstrated a positive, statistically significant effect in all three models. The odds ratios shown are based on a difference of one additional year of schooling between men. The effect can be better appreciated if one considers a 10 year educational difference between men: more educated men have an estimated odds of knowing two or more maternal morbidity signs that is almost two times higher (OR = 1·92, 95% CI = 1·78, 2·06) than less educated men, after controlling for all other factors in the model. The effect of a 10 year educational difference between men in the other two models is equivalent.

The effect of men's beliefs about pregnancy avoidance, like some of the other factors, was consistently positive on the knowledge of the fertile period and STDs. For both these areas of reproductive health, men who were less fatalistic about the occurrence of pregnancy were more likely to know more about complications and STDs than men who felt that pregnancy could not be prevented. In the fertile period model, this attitude was only marginally significant (OR = 1·15, 95% CI = 1·00, 1·33) but the effect was much stronger and highly significant in the model pertaining to STD-related knowledge (OR = 1·37, 95% CI = 1·22, 1·55). The opposite trend was observed in the case of naming symptoms of serious maternal conditions, where men who did not believe that pregnancy could be prevented were much more likely to know two or more of these signs (OR = 1·49, 95% CI = 1·28, 1·70, reverse OR not shown). Goodness-of-fit statistics for the three models fell within the range of what is expected for social science statistical models. Using a probability cut-off level of 0·5, the fitted model predicted the distribution of the observed data correctly in 78·6% of the cases for knowledge about when women are likely to become pregnant. The same statistics for knowing two or more facts about STDs and two or more signs of maternal complications were 73·9% and 64·8%, respectively.

The three models, excluding the urban residence–household asset interaction term, were estimated within each of the five districts as well (results not shown). In the between-district models for knowledge of the fertile period, the effects of household assets were stronger and statistically more significant in Nainital, Gonda and Aligarh

than in the other districts. Husbands' occupation demonstrated a strong association in Banda, and a moderate one in Gonda. Age tended to have a curvilinear relationship: knowledge was highest among 34–44 year olds, particularly in Aligarh and Gonda. Statistically significant and strongly positive effects from schooling were seen in Banda, Gonda and Nainital, where the odds ratio ranged between 1·06 and 1·07 for each year completed.

District-level differences in the patterns of these determinants were also found on the likelihood of husbands' knowledge of maternal complications. In these models, education remained a strong positive and significant predictor for Gonda, Banda and Aligarh, as did urban residence and household assets in Kanpur and Banda. Having at least one child raised the probability of husbands' awareness of two or more maternity complications significantly in Aligarh and Gonda by more than 3 times but only 1·73 times in Banda. Believing pregnancy can be prevented, however, unexpectedly lowered awareness in Banda and Kanpur. In the third model of STD knowledge, education was highly predictive in all districts, but particularly so in Banda (OR of 1·15 compared with ORs of around 1·06 for other districts). Belief that pregnancy can be prevented increased the likelihood of husbands' knowledge significantly by 3·2 times in Gonda; positive effects from increasing age were found in Aligarh. Although the aggregate model in Table 3 has captured the general pattern of effects from these selected predictors, the district-level results reflect the regional heterogeneity of the state.

Discussion

These data show that men of reproductive age living in these five districts of Uttar Pradesh know very little about the three areas of reproductive health examined. While the understanding of these issues is largely driven by sociodemographic characteristics such as urban residence, age and economic and educational status, men's belief about their ability to control reproduction has its own independent effect on their knowledge in each of these areas. Given the high prevalence of maternal and reproductive morbidity in India, these findings have important implications for future reproductive health-related programmatic and research efforts in north India. Men's lack of reproductive health knowledge leaves women particularly vulnerable in this area, as they are dependent on their husbands and other kin members for most types of health-related decision-making. This points to an urgent need for efforts to increase men's reproductive health knowledge, including basic facts about reproductive processes, disease prevention, and the benefits of reproductive health care for both men and women. In light of the growing AIDS epidemic in India, which is now spreading into the north (Pais, 1996), these issues have never been more pertinent.

The differences observed in the effects of some of the other determinants provide more evidence for the notion that the process of acquiring knowledge in these areas of reproductive health differs. District of residence, number of household assets, occupation, education and belief about preventing a pregnancy demonstrated significant effects in all the models. The magnitudes of the associations of these factors were similar for the fertility and STD models, but differences in occupation and district were observed in the case of maternal mortality symptoms. Likewise, older men were more likely to have knowledge about the menstrual cycle and STDs, but no significant

differences were observed by age with regard to maternal complications. In the latter model, men whose wives had given birth at least once and those who were of urban residence were much more likely to name two or more danger signs, whereas these factors did not demonstrate significant effects in the other two models after controlling for the other variables.

The persistent regional effects observed, even after controlling for background characteristics, may have been due to regional differences that could not be accounted for in the models. The socioeconomic effects in the between-district models varied somewhat, demonstrating that factors such as economic status and education matter more in some regions than in others for all three areas of reproductive health knowledge examined. If further information were available to capture individual socioeconomic status more precisely, such as household income and the nature of men's education, the regional effects may be attenuated. One important area which certainly has an influence on individual knowledge about health could not be examined in this study. Health education could be achieved through exposure to special community-based campaigns or programmes that include contact with health professionals. It may well be that information and education campaigns about health and family planning were targeted at certain areas, increasing the knowledge base of individuals living there. This type of information may be more important than general education in areas where illiteracy is high, such as in these areas of Uttar Pradesh. Future research could incorporate such community effects, which would shed light on the issue.

Although 90% of women of childbearing age in Uttar Pradesh are aware of some type of modern family planning (de Graft-Johnson *et al.*, 1997; IIPS, 1995), there is comparatively little knowledge of the biological process of reproduction and sexually transmitted infection among men. An understanding among couples in this area may help them consider family planning options in a manner that may enhance reproductive health care, which is currently very low. Men's low levels of knowledge of the danger signs of maternal mortality is also of concern for the health of childbearing women in India. Evidence from around the world indicates that maternal deaths result primarily from the delay in seeking care, which is largely caused by a lack of awareness among family members about the seriousness of the mother's condition (Fawcus *et al.*, 1988; Garenne *et al.*, 1997; Iskander & Hull, 1996; Jafarrey & Korejo, 1993). The proportion of men exhibiting knowledge about STDs was somewhat higher, but there were still many misconceptions which could hamper preventive and treatment-seeking behaviour among couples.

The relationship between men's beliefs about preventing a pregnancy and reproductive knowledge is not surprising in the case of the fertility- and STD-related areas. Men who reported a fatalistic belief were less likely to know about these issues, regardless of their age, urban or rural residence or educational, economic and occupational status, whether or not their wives had given birth and no matter which district they lived. However, the opposite trend was observed in the case of knowing maternal complications. One of the explanations for this may lie in the difference between the way knowledge in these three areas is acquired by these men. The answers regarding the most fertile period for women and the facts about STDs would ultimately have to come from an educated person such as a health practitioner – either through direct contact with them or indirectly, through friends who had talked with such a

person – or through an education campaign. These are not events that can be observed within the community. However, serious maternal symptoms, especially if they lead to a death, are observed directly and talked about within the community. A study in urban Uttar Pradesh found that 20% of women had known a relative, friend or neighbour who died of maternal causes; all women stated they were aware that women could die due to conditions that arose during pregnancy and childbirth (Bloom, 1997). Knowing that women could experience such signs may have an association with more fatalistic attitudes because, as the data show, men who feel this way are likely to be poorer and less educated, factors which also predispose communities to a higher risk of experiencing maternal death.

Since this study was based on a cross-sectional survey, it would be difficult to say whether men's fatalistic attitudes affect their understanding of reproductive health issues or whether the acquisition of this knowledge changes the way men feel. In either case, men's feelings about this issue are certainly indicative of their understanding of reproductive health. This study focused on factors that are difficult to change within a short period of time. These data did not allow for a full exploration of other factors that may affect or be affected by health-related knowledge, such as individual perception of risk for reproductive illness, feelings about the benefits of modern medical care for these problems and community effects from local programmes or organizational efforts to raise the health status of men and women. These would be important issues to investigate in future research.

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