

PATTERNS OF MODERN CONTRACEPTIVE USE IN INDIA

Beverly L. Stiles, *Midwestern State University*

ABSTRACT

Theoretically informed models are estimated using the MicroCase data set for India to examine "availability" of contraception as predictors of both contraceptive use and method of contraception chosen. More specifically, this research examines the availability of health facilities and health professionals as predictors of total contraceptive use and as predictors of sterilization and IUD insertion as contraceptive methods. Partial support was found for the hypothesis that availability of contraceptives is a predictor of the rate of IUD insertion in the states of India. Availability was not a significant determinant of the percentage of couples using contraception or the rate of sterilization within India.

INTRODUCTION

Population growth is undeniably of great concern and increasingly so within a global economy. Fertility control is not simply a concern in the West or among the leaders of the Third World, but instead is perceived, with great conviction, as a necessity. Fertility decline has been explained in terms of demographic transition theory since the development of demography as an academic field in the post-World War II era. The classic demographic transition is a theory of population change presented as a classification of evolutionary stages from high birth and death rates to low birth and death rates with mortality rates preceding fertility declines. This occurs within a process of socioeconomic development (Chatterjee & Riley 2001). Much initial research examined the societal changes that are likely to bring about reductions in fertility (Friedlander, Okun & Segal 1999). Initially, a lack of development was purported to be the reason that Third World countries maintained high birth rates and failed to follow the classic demographic transition. Subsequently, it was proposed that developing countries did not follow the pattern because they evidence significant differences from developed countries especially in terms of an obvious socioeconomic gap (Teitelbaum 1975). Other research recognized social, economic, and institutional changes as factors bringing about lower fertility rates (Caldwell 1982; Caldwell et al 1982; Caldwell 1999; Greenhalgh 1990). These social, economic, and institutional changes include

decreased infant and child mortality, the spread of urbanization, increased costs of raising children, rising parental aspirations, increases in literacy, rises in women's status, a rise in individualism, a decline in religiosity, and changes in other cultural factors.

(Friedlander et al 1999 4)

Eventually the connection was made between economic development factors and their effect upon the proximate determinants of fertility (Macunovich 1999; Suri 1991).

The proximate determinants of fertility are a limited set of biological and behavioral variables through which sociocultural, economic, and environmental conditions determine fertility. (Almgren 1992 313)

In other words, the proximate determinants are the intervening variables between economic development factors and decreased fertility rates. John Bongaarts (1982) recognizes the four most important intermediate (proximate) variables in determining the level of fertility in a country to be: marriage; contraceptive use; abortion; and infecundability due to breastfeeding. Lerman (1992) argues that the rising use of contraceptives is the proximate determinant considered the most responsible for lowering fertility rates in developing nations.

Prime Minister Nehru's declaration in the early 1950s that India would establish the world's first national family planning program was of huge importance to India's fertility decline (Acharya 2001). Although there were no immediate declines in fertility, India has recently evidenced significant declines in its total fertility rate (6.2 in 1965 to 3.75 in 1994). Still, India maintains a fast growing population (UN Estimates & Projections 1994). Adding nearly 17 million to the population each year, India is expected to surpass China as the most populous country by 2035 (Chatterjee & Riley 2001; Progressive Population Network 1995; Visaria & Visaria 1997).

There is an undeniable link between a country's fertility rate and contraceptive use,

or the extent to which those at risk (women between the ages of 15 and 49) use modern contraceptives. Furthermore, without attention to the predictors of contraceptive use, there is an inability to accurately assess to what degree policy, in terms of governmental provision of contraceptives and/or advocacy on the part of government and community leaders, will be effective in lowering fertility or even what type of policy is needed (Chatterjee & Riley 2001). Because contraceptive methods have different rates of effectiveness, choice of contraceptive method is also an important factor in determining the type and effectiveness of policy. Thus, the present study examines the determinants of modern contraceptive "use" in India as well as the determinants of the choice between two methods of modern contraception (sterilization and IUD). These are the two most common methods of contraception in India and are also promoted by the Indian government. Attention to availability as a determinant of both "use" of contraception (in terms of the percentage of reproductive-age couples using contraception) as well as "method" of choice (sterilization vs. IUD) may shed light on the contradictory results in fertility studies of the relevant factors predicting declining fertility rates.

LITERATURE REVIEW

Much of the research on the determinants of contraception (use and/or specific methods) in India is somewhat limited as much of the research tends to employ regional studies, take a micro approach, or address only a limited number of factors as determinants of contraception. Clearly, micro approaches provide necessary answers to understanding contraception, and a macro approach ultimately rests on individual level studies. Still, when we seek to understand contraception, it is of obvious use to study the arrangements made by a society for distributing goods and services among its members. Another shortcoming of much of the research is that it seeks to determine how modernization, sociocultural, and economic variables affect fertility rates rather than examining them as indirect determinants of fertility rates, through their effect upon the proximate determinants of fertility. Still, these studies provide useful knowledge concerning the patterns of modern contraception in India.

In the 1950's, a project began in Khanna,

India in which for six years, an entire village was provided with nutritional supplements, public health, and medical care. Everyone was taught about contraception and the villagers were responsive to the health care workers and all the services that they brought. A positive outcome was that infant mortality fell considerably. Still, the fertility rate remained high. Eventually the health care workers realized that the reason for the consistent high fertility rate was that the Khanna people liked large families. The villagers were delighted that now, with lower infant mortality and more health care services, they could have the large numbers of surviving children that they desired (Mamdani 1972; Wyon & Gordon 1971). According to Mamdani, the Khanna contraceptive study conducted in the late 1950's failed because it was not economically profitable to limit family size. This supports Caldwell's (1982 152) theory of "Intergenerational wealth-flow." Caldwell argues that the import of Western ideas, particularly the recognition of the importance of the nuclear family and the subsequent acceptance of reversing the wealth flow in the direction of parents to children, brings about fertility decline. Once the wealth flow is in this direction, it becomes rational for the decline in fertility as children then incur costs to parents rather than provide advantages in terms of sources of wealth (care for elderly parents; actual labor provided, etc.). Economic development's role in fertility decline is that it may further the education within a country, thus increasing the import of western ideas, particularly those promoting the nuclear family and expenditures upon one's children (Caldwell 1982, 1999). Because India is largely rural, it is probable that there remains a wealth flow from children to parents, at least from sons (Visaria & Visaria 1997).

According to Bhende and associates (1991), determinants of method choice in India have been of little interest in research because the government has largely determined the methods that are available. This is supported by evidence that currently the government is promoting sterilization and IUD insertion as a means to lower fertility (Progressive Population Network 1995). However, a regional study of a national family planning program permitting contraceptive choice was conducted in an industrial city in the state of Bihar. Findings revealed

several factors as determinants of contraceptive use and method. Among the determining factors, religion/caste affected contraceptive use in that Muslims and Hindu scheduled castes had lower contraceptive use than the other 75 percent of the population. Muslims were less likely to use female sterilization than other nonpermanent methods. Hindus in scheduled castes had lower use of female sterilization, and other nonpermanent methods (condom and natural methods) than the remainder of the population. Reasons for lower contraceptive use among Muslims is due to religious nonacceptance of contraceptives. Second, husband's occupation was a factor determining contraceptive method choice, but not overall use. That is, professionals and managers preferred using the condom, while skilled, non-skilled, and all others, preferred female sterilization. Third, there's a strong positive relationship between wife's education and all nonpermanent methods of contraception, as well as a negative relationship between male and female sterilization (Miller 1986).

The overall level of education within a community has been found to have a positive effect on specific methods of contraception, regardless of the education level of the individual. Findings suggest that Roman Catholic women with moderate education or none at all, living in villages with a higher overall level of education, as opposed to those living in villages with very little overall education, make greater use of family planning methods, especially sterilization (Roy, Rao & Prasad 1991).

In examining the effect that modernization has on fertility in India, Srinivasan addresses modernization's effect upon increases in contraceptive use.

The use of modern methods of contraception for spacing or limiting the number of children is in itself an index of modernity. (Srinivasan 1988 97)

Srinivasan recognizes the variability between states in the success of family planning strategies. He contends that the factors determining this variability is that the delivery of services varies as well as do demand factors such as those determined by demographic and/or sociocultural characteristics of the population. In examining the factors that may affect contraceptive practices, Srinivasan (1988 98) collected "data on selected social, economic and health service variables" within 15 of the larger states of India. His findings point to the significant effect of "the number of auxiliary nurse-midwives per one million population" (Srinivasan 1988 101) as affecting the rate of contraceptive use among couples. He recognizes that although India is undergoing significant developmental changes due to industrialization, transportation, agriculture, etc., it is likely that the data used was inadequate in capturing these developmental factors, which may account for the lack of significance of these factors. Other factors such as female literacy, urbanization, and income level did not appear strong enough to determine changes in contraceptive use among couples (Srinivasan 1988).

Lerman's (1992) research on contraception in the developing country of Indonesia may provide evidence of factors relevant to contraception use in India. Although Lerman sought predictors of women's current contraceptive method as well as the type of service point selected, he addresses issues of supply and demand. Findings indicate that, in Indonesia, type of contraception service point selected is determined primarily by demand factors. These include both personal and social demand factors constrained by such characteristics as education, income, age, religion, value of children within the culture, as well as prominent cultural attitudes based on religion or politics. However, contraceptive method "choice" may be based more on government provided availability of varying contraceptive methods.

Lerman's (1992) findings indicate that contraception use increases with wife's education and with husband's professional employment. There was a negative relationship between contraception use and being Muslim. There is a positive relationship between contraceptive use and women employed and earning an income. In addition, contraceptive use was higher in economically depressed as well as advanced segments of the country (a curvilinear effect). In regards to predictors of method of choice, women are less likely to use IUD and sterilization as contraceptive methods when their husbands are employed in "sales, service, and manual occupations...than women whose husbands work in agriculture" (Lerman 1992 151).

The importance of education as a component of modernization for lowering fertility

rates in India is recognized as occurring through its effect on many factors, including its effect on the increased likelihood that educated women will be more likely to seek birth control information and contraceptives from family planning facilities and to correctly use them (Suri 1991). Education is also synonymous with increasing literacy rates. Female literacy as a predictor of fertility has been examined from several perspectives. First, female literacy is an indicator of the status of women and their subsequent ability to make their own decisions about their reproductive behavior and to seek information about contraception (Suri 1991). Second, in a society in which males are economically dominant, son preference is the norm (Miller 1986). Sons provide for security in old age and are also a source of status for women, who otherwise have very low status (Caldwell 1982; Miller 1986). These factors promote fertility, thus, increasing the likelihood of larger families (Miller 1986). Third, in line with Caldwell's wealth-flow theory (1982), fertility and female literacy rate have a close affinity because education results in increased exposure to Western ideas, including fertility norms of women from industrialized countries. Finally, research has indicated that educated women are purported to use more effective birth control methods.

Although some research has called for a reformulation of demographic transition theory, due to a lack of relevance for developing countries, still development/modernization remains a factor in declining fertility rates (Teitelbaum 1975).

Modernization can be defined as the process of transforming society from its traditional values to a modern set of values and associated behavior. (Srinivasan 1988 95)

Modernization's effect upon fertility rates is purported to occur through what has been termed developmental effects either linking, or interchangeably using the concepts of "urbanization," increasing "density," or "industrialization" (Firebaugh 1982; Srinivasan 1988; Suri 1991). Just as terminology has been diverse, so have the purported reasons for modernization's negative effect upon fertility rates. For example, urbanization has been posited to affect fertility rates through its effect upon positive attitudes towards birth control. Furthermore, as industrialization in-

creases and production moves outside the home, there is less need or value in having a large family (Suri 1991). Furthermore, high-density areas (characteristic of urban areas) have been found to aid the acquisition of contraceptive information (Collver, Speare & Liu 1967). Therefore, urbanization is expected to have a positive effect on contraceptive use as well as on contraceptive method.

HYPOTHESES

While it is evident that social factors affect modern contraceptive use, little attention is paid to the supply of health facilities as an objective element of availability, as well as an element of state structure that may affect contraceptive use. Logically, lack of availability of health facilities may act as an environmental constraint to lower fertility rates through its impact on the insufficient availability of contraceptives as well as insufficient information about contraceptives. The present research postulates that the exposure to contraceptive information is likely to increase the use of contraceptives. Knodel, Chamrathirong & Debavalya (1987) also recognize the importance of availability of resources in Thailand through the presence of government fertility programs promoting the diffusion of knowledge concerning the ability to control fertility as well as dissemination of contraceptive information. This is important since some prefer to argue that individual motivation, rather than differential access to modern contraception, is the primary determinant of fertility. We must surely recognize that while individuals do make choices, those choices are influenced by societal features that surround them. This is the very essence of sociology.

Lerman (1992) argues that the prevalence of contraceptive use is an important factor for lowering fertility rates as it is an area in which the government has some control. That is, the government allocates health facilities and family planning personnel. This provides the potential to influence personal considerations of both contraception use and method due to the ability to provide information and recommendations. Simmons (1992) also argues the need to recognize the importance of the availability or "supply" of government or private programs whose purpose is to reduce fertility. He posits that both supply considerations, in terms of family planning programs, as well as demand characteris-

Table 1 - Means, Standard Deviations, Value Ranges and Specification of State Extremes on Variables in the Analysis (31 State and Union Territories of India)

	Hosp	Disp	Pract	Nurses	%Hindu	%Muslim	%Castes	%Contra	Rate/ster	Rate/IUD	%Urban	Fem/Lit
Mean	17.19	52.46	528.19	274.14	65.34	11.95	12.23	23.82	40.46	21.35	27.02	31.6
Std. Dev	17.38	44.77	300.81	263.43	31.25	19.56	7.86	8.00	31.17	22.20	20.60	14.76
Range of values	1.36 to 77.98	2.88 to 200.00	240.06 to 1375.58	53.27 to 1044.19	3.1 to 96.20	0 to 93.70	.03 to 26.87	11 to 37	2.70 to 100.70	1.20 to 78.40	6.70 to 93.60	11.30 to 65.70
State Extremes												
Lowest	Naga-land	Naga-land	Utter Pradesh	Himachal Pradesh	Lakshadweep	Sikkim	Mizoram	Jammu & Kashmir	Naga-land	Mizoram	Arunachal Pradesh	Rajasthan
Highest	Goa, Daman & Diu	A.&N. Islands	Punjab	Punjab	Orissa	Lakshadweep	Punjab	Maharashtra	Pondichery	Punjab	Chandigarh	Kerala

tics, influenced by sociocultural and demographic characteristics, influence fertility. Myrdal (1968) recognized that, in conjunction with economic and social development, government sponsored availability and measures to spread contraception are the keys to lowering fertility rates. Yet studies are limited. Moreover, according to Tsui (1985), studies using World Fertility Survey data examine contraceptive availability from the perspective of "perceived availability" as this is the type of data available.

The present study postulates that the exposure to contraceptive information is likely to increase the total use of contraceptives, thus, it is hypothesized that availability (in terms of supply) of health facilities and health professionals is a predictor of contraceptive use (measured in terms of the percentage of reproductive-age couples using contraception). In addition, because India employs government policy promoting sterilization and IUD insertion, it is hypothesized that availability (in terms of supply) of health facilities and health professionals is also a predictor of sterilization and IUD insertion as contraceptive methods. Therefore, both choice to use contraception as well as method chosen would logically be affected by availability considerations.

DATA AND METHODS
Sample

MicroCase data set for India was utilized for this study. MicroCase is a complete statistical analysis and data management system created for social scientists. The MicroCase data set consists of aggregate data from the 31 states and "Union Territories" of India. There are 194 variables in the primary file, all converted into rates. A secondary file containing raw data has 291 variables. The data are from three sources, *India's Statistical Abstract*, the World Bank's 1990 report, "India: Trends, Issues and Options", and *The Statistical Pocket Book* (1990). A problem within the data is the underreporting from many states and territories. This has substantially reduced the number of cases in many of the models.

Variables

The models to be tested specified the effect of availability of contraception (in terms of health facilities and health professionals) on contraceptive use and choice of method

after controlling for a number of variables that might be related to both contraceptive use and choice of contraceptive method, and so might have rendered the relationship spurious. Table 1 presents descriptive statistics of the variables analyzed in this paper, indicating not only the means, standard deviations and ranges of all variables, but also indicating which states are in the extremes on each measure.

Dependent variables. Contraceptive use and contraceptive method are the dependent variables. The following three variables comprise the three dependent variables, with the first variable measuring "use" and the second and third variables measuring "method."

1. The percentage of reproductive-age couples using contraception (%CONTR) (Values range from 11 to 37 percent)
2. The rate (out of 1000) of the population sterilized (RATE/STER) (Values range from 2.7 to 100.7)
3. The rate (out of 1000) of IUD insertions (RATE/IUD) (Values range from 1.2 to 78.4)

Independent variables. The independent variable of interest is the "availability" of modern contraceptives. These variables were generated by dividing each independent variable of interest (the number of hospitals, dispensaries, practitioners and nurses) by the population and then multiplying by 1000. Each of the following four proxy variables for availability are expected to be positively related to contraceptive use and method:

1. The rate (per 1000 population) of hospitals (HOSP) (Values range from 1.36 to 77.98)
2. The rate (per 1000 population) of dispensaries (DISP) (Values range from 2.88 to 200.00)
3. The rate (per 1000 population) of practitioners (PRACT) (Values range from 240.06 to 1375.58)
4. The rate (per 1000 population) of nurses (NURSES) (Values range from 53.27 to 1044.19)

Control variables. Additional variables have been proposed within the literature to affect fertility rates and, therefore, have been included in the models. These include the female literacy rate, the extent of develop-

ment/modernization, the percentage of the population that is Muslim and Hindu, as well as the percentage of the population who are members of a scheduled caste.

Most studies indicate a close relationship between female literacy rate and fertility rates (Kapoor 1991; Srinivasan 1988; Suri 1991). The female literacy rate (FEM/LIT) of a population is expected to be positively related to both contraceptive use and method.

Urbanization (%URBAN) has been included as a control variable as a proxy for development/modernization. The theory of demographic transition was a catalyst to later affirming modernization's role in affecting fertility rates (Coale 1973).

The percentage of the population Muslim (%MUSLIM) and percentage Hindu (%HINDU) have been included as control variables. India's population in 1981 was 82.6 percent Hindu and 11.4 percent Muslim (India 1991). Within both Hinduism and Islam, artificial means of interfering with procreation are not well received. Furthermore, both are conservative religions, less tolerant of change, especially that from other countries. This dislike or distrust of change includes notions of contraception from other countries (Suri 1991). These religious values are factors that promote fertility and increase the likelihood of larger families. Therefore, the percentage of the population who are Hindu or Muslim is expected to have a negative effect on aggregate contraceptive use as well as on contraceptive method.

The percentage of the population who are a member of a scheduled caste (%CASTES) has also been included as a control variable. The caste system is a rigid system of inequality in which those who are "untouchable" are denied access to resources, including social advancement (Khare 1984). Because members of scheduled castes continue to experience social discrimination and deprivation, they are less likely to have access to contraceptive information. Therefore, the percentage of the population who are a member of a scheduled caste are expected to have a negative effect on aggregate contraceptive use and contraceptive method.

Analysis

Preliminary regression analysis employed ordinary least squares (OLS) regression with careful attention to influential outliers. Scatterplot matrices within the STATA sta-

Table 2 - Zero Order Correlation Matrix of Independent and Dependent Variables

	Hosp	Disp	Pract	Nurses	%Hindu	%Muslim	%Castes	Contra	Rate/ster	Rate/IUD	%Urban	Fem/Lit
Hosp	1.00											
Disp	0.64	1.00										
Pract	0.23	0.63	1.00									
Nurses	0.25	0.67	0.90	1.00								
%Hindu	-0.12	-0.64	-0.85	-0.83	1.00							
%Muslim	-0.36	-0.43	-0.35	-0.54	0.20	1.00						
%Castes	-0.54	-0.10	0.49	0.45	-0.62	0.04	1.00					
Contra	0.81	0.51	0.39	0.36	-0.06	-0.38	-0.47	1.00				
Rate/ster	0.10	-0.05	0.34	0.25	-0.10	-0.07	0.04	0.33	1.00			
Rate/IUD	0.37	0.77	0.80	0.80	-0.88	-0.48	0.42	0.24	-0.08	1.00		
%Urban	0.53	0.55	0.52	0.46	-0.22	-0.07	-0.19	0.73	0.49	0.22	1.00	
Fem/Lit	0.57	0.51	0.71	0.59	-0.35	-0.22	-0.09	0.85	0.42	0.40	0.83	1.00

tistical program were used to identify the presence of outliers (Belsley, Kuh & Welsch 1980). Because elimination of cases recognized as influential would have resulted in the elimination of a substantial number of crucial cases, an iteratively reweighted least squares (IRLS) procedure (a robust regression technique) was determined to be more suitable in analyzing the data. With each iteration, the IRLS procedure estimates the

regression parameters, calculates the residuals, and downweights cases with large residuals. The process repeats until weights no longer show much change. (Hamilton 1993 126)

Although IRLS does not permit comparison of the independent variables as coefficients cannot be standardized, this was deemed the most appropriate method as OLS results are biased due to leverage from outliers. The IRLS analyses were conducted using the statistical package STATA (Computing Resource Center 2001). Twelve models were estimated in which each of the availability variables and the control variables, that were not highly correlated, predicted to each of the three dependent variables.

RESULTS

Table 2 presents the zero-order correlation coefficients of the bivariate relationships between the independent and dependent variables analyzed. In all but three of the correlations between the independent and dependent variables the direction specified is supported. The direction of the relationship between the percentage of the population who are a member of a scheduled caste and the rate (out of 1000) of the population sterilized and between the percentage who are a member of a scheduled caste and the rate of IUD insertions is positive, but was predicted to be negative. The direction of the relationship between the rate of dispensaries and the rate of the population sterilized is negative, but was predicted to be positive.

The correlations indicate potential problems of multicollinearity. The relationships among the availability variables (dispensaries, hospitals, practitioners, and nurses) are naturally substantial. However, no more than one availability variable appears in any regression model at the same time. Also positively correlated are urbanization and female

Table 3 - Unstandardized and Standardized Coefficients for OLS Regressions on Dependent Variable indicators of Availability

	Rate/Contr		Rate/Ster.		Rate/IUD	
	b	B	b	B	b	B
	Model 1		Model 1		Model 1	
Rate/Dispensary	.0001	.3348	-.0000	-.0944	.0002	.2925*
%Hindu	.1090	.2657	.1905	.1758	-.0469	-.0598
%Muslim	-.2402	-.4599*	.2799	.1125	-.5014	-.2783*
%Castes	-.3512	-.2578	1.6624	.4092*	1.7070	.5804*
Rate/Fem.Lit.	.3809	.6262	.8549	.4098*	.5520	.3655*
	5df, N=16		5 df, N=26		5 df, N=26	
	Model 2		Model 2		Model 2	
Rate/Hospitals	.0002	.1914	.0007	.3263	-.0003	-.2036
%Hindu	-.0072	-.0175	.3887	.3508	-.1935	-.2425
%Muslim	-.2730	-.5228*	.5136	.2040	-.5342	-.2946*
%Castes	-.3834	-.2814	1.9850	.4846*	1.6228	.5500*
Rate/Fem.Lit.	.2727	.4483*	.7439	.3510*	.6277	.4113*
	5df, N=16		5df, N=27		5df, N=27	
	Model 3		Model 3		Model 3	
Rate/Practitioner	.0000	.3427	.0000	.0069	.0000	.9248*
%Urban	.4405	.3726*	2.0998	.5033	-.7856	-.3010
%Muslim	-.3142	-.6070*	-.1106	-.0605	-.4517	-.3952*
%Castes	-.8111	-.5507*	.7456	.1435	-.3690	-.1135
	4df, N=12		4df, N=12		4df, N=12	
	Model 4		Model 4		Model 4	
Rate/Nurses	-.0000	-.0688	-.0000	-.1529	.0000	.3436
%Muslim	-.6049	-.5022*	.4994	-.0984	-1.0755	-.3215
%Castes	-.4536	-.3472*	1.2541	.2279	1.1737	.3234
Rate/Fem.Lit.	.4366	.7782*	1.5206	.6431*	.2111	.1355
	4df, N=15		4df, N=15		4df, N=15	

*p<.05 (one-tailed test)

literacy rate. The strong positive correlation of .83 between urbanization and female literacy rate indicates redundancy in their measures. With one exception, it was decided that urbanization would be dropped from the models as literacy rate of females theoretically captures more precise causative dimensions of fertility declines. The exception in which female literacy rate was dropped and urbanization was left in the equations are those in which the availability variable, the rate of practitioners, is too highly positively correlated with the female literacy rate (0.71). Therefore, when the rate of practitioners is predicted to each of the three dependent variables, urbanization is placed in the equation as it is only moderately correlated with the independent variable, the rate of practitioners.

Collinearity is also a problem between the percentage of the population that is Hindu and the rate of practitioners, and between the percentage of the population that is Hindu and the rate of nurses. Because the percentage of the population that is Hindu and the rate of practitioners are too highly negatively correlated (-.85), and the percentage of the population that is Hindu and the rate of nurses are too highly correlated (-0.83), the percentage of the population that is Hindu has been dropped from the equations in which the two independent variables of interest, the rate of practitioners and the rate of nurses, are predicted to each of the three dependent variables.

Table 3 presents the robust regression coefficients on the indicators of availability.

The effect of availability on both contraceptive use and contraceptive method indicates only partial support for the second hypothesis, that availability of health facilities and health professionals is a predictor of the rate of sterilization and the rate of IUD insertion in the states of India. Availability was found to predict only the rate of IUD insertion, not the rate of sterilization. Moreover, only two of the four availability variables were significant predictors of the rate of IUD insertion.

The results for Model 1 & Model 3 predicting the rate of IUD insertions indicates that both the rate of dispensaries and the rate of practitioners within the population are significant predictors of the rate of IUD insertion within the population ($p < .05$, one-tailed test). As the rate of dispensaries and the rate of practitioners increases within the population, so does the rate of IUD insertion. However, availability does not support the hypothesis that "availability of health facilities and health professionals is a predictor of contraceptive use" as none of the availability variables are significant for the rate of contraception within the population (the percentage of reproductive-age couples using contraception).

As expected, there were other determinants of both the percentage of reproductive-age couples using contraception and the rate of sterilization and IUD insertion. As is apparent in Table 3, of the four independent variables regressed on the dependent variable, "contraception" (the percentage of reproductive-age couples using contraception), the female literacy rate was a significant predictor of the percentage of reproductive-age couples using contraception. In addition, in all models predicting "use" (the percentage of reproductive-age couples using contraception), the control variables "the percentage of the population Muslim" and "the percentage of the population who are a member of a scheduled caste" are negatively related, although not significant in Model 1. Therefore, in three of the four models predicting to contraception use (the percentage of reproductive-age couples using contraception), as the percentage of Muslim and percentage of Castes in society increase, the percentage of reproductive-age couples using contraception decreases. The female literacy rate was also a significant predictor of the rate of IUD insertion in the population in Model 1 and Model 2 in which the rate of dispensaries and the rate of practitioners

were the availability variables modeled. Urbanization, a proxy for development/modernization, was found to be a significant determinant of contraceptive method (the rate of the population sterilized and the rate of IUD insertions) when included in the model testing the rate of practitioners in the population as a determinant of each of the dependent variables. Percent Hindu was not found to be significantly related to the dependent variables of contraceptive use or method.

DISCUSSION AND CONCLUSION

This study sought to determine the effect that availability of health facilities and health professionals would have on total contraceptive use and specific contraceptive method. This study finds partial support for the hypothesis that availability of contraceptives in terms of the rate of health facilities and health professionals is a predictor of the rate of sterilization and rate of IUD insertion in the states of India. While the rate of hospitals and nurses did not increase the rate of IUD insertion or the rate of sterilization, the rate of dispensaries and the rate of practitioners did increase the likelihood of IUD insertion. None of the availability variables (hospitals, dispensaries, practitioners, and nurses) were a significant determinant of the percentage of reproductive-age couples using contraception or the rate of sterilization within India.

The importance of availability in effecting contraceptive use and method cannot be denied. Although this analysis does not overwhelmingly substantiate this claim, undeniably availability is an important factor in the realm of modern contraception. It appears that local availability (in terms of dispensaries) as well as the presence of doctors (practitioners) does result in an increase in IUD insertion. Beyond these specific findings, availability is important for two reasons. First, while often a change in norms is seen as one of the factors affecting the proximate determinants, especially contraceptive use, it might be argued that availability, in terms of progressive, accessible, fertility programs may also bring about a change in the norms of society. It must be recognized that often norms change in such a way that "what is, becomes what should be." That is, "what is, becomes what is normative." Second, because fertility is a social process, as the norms of society change, technology and re-

sources need to be available. In any case the support, albeit limited, of the findings that the rate of dispensaries and the rate of practitioners in the population affect the rate of IUD insertion as a method of contraception, suggests the importance of affecting choice of contraception method through availability of technology and resources.

As expected, and supported in prior research, female literacy rate, religion, and class distinction are important determinants of the rate of contraceptive use and method. The effect of the female literacy rate as a predictor of fertility and contraceptive use and has been examined from several perspectives. Female literacy is associated with an increase in the status of women and their ability to make their own decisions about fertility and to seek information about contraception (Suri 1991). In addition, according to Caldwell's wealth-flow theory (1982), fertility and female literacy rate are closely associated because education results in increased exposure to Western ideas, including fertility norms from industrialized countries. Finally, research has indicated that educated women are purported to use more effective birth control methods

Religion is another variable associated with contraception. Religion often promotes fertility. Especially important for India is that within Hinduism and Islam, both conservative religions, artificial means of interfering with procreation are not well received which means that it is expected to have a negative effect on contraceptive use. They are also less tolerant of change, including notions of contraception, from other countries (Suri 1991). Thus religion often increases the likelihood of larger families.

The caste system is a rigid system of stratification resulting in inequality and oppression. In such a system that exists in India, those who are "untouchable," members of the lowest class, are denied access to resources, including social advancement (Khare 1984). Because members of scheduled castes continue to experience social discrimination and deprivation, they are less likely to have access to contraceptive information.

Perhaps only finding partial support for the hypothesis that availability of contraceptives is a predictor of the rate of sterilization and rate of IUD insertion in the states of India may be accounted for by the inadequa-

cies in measurements and data. The proxies for "availability" may not capture the true effects of availability of fertility resources. Therefore, better measures might yield stronger results. Moreover, it is apparent that the data was less than adequate due to so few cases in the majority of the models. This was due to underreporting from many of the states. Although beyond the scope of the present research, the agenda for future research should examine fertility resources, "availability," in terms of actual family planning programs.

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