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Contraceptive Method's Use and Choice in Kerala and Uttar Pradesh: Multinomial Logit Analysis of NFHS Data

Introduction

HITHERTO, critics comprising population scientists, in general, and feminists, in particular, have often criticised India's Family Welfare Programme for it's overdependence, on female sterilisation and thus it's gender bias against women and have often propagated for involvement of males in sharing the burden of the family planning programme. Furthermore, the critics of India's Family Welfare/Planning Programme and it's population policies have often held the programme efforts to be mainly responsible for non-achievement of the desired demographic goals, especially on fertility front, and thus for the failure of arresting the accelerated population growth process in the Indian context (Banerjee 1974). Furthermore, several population scientists have criticised India's socipeconomic developmental policies and programmes for lack of concerted efforts for improvements on socioeconomic factors like health, education, employment, poverty, status of women, etc., which are certainly beyond family planning programme and adversely affect the demand side of fertility in the process of demographic/fertility transition (Bose 1993: 114).

Interestingly, whole gamut of programme/supply side as well as socioeconomic and cultural or demand side factors affecting fertility have often been highlighted for the slowdown of the fertility transition process in the Indian context. Nevertheless, the process of fertility transition has already been initiated throughout India (Visaria 1995). However, varying pace of fertility decline over geographical regions and socioeconomic and cultural groups have often been reckoned with, and prescriptions for quickening the fertility transition process in India, unfortunately, have often been based on either analysis of scanty data or personal whims and fancies of selected scholars. At times we have been getting prescriptions like 'Development is the Best Contraceptive' or 'Social Development

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is the Best Contraceptive' or some variants of the same for quickening the fertility transition process or arresting the accelerated pace of population growth process in the Indian context.

However, non-accordance of due credit to family planning efforts for curtailment of increase in natural fertility, have also been duly pointed out by population scientists (Srinivasan 1994). Rightly so, it was pointed out that a key linkage between socioeconomic development and fertility which must have slowed down India's fertility decline process has been the rise in natural fertility, the number of births that a woman would have if she used no contraceptives. Historically, the natural fertility in India has been only around 6 live births per lifetime, which is just half than the potential level or fecundity or the maximum observed in actual Hutterite population elsewhere (Rappetto 1994).

Despite the tradition of early and universal marriage in the Indian context we find historically religious and cultural restrictions on sex, prohibitions against widow remarriage, prolonged breastfeeding, malnutrition, and the effects of malaria, tuberculosis and other diseases must have largely contributed to the lownatural fertility. Togetherwith socioeconomic development, urbanization and westernization many of these cultural practices have weakened and because of improvements in general nutritional standards and medicare the life expectancy, morbidity and general health conditions have improved and thus natural fertility must have risen substantially. Some quick estimates of naturally fertility over period reveals an upward trend in the natural fertility from approximately 7 in the 1970s to almost 8 to 9 by 1991 (Srinivasan 1994).

The increase in the natural fertility as a consequence of socioeconomic development and weakening of cultural practices must also have been neutralised in addition to the apparent decline in actual fertility through the family planning efforts. It has also been contended that India's population growth during 1980s would have been 2.35 instead of 2.11 without the family planning programme efforts because of the increase in the natural fertility (Gulati, 1993). However, due credit to the programme efforts for neutralising the increase in the natural fertility should be apportioned and the extent of increase in natural fertility should be accurately estimated based on hard and reliable data to highlight the extent of programme efforts which might have gone into for the purpose.

Objectives of the Study

This study purports to highlight the relative significance of alternate factors affecting choice and current use of contraceptive methods in different socioeconomic and cultural settings of Kerala and Uttar Pradesh, which have been categorized as demographically most advanced and most backward states of India respectively.

It has often been contended that the mainstay of India's family planning/welfare programme has been the sterilization, especially female sterilization. Rather the Family Welfare Department has sometimes been categorised as Sterilisation Department because of it's predominant sterilisation-oriented approach. The suggested general prescription to bring the Programme out of sterilisation trap is to revamp the Family Planning Programme and concentrate more on spacing methods, give adequate consideration to

demand side factors viz. female education and female employment, age at marriage, status of women, provision of social security, improvements in health conditions,etc. The study, thus, intends to highlight specific important socioeconomic, cultural and demographic determinants of the choice and use of contraceptive methods in different socioeconomic and cultural settings of the two states. The multivariate analytical technique utilised for the purpose is multinomial logit analysis and empirical results are based on the NFHS data for the two states.

Methodology

The multinomial logit regressional technique facilitates in eliciting the effects of several predictor variables, which may be quantitative, categorical or mixture of the two, on the response variable which has more that two categories. It is the generalization of the binary logit model where the response variable is limited to only two categories such as use or nonuse of contraceptive methods or ownership or non-ownership of a car or basically yes/no kind of decisions on the part of the respondents. However, the categories of response variable in the multinomial logit model must be mutually exclusive and exhaustive which constrains all the respondents to fall in one and only one of the designated categories. The three categories of contraceptive method's choice in the present study are using temporary/spacing methods, using terminal/sterilization methods, and using no method. The Maximum Likelihood (ML) estimational procedure is adopted for eliciting parametric estimates of the structural coefficients of the model. Retherford provides detailed exposition of mathematical details of the ML estimational procedure, cautious interpretation of the estimated parameters, multiple classification analysis (MCA) based on the elicited parametric estimates, etc. in the multinomial logit analysis (Retherford and Minja,1993).

A brief presentation of the functional form of the multinominal logit model for the present study follows. The model consists of following two equations plus a constraint as follows:

$$\text{Log } (P_1/P_3) = A_1 + \sum B_{1j} * X_j \; ; \; j = 1, k; \qquad (1)$$

$$\text{Log } (P_2/P_3) = A_2 + \sum B_{2j} * X_j \; ; \; j = 1, k; \qquad (2)$$

$$P_1 + P_2 + P_3 = 1 \qquad (3)$$

where, P_1 is the estimated probability of using temporary methods, P_2 denotes the estimated probability of using terminal methods and P_3 is the probability of using no method. Obviously, the reference category in the present model is using no method category with probability P_3 and it may be noted that the three devised contraceptive use categories are mutually exclusive and exhaustive. Furthermore, k signifies the number of predictor variables (X_j's), which could be quantitative or qualitative or mixture of the two. Furthermore, the analysis in the present study is restricted only for currently married and married only once women who and are still within the reproductive age span of 14-49 years, to obviate the effects of marital distortions during reproductive career on the contraception behaviour.

The estimated structural coefficients (B_{ij}'s) by the Maximum Likelihood estimational procedure and their Mean values are in turn utilised to elicit the estimates of probabilities of use or nonuse of different methods of contraception as follows:

$$Z_1 = \exp (A_1 + \sum B_{1j} * X_j) \quad (4)$$
$$Z_2 = \exp (A_2 + \sum B_{2j} * X_j) \quad (5)$$
$$Z_3 = 1 + Z_1 + Z_2 \quad (6)$$

where the summations range from j=1 to j=k. Thereby the estimated probabilities of use or nonuse of different contraceptive methods are elicited as follows:

$$P_1 = Z_1 / Z_3 \quad (7)$$
$$P_2 = Z_2 / Z_3 \quad (8)$$
$$P_3 = 1 / Z_3 \quad (9)$$

The MCA table for adjusted values of P_i.'s is constructed by substituting appropriate combinations of ones, zeros, and mean values for the predictor variables (X_is) in the abovementioned estimated equations. The adjusted values are based on elicited parametric estimates for the complete model including all the predictors simultaneously. Alternatively, all the predictor variables are controlled at their mean values excepting the one whose effect is to be elicited at it's particular level. The elicited probabilities when multiplied by hundred provides estimates of specific contraception method use rates amongst respondents in the laid down categories. The Multiplication Classification Analysis (MCA) Tables for the purpose are also presented in the study.

The Data

Interestingly, the detailed NFHS data on several important aspects of fertility, family planning, health, and socioecortomic and cultural aspects of female respondents from all over India provides an excellent opportunity for highlighting interactions amongst these interrelated factors and thus would help in prioritisation of alternate factors affecting the basic demographic parameters in different socioeconomic and cultural settings of India. This analysis here has been limited to highlighting factors affecting choice and current use of temporary/spacing methods and terminal/sterilisation methods of contraception in the two states. Obviously, the analysis can be carried further to highlight factors affecting the choice and use of all the individual contraception methods with the multinomial logit analytical technique, and obviously for all the states too.

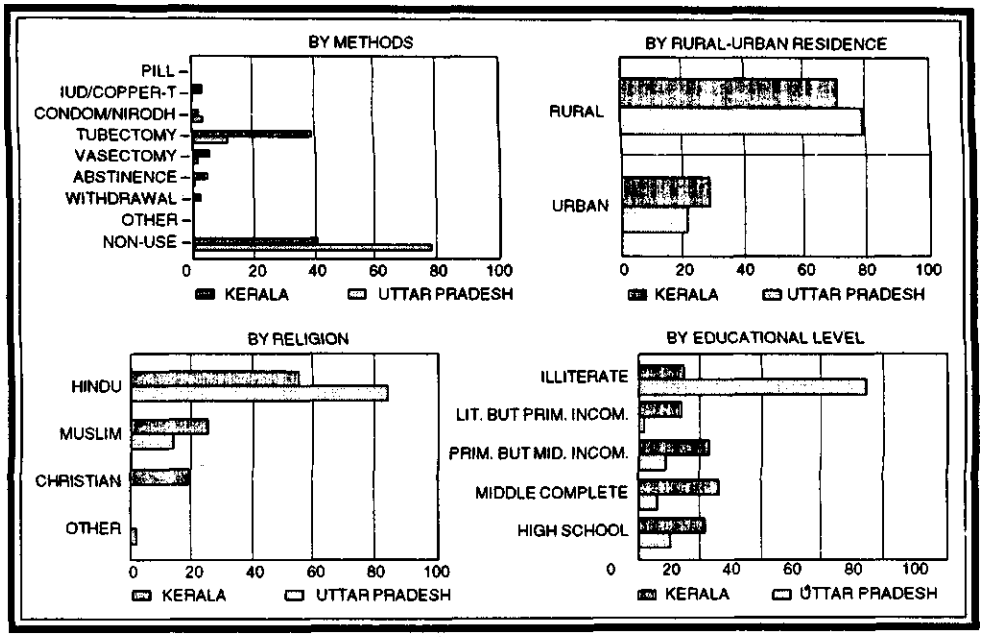
The present study also purports to analyze the effects of some important determinants of choice and use of contraceptive methods like rural/urban residence, religion of the respondent, educational levels and working status of the respondent, realised fertility and family's sex composition characterised by number of living children and number of living

sons, and number of children died depicting morbidity and mortality amongst children in the two states.

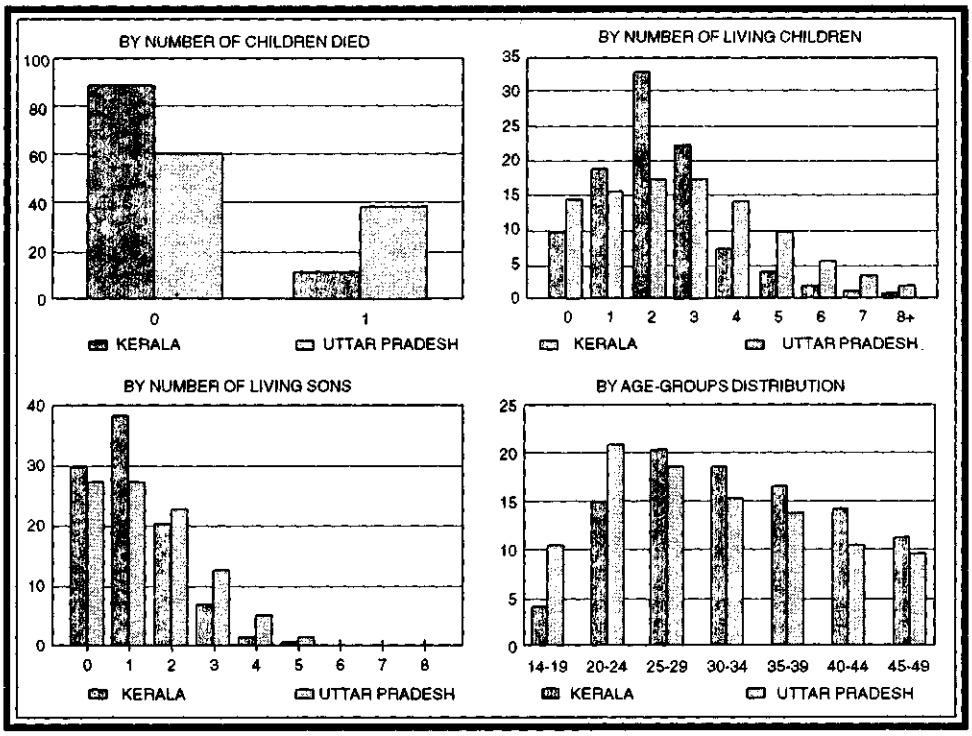
The quantitative variables in the present analysis pertaining to the female respondents are age of the respondent iny ears (AGE), number of living children (NLC), number of living sons (NLS), number of children died (NCD), etc. and categorical variables are rural/urban residence of the respondent (RES), religious categorisation of respondent like Muslim or Hindu or Christian or others (RELIGW); educational categories like illiterate (ILL), literate but primary incomplete (LBPI), primary but middle incomplete (PBMI), middle and above (MAA), rural/urban residence (RES) and respondent's working for money or otherwise (RWS).

In the analysis we have inducted squared term of number of sons (NLSSQ) to test whether the contraceptive use amongst respondents picks up after having some minimum number of sons or not, to highlight the extent of son preference in the Indian conditions which has often been talked about (Gulati, 1988: 102). Similarly an age-squared (AGESQ) term is inducted to test whether contraceptive use tends to increase with age upto some level and thereby it levels off or decline or not (Retherford,1993: 136). Thus, squared terms of age and number of living sons are inducted to test the threshold hypotheses for the two variables.

A comparative picture of the distribution of the female respondents by different characteristics under the purview of the present study for the two states viz. KeraJa and Uttar Pradesh, is presented in Graphs 1 and 2.



Graph 1. Percent Distribution of Female Respondents in Kerala and U.P.



Graph 2. Percent Distribution of Female Respondents in Kerala and U.P

Perusal of the Graph 1 reveals that contraceptive use of temporary methods comprising Pill, lUD/CuT, Condoms, Periodic Abstinence and Withdrawal turns out to be 23.9 percent in Kerala compared to 33.4 in Uttar Pradesh whereas extent of sterilisation comprising both male and female turns out to be 76.1 and 66.6 for the two states respectively. It is interesting to observe that female sterilisation predominates in both the states.

Rural/Urban distribution of the female respondents in the Graph reveals that in Kerala almost 28 percent the respondents are from urban areas compared to 20 percent in Uttar Pradesh. The religious distribution of female respondents in the Graph reveals that almost 26 percent of female respondent are Muslim and about 20 percent are Christians in Kerala where the percentages turn out to only 13.6 and 1.8 respectively in Uttar Pradesh. The extent of literacy in Kerala is significantly higher than in Uttar Pradesh. Rather 47 percent of the female respondents are middle and above in Kerala compared to just 14.9 percent in Uttar Pradesh as shown in the Graph. Extent of infant and child mortality is much lower in Kerala compared to Uttar Pradesh. Almost 88 percent of respondents in Kerala have not reported death of any child compared to only 62 percent in Uttar Pradesh. Furthermore only 2.4 percent of respondents have reported death of two or more children in Kerala compared to 16.8 in Uttar Pradesh.

Information on demographic parameters viz. age structure, realised fertility and family's sex composition, is presented in Graph 2. Perusal of the Graph 2 reveals that almost 62 percent of female respondents have reported number of living children to be 2 or less in Kerala compared to 47 percent in Uttar Pradesh. Furthermore respondents with three or more surviving sons in Kerala turn out to be only 10.5 percent compared to 21.2 percent in Uttar Pradesh indicating that extent of son preference seems to be significantly higher in Uttar Pradesh compared to Kerala. On age structure we find that proportionate respondents in 14-19 years age group in Kerala is only 4.0 percent compared to 10.8 in Uttar Pradesh as per Graph 2. It is basically because of low marriage age patterns in Uttar Pradesh compared to Kerala and since the respondents selected are based on the criterion of being currently married we find that proportions in 14-19 years have turned out to be higher in Uttar Pradesh compared to Kerala.

Mean values and some other descriptive statistics of all the predictor variables are provided in the Appendix Table 1.

Parametric Estimates of the Multinomial Logit Models for Kerala and Uttar-Pradesh

The estimated coefficients of the Multinomial Logit Regression Model outlined in the text for Kerala and Uttar Pradesh are presented in Tables 1 and 2, respectively. The coefficients under Log(Pl/P3) depicts effects of predictor variables on use of the temporary/ spacing methods over no use of the contraceptive methods and similarly under Log(P2/ P3) depicts the effects on use of terminal/sterilization methods over no use of the methods. An aesterik after a coefficient depicts its significance at one percent level and two asteriks depict the significance at 5 percent level.

It may be noted that the sign of the coefficient should be cautiously interpreted in the Multinominal Logit Model. Generally, a positive sign depicts an increase in the ratio of use of particular method over non-use and vice versa. Nevertheless, the positive sign in the Multinominal Logit Model depicting increase in the ratio could also be under typical situation where there is actual decline in both the use as well as non-use of the particular method but the ratio of the two may still increase (Retherford 1993: 153). Thus the effects of the predictors on the choice and use of temporary and terminal methods or no method would be elicited through estimation of the probabilities of use in the MCA Table 3 in the subsequent sections.

Multinomial Logit Regression Results for Kerala

The structural coefficients and their standard errors alongwith their levels of significance for Kerala are presented in Table 1. Perusal of Table 1 reveals that all the estimated structural coefficients pertaining to all the predictor variables, excepting respondent's working status (RWSD) and child's death in the family (NCDD), have turned out to be highly significant. Alternatively, the effects of all the predictor variables excepting female employment for renumeration and infant's death in the family in Kerala depict significant effect on the

TABLE 1: MULTINOMIAL LOGIT REGRESSION COEFFICIENTS AND THEIR STANDARD ERRORS FOR THE MODEL: LOG(P_1/P_3) = $A_3 + S B_{ik} * X_k$ J = 1, 2 & k = 1, 13; FOR THE CURRENTLY MARRIED BUT MARRIED ONLY ONCE WOMEN AGED 14-49 YEARS FOR KERALA

Prredictor Variable	Log (P_1/P_3)		Log (P_2/P_3)	
	Coefficients	*Standard Error*	*Coefficients*	*Standard Error*
INTERCEPT	-8.436*	.912	-15.739*	.812
RURAL/URBAN RESIDENCE: (RESD)	-0.219**	.114	-0.243*	.093
RELIGION:				
(RELIC. D1) Hindus/Muslims (RELIG. D2) Others/Muslims	0.824* 0.979*	.151.173	1.994* 1.819*	.121.142
EDUCATIONAL CATEGORIES:				
(EDURLBPID) LIT BUT PRIM INC	0.553**	,286	0.256**	.141
(EDURPBMID) PRIM BUT MID INC	0.932*	.259	0.299**	.132
(EDURMAAD) MIDD & ABOVE	2.100*	.246	0.230*	.128
WORKING WITH MONEY OR OTHERWISE:				
(RWSD)	0.153	.133	0.027	.099
NUMBER OF CHILDREN DIED:				
(NCDD)	-0.125	.152	-0.109	.082
NUMBER OF LIVING CHILDREN:				
(NLC)	0.265*	.061	0.547*	.044
NUMBER OF LIVING SONS:				
(NLS)	0.426*	.123	1.046*	.091
(NLSSQ)	-0.122*	.034	-0.245*	.022
AGE IN YEARS:				
(AGE)	0.319*	.055	0.762*	.051
(AGESQD)	-0.005*	.001	-0.011*	.001
STATISTICS:				
N	2327		3616	
-2 Log L_1	2257.92		3592.43	
~2 Log L_0	2630.75		5007.57	

use of temporary as well as terminal methods of contraception. Surprisingly, the working of women with money has not depicted any significant effect on contraception use rate when we control of other important predictors in the present study. Possibly, some further investigations would facilitate in highlighting the reality as the result is quite contrary to general expectations.

The directions of effects of all the predictor variables have turned out to be consistent with general expectations. The use of temporary as weM as terminal methods of contraception is found to be significantly lower in rural areas compared to the urban ones.

Surprisingly, the use of temporary as well as terminal methods is found to be significantly higher amongst Hindus as well as Other religious communities compared to Muslims, even when we control for all other important predictors of contraceptive use. Furthermore the use of terminal methods or sterilization is significantly higher amongst Non-Muslim respondents compared to the Muslim respondents. Thus, overall use of contraceptive methods and especially sterilization turn out to be significantly lower amongst Muslims compared to Non-Muslims even in the state of Kerala, which is demographically most advanced state of India.

Coming to educational categories we find that use of temporary as well as terminal methods is significantly higher amongst literate and higher educated respondents compared to the illiterate ones. Furthermore, the use rate of temporary methods goes up alongwith education as depicted by the increasing magnitude of coefficient in the educational categories. Still further we find a sudden jump in the use rate of temporary methods amongst respondents with educational levels middle and above. Thus, educational level of middle level seems to bring about significantly higher and positive impact on the use of temporary methods of contraception.

Coming to realised fertility characterised by the number of living children (NLC) we find that the use of temporary as well as terminal methods of contraception goes up alongwith the number of living children. Furthermore, the effect on use of terminal methods/ sterilization turns out to be much higher compared to the use of temporary methods.

Basically the deep rooted son-preference phenomenon in the Indian society is found to depict significant effect on use of temporary as well as terminal methods even in state like Kerala, which is considered to have much higher levels of education. Furthermore, we find the effects of son preference on use of terminal methods is much more profound compared to temporary ones. Interestingly, we find that the quadratic effect of number of living sons (NLSSQ) turn out to be significant and negative depicting that there exists a threshold level of number of sons beyond which the use rates level off. A much better picture would emerge when we come to the estimated probabilities in the subsequent sections. It may be of interest to mention that the correlations between the explanatory variables like NLC, NLS and NLSSQ turned out to be less than the pseudo-R square values of the multinomial logit regressions (not reported here) and thus the problem of multicollinearity amongst such confounding variables is not expected to cause any problem towards significance of the estimated parameters.

The age of the respondent (AGE) also depicts significant and positive impact on use of temporary as well as terminal methods of contraception. Furthermore, we find the quadratic effect (AGESQ) also turn out to be significant and negative for both the categories of contraception depicting that the use rate goes up alongwith age upto a point or threshold level and beyond that age the use rate levels off or may even decline (Retherford, *et al*,, 1993: 142).

TABLE 2: MULTINOMIAL LOGIT REGRESSION COEFFICIENTS AND THEIR STANDARD ERRORS FOR THE MODEL: LOG $(P_j/P_3) = A_j + \Sigma B_{jk}*X_k$; j = 1, 2 & k = 1, 13; FOR THE CURRENTLY MARRIED BUT MARRIED ONLY ONCE WOMEN AGED 14-49 YEARS FOR UTTAR PRADESH

Prredictor Variable	Log (P_1/P_3)		Log (P_2/P_3)	
	Coefficients	*Standard Error*	*Coefficients*	*Standard Error*
INTERCEPT	-8.869*	.753	-17.271*	.787
RURAL/URBAN RESIDENCE: (RESD)	-0.958*	.094	-0.385*	.086
RELIGION:				
(REL1G D1) Hindus/Muslims	0.343*	.123	1.760*	.143
(RELIG D2) Others/Muslims	0.823*	.235	2.117*	.254
EDUCATIONAL CATEGORIES:				
(EDURLBPID) LIT BUT PRIM INC	0679*	279	0.671*	.192
(EDURPBMID)PRIM BUT MID INC	1,147*	.129	0.637*	.111
(EDURMAAD) MIDD & ABOVE	1688*	.106	0.659*	.104
WORKING WITH MONEY OR OTHERWISE (RWSD)	-0.123	.152	0.020	.106
NUMBER OF CHILDREN DIED:				
(NCD)	-0.231*	.052	- 0.205*	.026
NUMBER OF LIVING CHILDREN:				
(NLC)	0.145*	.034	0.145*	.024
NUMBER OF LIVING SONS:				
(NLS)	0.445*	.094	1.865*	.102
(NLSSQD)	-0.083*	.019	-0.299*	.019
AGE IN YEARS:				
(AGE)	0.443*	.047	0.677*	.043
(AGESQD)	-0.007*	.001	-0.008*	.001
STATISTICS				
N	9629		10436	
-2 Log L_1	4483.3		6611.6	
-2 Log L_0	5564.9		9003.2	

Multinomial Logit Regression Results for Kerala

The elicited parametric estimates of the Multinominal Logit Model for Uttar Pradesh are presented in Table 2. Perusal of Table 2 reveals that all the estimated structural coefficients excepting pertaining to respondent's working status (RWSD), have turned

out to be highly significant. Interestingly we find that children's deaths in the households, which did not depict any significant effect on contraceptive's use in Kerala, has also turned out to depict significant and negative effect on use of temporary as we\\ as terminal methods in Uttar Pradesh. Possibly, the levels of infant mortality in Kerala have come down to so low levels that exceptional deaths in the households does not depict any significant impact on the mindset of respondents and thus does not depict any impact on their fertility or contraceptive use behaviour in Kerala, whereas in Uttar Pradesh the effect is still significant. It may be of interest to note that the direction of effects of all the predictor variables have turned out to be consistent with general expectations, as have noted and discussed for Kerala in the earlier section. Thus, precision and significance of all the structural estimates of the Multinomial Logit Model for Uttar Pradesh turn out to be consistent with general expectations and thus the interpretation of the results stands similar to that of Kerala's estimated structural coefficients.

Estimated Probabilities of Use or Nonuse of Temporary and Terminal Methods of Contraception in Kerala and Uttar Pradesh

Estimated probabilities of use or non-use of different contraceptive methods viz. use of temporary/spacing methods *(P1)*, use of terminal/sterilization methods *(P2)* and no-use of any method (P3), based on elicited parametric estimates of the Multinomial Logit Models (Table 2) and the Mean Values of predicator variables presented in Appendix Table 1. The MCA Table of Adjusted values of probabilities of Use or Non-use is presented in Table 3.

The adjusted values are based on the complete model including all predictor variables simultaneously. The values in Table 3 are obtained using the estimated coefficients in Tables 1 and 2, the Mean values of other predictors, and the specific value of the particular predictor against which the estimated probabilities are elicited.

The significant features emerging out of the Table 3 are that the adjusted values of Pj's are in close correspondence with the elicited multinominal logit regressional estimates in Tables 1 and 2. Interestingly, the religious differentials in the use rates of sterilization are significantly lower for the Muslims compared to the Hindus and the other religious groups in both the states of Kerala as well as Uttar Pradesh. Furthermore, in Kerala we find that non-use of any contraceptive method amongst Muslims turn out to be almost 73 percent compared to around 35 percent amongst non-Muslims. Thus, the use rates of contraceptives are considerably lower amongst Muslims compared to other religious communities despite controlling all the important predictors of fertility and contraception.

Education beyond middle level plays significant role in the widespread use of temporary/spacing methods in both the states of Kerala as well as Uttar Pradesh. However, the acceptance rates of terminal methods of contraception viz. sterilization, are not remarkably different between different educational categories, when other predictor variables are controlled. But certainly the use of spacing or temporary methods of contraception improves significantly amongst respondents with education above middle level.

TABLE 3: MCA TABLE OF ADJUSTED VALUES OF PROBABILITIES OF USE OR NON-USE i.e. Pj 's, FOR THE MODELS IN THE TEXT FOR CURRENTLY MARRIED BUT MARRIED ONLY ONCE' WOMEN AGED 14-49 YEARS IN KERALA AND U.P.

Predictor Variable	*Kerala's*				*Uttar Pradesh's*			
	N	P_1	P_2	P_3	*N*	P_1	P_2	P_3
Residence:								
Rural	3022	.122	.408	.473	8940	.081	.086	.832
Urban	1182	.133	.451	.415	2307	.181	.108	.710
Religion:								
Muslims	1071	.112	.157	.730	1535	.082	.026	.891
Hindus	2300	.119	.539	.341	9505	.099	.130	.769
Others	833	.150	.485	.365	200	.144	.166	.688
Education:								
ILL	655	.037	.408	.554	8446	.033	.060	.906
LBPI	600	.057	.459	.483	227	.060	.108	.831
PBMI	967	.079	.458	.462	891	.092	.101	.805
MAA	1982	.222	.374	.403	1683	.149	.097	.753
Number of Children Died:								
0	3713	.125	.421	.454	7004	.104	.091	.803
1	491	.118	.400	.481	4243	.086	.081	.833
Number of Living Children :								
1		.132	.255	.611		.090	.101	.808
2		.141	.360	.498		.103	.094	.801
3		.141	*All*	.381		.118	.087	.793
4		.132	.593	.274		.135	.081	.783
Number of Living Sons:								
0		.110	.296	.593		.076	.024	.899
1		.132	.457	.411		.112	.101	.785
2		.119	.530	.350		.115	.224	.660
3		.111	.496	.392		.107	.294	.598
Age in Years:								
15		.075	.024	.900		.031	.001	.968
25		.148	.351	.500		.134	.038	.828
35		.116	.595	.287		.139	.175	.684
45		.111	.362	.525		.047	.202	.750
Total Respondents:		Kerala: 4204				Uttar Pradesh: 11247		

Surprisingly, gainful employment of women for pecuniary reasons does not depict any significant effect on use of contraceptive methods. Possibly, some further categorisation of female workers in occupational hierarchy like menial and professional categories may depict some effect on the use of contraceptive methods. Further analysis for the purpose is essential.

A uniform direct relationship between the level of mortality and the level of fertility and thus contraception use rates has often been highlighted in the literature. Perceived risk of child mortality amongst couples heightens the fertility levels because of it's pronatalistic effects viz. amenorrhoea effect, replacement effect and insurance effect (Mahadevan 1989). The similar tendency is discernible from the Table as contraceptive use rates for temporary as well as terminal methods are higher amongst respondents who have not experienced any child's death in the households compared to those who have.

Interestingly, the contraceptive use rates for both temporary as well as terminal methods tend to move up alongwith age (AGE), number of children (NLC), and number of living sons (NLS) in both the states of Kerala as well as Uttar Pradesh. It is interesting to observe that jumps in the use rates of contraceptive methods, especially terminal methods, are much higher even at younger ages i.e. at 25 years, in the Southern State of Kerala compared to the higher jumps at 35 years in Uttar Pradesh. Thus, despite higher age at marriage in Kerala we find the widespread use of contraceptive methods, especially terminal methods at younger ages depict shortened span of childbearing in Kerala compared to prolonged childbearing till late age in Uttar Pradesh.

It is interesting to note that extent of son preference in Kerala is much lower compared to Uttar Pradesh. In Kerala we find that jumps in the use rates, especially of terminal methods, are remarkable higher even after having one son, whereas similar jumps in the use rates occur in Uttar Pradesh only after having two or three sons. Further details over the strong son preference in Uttar Pradesh compared to Kerala are revealed through desire for sex of the additional child which reveals that almost 40 percent of the respondents in Kerala are indifferent about the sex of the additional desired child, whereas in Uttar Pradesh the percentage is only 14. Thus, higher intensity of son preference in the Northern states compared to the Southern states, may be because of socioeconomic reasons or cultural reasons, need further investigations. Furthermore, we find that number of living children don't make any marked difference in the use rates of contraceptive methods in Uttar Pradesh whereas in Kerala we do find some improvements in the use rates alongwith the number of children. But the jumps in the use rates is much higher alongwith the number of sons compared to the number of children. Thus, it is not only size of the family but also its sex composition which affects significantly the fertility and the contraceptive use behaviour in the Indian context, and more so in Uttar Pradesh or the Northern States compared to Kerala or the Southern states.

Conclusions

The study clearly highlights that contraceptive use rates are significantly lower amongst the Muslims compared to the Hindus and the other religious groups, despite controlling all the important predictors of contraceptive use behaviour. Rather the use of terminal methods or sterilization is almost negligible amongst the Muslims. Thus, focused attention is to be paid in areas which are predominantly inhabited by Muslims for improvements in the contraceptive use rates and in turn reduction in their fertility.

Though the parental preference for male children seems to be a world-wide phenomenon. However, the extent of son preference is noted to be markedly high in the Indian context. The regional differentials in India are depicted as the extent of son preference is much higher in Uttar Pradesh comapred to the Southern state of Kerala. To quicken the fertility transition process it is essential to mitigate the desire for having at least two sons through measures like higher female education and employment and thus improvement in women's status. Furthermore, introduction of social security systems and insurance schemes, curbing of cultural and religious practices enhancing son's status should also affect the extent of son preference in India. Since desire for having at least two sons would result into expected family size of four under the presumption of no tempering with the sex ratio at birth through inhuman measures like female foeticide through amniocentesis.

Female education beyond middle level depicts significant effect on the usage of contraceptive methods thus it is higher education and not just literacy amongst women which can bring about results in terms of wider usage of contraceptive methods and reduction in fertility. In Kerala we find that more than 47 percent of the female respondents were middle and above, which has brought good results for widespread contraceptive use and lowering of fertility.

Infant mortality needs priority attention since improved survival chances of the new born children would certainly help in curbing the pronatalistic effects of higher infant mortality viz. amenorrhoea effect, replacement effect and insurance effect, and thus would augment usage of contraceptive methods and facilitate fertility reduction process.

The study clearly highlights that the regional strategies should concentrate on the region specific predominant determinants of alternate methods of contraception. It could focus attention on some specific religious groups concentrated in some regions and which are not coming forward for usage of contraceptive methods and thus have higher fertility. It could be concentrated efforts for higher female education and employment in areas where sociocultural practices are coming in the way of mitigation of son preference.

The study clearly highlights that improvements in general health conditions and thus reduction in infant and child mortality which helps in higher use of contraceptive methods. However, mortality and morbidity reduction is an important objective in itself apart from its positive effects on contraceptive use and fertility reduction.

References

Banerjee, D.. 1974, Family Planning in India: Some Inhibiting Factors. *In:* Ashish Bose *etal.* (eds.), *Population in India's Development:1947-2000.* Vikas, New Delhi.

Bose, Ashish, 1993, *India and the. Asian Population Perspective.* B. R. Publishing Corporation, Delhi. Chopra, K. and Gulati, S. C., 1993, Population, Poverty and Environmental Degradation: The Role of Property Rights.

Background Paper, Second India Revisited Project, World Resource Institute, Washington. Gulati, S.C., 1987, Some reflections on son preference and it's influence on additional desired fertility. *Demography*

India, 20(2). Gulati, S. C., 1988, *Fertility in India: An Econometric Analysis of Delhi Metropolis Survey Data.* Sage Publications,

Delhi.

Gulati, S. C., 1992, India's Population Growth Without Contraception During 1980s. Working Paper, Institute of Economic Growth, Delhi.
Mahadevan, K.(ed.), 1989, *Fertility Policies of Asian Countries*. Sage Publications, New Delhi. Mahadevan, K.. and Sumangala, M., 1987, *Social Development, Cultural Change and Fertility Decline: A Study of Fertility Change in Kerala*. Sage Publications, New Delhi. Repetto, Robert, 1994, *The Second India Revisited: Population, Poverty, and Environmental Stress over Two Decades*. World Resource Institute, Washington. Retherford, Robert D. and Choe, Minja Kirn, 1993, *Statistical Models For Causal Analysis*. John Wiley & Sons, Inc., New York. Srinivasan.K., 1994, Demographic Transition in India since 1970-Trends and Correlates. Background Paper, Second India Revisited Project, World Resource Institute, Washington. Visaria, Pravin and Visaria, Leela, 1995, Accelerating Fertility Transition in India During the 1980s: Trends and Determinants. Working Paper No. 66, Gujarat Institute of Development Research, Ahmedabad.

Appendix

TABLE 1: DESCRIPTIVE STATISTICS OF SELECTED VARIABLES UNDER STUDY FOR KERALA AND UTTAR PRADESH

Abbreviated Name of Predictor Variable	*Kerala*				*Uttar Pradesh*			
	Mean	*Std. Dev.*	*Min.*	*Max.*	*Mean*	*Std. Dev.*	*Min.*	*Max.*
RESD	1.73	.45	0	1	1.79	.40	0	1
RELIGD1	.55	.50	0	1	.85	.36	0	I
RELIGD2	.20	.40	0	I	.02	.13	0	1
EDURLBPID	.14	.35	0	1	.02	.14	0	1
EDURPBBMD	.23	.42	0	1	.08	.27	0	1
EDURMAAD	.47	.50	0	1	.15	.36	0	1
RWSD	.25	.43	0	1	.08	.27	0	1
NCDD	.12	.32	0	1	.38	.48	0	1
NLC	2.34	1.62	0	13	2.85	2.06	0	12
NLS	1.17	1.10	0	8	151	134	0	8
NLSSQ	2.57	4.44	0	64	4.06	5.98	0	64
AGE	32.83	8.40	14	49	30.55	9.10	14	49
AGESQ	1148	565.4	196	2401	1016	588.1	196	2401