FERTILITY AND RCH STATUS IN UTTARANCHAL AND UTTAR PRADESH: A District Level Analysis

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AND UTTARANCHAL: A District Level Analysis

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Abstract

India's accelerated population growth since 1951 emanated from sharp declines in mortality without concomitant declines in fertility. The National Health Policy in 1983 had laid down specific targets for fertility reduction to replacement level by year 2000. This study attempts to highlight the linkages between fertility and other crucial reproductive and child health (RCH) components viz. antenatal care, safe deliveries and children's immunization; and other socio-economic and demographic profiles at the district level in Uttar Pradesh and Uttaranchal. This study elicits districtwise reproductive health status indices. The study highlights relative significance of alternate predictors of fertility in the districts of Uttar Pradesh and Uttaranchal. The database for the study is drawn from district level surveys conducted under RCH programme during 1998 and 1999, Censuses, Planning Commission's documents, and Center for Monitoring Indian Economy (CMIE). The study reveals that RCH Care utilization and women's empowerment depict strong inhibitive impact on fertility. Furthermore, focussed attention on the Muslim dominated districts towards better utilization of RCH care and contraception would bring about fertility reduction and facilitate faster achievement of population stabilization goals.

Keywords: Reproductive and Child Health, Women's Empowerment, Fertility.

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I. INTRODUCTION

India's accelerated population growth since 1951 was on account of sharp declines in mortality without concomitant declines in fertility. The National Health Policy in 1983 had laid down specific targets for fertility reduction, which aimed at replacement level fertility by year 2000. Despite concerted efforts in the form of national programmes on family planning, child survival and safe motherhood, mother and child health, universal immunization of children, etc. which were intended to impact fertility through its crucial determinants; these have however not succeeded in bringing down fertility to the replacement levels for India. However, replacement level fertility levels have been achieved in some larger states like Kerala and Tamil Nadu and smaller territories like Goa, Delhi, Chandigarh, Nagaland, Pondichery, etc. The medium-term objective enshrined in the National Population Policy document released in March 2000 clearly specifies that fertility must reach replacement level by 2010 through vigorous implementation of inter-sectoral operational strategies (National Population Policy, 2000). The state of Uttar Pradesh (UP) with the largest population size and highest fertility levels is the focus of attention in the attempted realization of the National Population Policy goals.

Paradigm shifts in India's population policies from those that were contraceptives-mix target oriented to the target free approach in April 1996 followed thereby by the client-centred-demand driven community needs assessment (CNA) approach during late 1997 have led to an emphasis on the RCH services package. Stress on the same has been reiterated in the population policy statement of Uttar Pradesh. A comprehensive definition of RCH was deliberated at length and adopted at the ICPD conference at Cairo in September 1994. Control of reproductive tract infections (RTIs) and sexually transmitted diseases (STDs) was an important ingredient for reproductive morbidity control in the RCH package. The comprehensive definition of 'reproductive health ' implies a state of complete physical, mental and social well being and not merely the absence of disease or infirmity in all matters relating to the reproductive system and to its functions and processes. Thus, control of RTIs and STDs becomes an important component of the UN resolution under its RCH care package.

The RCH package comprises several key components like contraception, basically meant for safe and satisfying sex life; treatment of infertility; prenatal, natal and post-partum care for the mother; psychological preparation of adolescents through information, education and communication (IEC) for sexual and reproductive life; control and treatment of RTIs, HIV/AIDS, etc., conditions, which have reproductive morbidity and mortality implications. All these components have a significant effect on the functions and processes of the reproductive system of both men and women. The interlinkages existing between these key components and the determinants of incidence of women’s RTIs or STIs is the focus of the present study.

GoI's new approach of re-orienting the reproductive health programme and strengthening the services at the out-reach level requires a decentralization of planning, monitoring and an evaluation of services at the micro levels, viz. state, district, block, etc. Keeping in view these objectives, GoI decided to generate district level data on the utilization of reproductive and child health services that are provided by government health facilities as also people's perception of the quality of these services. Generation of district level data was facilitated through the rapid household survey (RHS) covering 50% of the districts in the country every year beginning 1998. Thus, district level data for all reproductive

health parameters could be collated from the first two phases of the survey during 1998 and 1999, which covered all the districts as of 1991, which stretched over 25 states and 7 union territories.

The demographic backwardness of UP is characterised by most demographic parameters such as: high fertility with a total fertility rate (TFR) of 4.8; relatively much higher levels of infant mortality of 85 per thousand births; maternal mortality ratio of 707; much lower level of contraceptive prevalence rate of 38%; etc. Furthermore, UP's performance for reproductive and child health (RCH) parameters like utilization of complete antenatal care is only 5% compared to India's 15%, children's complete immunization is just 17% compared to India's 53%; the unmet need for contraception is 47% compared to India's 27%, almost completed fertility characterised by the mean children ever born to currently married women aged 40-44 years turns out to be 5.8 compared to India's 4.5 (IIPS, 1999).

It is clear therefore, that UP being the largest state in terms of it's population size, it's 166.4 million, comprising 17% of India's population; it's demographic backwardness needs to be the focus of attention and concerted efforts need to be made towards achievement of the National Population Policy's medium term goal of bringing down fertility to the replacement level by 2010 (GoI, NPP, March 2000).

UP's population policy statement released in July 2000 reiterated the National Population Policy's strategies to be adopted for a faster decline in fertility and thus control of the excessive population growth in the state. The strategies include: decentralised planning and programme implementation by ensuring active participation of *panchayats;* co-operatives, governmental and non-government organizations; women's socio-economic upliftment and empowerment; enhancement of the marriageable age for girls and boys; meeting the unmet needs for family welfare services; ensuring mother and child health and survival by providing quality health care services; etc. However, the major objective enshrined in the state's policy statement is to help people achieve their desired family size, bring about a reduction in infant and maternal mortality rates, which are considered to be unacceptably high in UP, and streamline reproductive and child health services. However, the overall objective of containing rapidly increasing population by bringing down fertility to replacement level by 2016 has been enshrined in the population policy statement issued by the Government of Uttar Pradesh (GoUP, July 2000).

Data on RCH parameters from the survey and other socioeconomic and demographic profiles have been taken from alternate sources like censuses, Center for Monitoring Indian Economy (CMIE), other district level studies, etc. for all the districts of Uttar Pradesh and have been utilized for the econometric analysis in the present study.

II. OBJECTIVES OF THE STUDY

This study attempts to highlight interlinkages between district level fertility, contraception, marriage age patterns, crucial reproductive and child health components namely antenatal care, institutional deliveries, home deliveries attended by trained professionals or *dais;* and extent of children's immunization, with socio-economic and cultural variables like women's education and employment and district's overall economic development, road-infrastructure, and religious compositional characteristics. Thereby, the study purports to elicit districtwise reproductive and child health status (RCH) indices to identify demographically sensitive districts, which may be focussed upon to bring about faster improvents on the demographic front. Thereafter, the study intends to highlight significant factors affecting fertility variations in the districts of Uttaranchal and Uttar Pradesh.

III. METHODOLOGY

Through factorial investigations interlinkages between fertility, contraception usage, marriage age patterns, reproductive and child health care utilization, socio-economic profiles and cultural factors are established. The factorial investigations facilitate semi-quantitative insights into the linkages and help in selection of the relevant variables for eliciting the districtwise composite indices. Districtwise RCH status indices will then be elicited using the Principal Component analytical technique. The indices would facilitate in an identification of the demographically sensitive districts that need to be concentrated upon to bring about optimal results towards population control and stabilization. Thereafter, predictors of district level fertility variations would be highlighted and the relative significance of alternate predictors will help in the identification of factors to be focussed upon to bring about faster population control in the demographically backward districts of Uttaranchal and Uttar Pradesh.

IV. ECONOMETRIC BASE OF THE STUDY

The district level database for demographic and RCH indicators has been compiled from district level reports of the Rapid Household Survey under the Reproductive and Child Health (RCH) project conducted during 1998-9 by the Government of India which was sponsored by the World Bank. The fertility characteristics under study are percent births of order 3 and above over three years prior to the survey (PBO3+). The fertility characteristic of child women ratio (CWR) has been elicited from Census 2001. Marital patterns are characterised by percent girls married below 18 years of age during three years prior to survey (PGMB18). Contraceptive usage patterns are elicited by percent couples using any family planning method (PCUFPM).

The RCH components brought under the purview of the present study are percent pregnancies occurring 3 years prior to the RCH survey in which antenatal care was used (PPANC). Similarly, delivery care characterised by percent safe deliveries (PSD) i.e. attended by trained professionals whether delivery took place in a health institution or at home. Furthermore, the extent of children's immunization is characterised by percent children born during the three year period before the date of the survey, are more than one year in age and are completely immunized (PCWCI). Incidence of reproductive tract infections is characterised by percent females suffering from RTIs (PFSRTI). This is interlinked with most of the demographic and socio-economic characteristics and has also been brought under the purview of the present study.

Women's empowerment enabling factors are characterised by women's literacy rate (FLR) and

women's work participation rate (FWPR). Extent of urbanization in the district is characterised by percent population living in urban areas (PURB). Furthermore, extent of road infrastructure is characterised by percent villages not connected by all-weather or *pucca* roads (PVNCPR). Overall economic development of a district was characterised by an index based on 12 underlying developmental variables depicting agricultural, industrial and tertiary sectoral indices. Religious composition of the districts characterised by percent Muslim population (PMUS) was picked up from the census.

Detailed description of the 14 variables, predominantly drawn from RHS-RCH district level survey reports, under the purview of the present study and a summary statistics of the variables are presented in Appendix Tables 1 and 2. The sources of data are RHS-RCH district level reports, censuses, CMIE, and author's earlier studies in which districtwise overall economic development indices were evolved.

V. RAPID HOUSEHOLD SURVEY - REPRODUCTIVE AND CHILD HEALTH: SURVEY DESIGN

The RCH survey design had selected around 50% of the districts numbering 252 in the first phase during 1998. The districts stretched over 25 states and 7 union-territories of India. The remaining districts were selected in the second phase of the project in 1999. Thus, data for all the districts of India was collected during 1998-9.

The survey based data was collected through a sample design adopted for eliciting representative samples of 50 primary sampling units (PSUs) through a probability proportional to size (PPS) sampling procedure. This had a rural-urban composition proportional to the district's population being rural or urban, whereby the mapping and listing of the selected village/ward PSUs provided a sampling frame for the selection of 22 households from each of the PSUs through the circular systematic sampling procedure. The multi-stage stratified sampling procedure was adopted to ensure self-weighting patterns for the selected respondents from rural and urban PSUs. The non-sampling errors were kept under check through proper monitoring, supervision, spot-check, back-checks, etc. of the selected households in each PSU.

VI. STRUCTURAL LINKAGES AMONG THE SELECTED VARIABLES

Semi-quantitative insights into the interlinkages between fertility and other selected socio-demographic and reproductive and child health utilization factors will be highlighted through the factorial investigations. The list and descriptive statistics of the selected variables is provided in Appendix Table-1. The number of factors retained in the analysis are only three as per Kaiser's criterion of Eigen values greater than unity (Harman, 1960). The varimax rotated factor structure is presented in Table 1.

Perusal of the factor matrix reveals that most of the variables in the purview of the present study have been duly represented in the structure. The extent of communalities vary between.59 for higher order births (PBO3P) to .88 for child women ratio (CWR). Other reproductive and child health underlying characteristics, socio-economic characteristics are duly represented in the form of three elicited factors. The interlinkages and identification of the elicited factors are briefly discussed as follows.

Table 1: Varimax Rotated Factor Structure for the Selected Variables

Variable	Factor Loadings on Variables			Communality
	F-I	F-II	F-III	
1. PBO3P	**-.74**	.02	-.16	.57
2. CWR	**-.92**	.08	-.18	.88
3. PGMB18	**-.78**	-.24	.38	.82
4. PCUFPM	**.87**	.01	.14	.77
5. PPANC	.20	-.07	**.86**	.79
6. PSD	**.56**	.38	**.57**	.79
7. PCWCI	**.69**	-.38	.07	.63
8. PFSRTI	.01	.17	**-.79**	.65
9. FLR	**.78**	.09	.12	.64
10. FWPR	.43	**-.73**	.08	.72
11. PURB	.42	**.79**	.09	.81
12. PMUS	-.34	**.64**	-.25	.59
13. DDIO	.30	**.87**	.04	.86
14. PVNCPR	.01	**-.83**	.13	.71
Eigen-Values:	5.05	3.49	1.68	

VII. IDENTIFICATION OF THE FACTOR STRUCTURE AND LINKAGES

Perusal of the first factor (F-I) reveals that the underlying or predominant constituents of the first factor (F-I) are characteristics such as fertility; marriage age patterns, contraception, and delivery care utilisation and children's immunisation. It may be of interest to mention that all the predominant constituents depict consistent linkages such as fertility (PBO3P and CWR) depicts an inverse association with marriage age patterns. Alternatively, districts with a lower age at marriage or higher percent of girls marrying below 18 (PGMB18) depict inverse association with fertility. Furthermore, a higher usage of contraception (PCUFPM) depicts negative association with fertility and positive association with contraception. Interestingly, we find that the higher utilisation of delivery care and children's immunization depicts a negative association with fertility. Alternatively, the delivery care and children's immunization impacting neonatal and post neonatal components of infant mortality, respectively, and thus overall reduction in infant and maternal mortality, depict a negative association with fertility characteristics.

The underlying constituents of the second factor (F-II) depict that women's work participation rate (FWPR) and overall economic development (DDIO) are strongly linked with each other. Districts with a higher percent of Muslim population (PMUS) depict lower participation of women in the workforce. Extent of urbanization (PURB) depicts a positive association with the utilization of delivery care or extent of safe deliveries (PSD). It may be of interest to mention that a lack road connectivity (PVNCPR) depicts an inverse association with overall economic development. The development of road infrastructure in districts of Uttar Pradesh, especially hilly district, can lead to higher economic development and higher utilization of delivery care.

The main constituents of the third factor (F-III) turn out to be utilisation of mother's care namely, antenatal (PPANC), delivery care (PSD), and linkages with the incidence of RTIs amongst women. It may be of interest to mention that districts depicting a higher utilization antenatal and delivery care depict a lower incidence of reproductive and tract infections (PFSRTI) amongst women.

The exact nature of linkages, magnitude of effects and the relative significance of different socio-economic, demographic, and RCH components on the levels of fertility would be explored in the later section through a parametric estimation of the multiple linear relation.

VIII. DISTRICTWISE RCH-STATUS INDICES

The factor analytical approach has been utilized for constructing the RCH-status composite indices for all the 63 districts of Uttar Pradesh. These districts were covered under the RHS-RCH project sponsored by the MoHFW. Six district level reproductive and child health key underlying characteristics alongwith demographic variables have been selected for eliciting the composite indices. The variables selected are: (i) child-woman ratio (CWR), (ii) percent births in last 3 years of birth order 3+ (PBO3P), (iii) percent couples using any contraceptive method (CUAM), (iv) percent girls married below 18 years of age (PGMB18), (v) percent safe deliveries during last three years prior to survey (PSD), and (vi) percent children born over last three years and currently over one year of age who have been fully immunized (PCWCI). Summary indices of the selected variables are provided in the Annex Table 2.

The six indicators have been revealed to be highly interlinked and fall within the purview of the MoHFW. The composite indices would facilitate the identification of such districts, which are demographically backward or sensitive, and need special attention in the attainment of the national objectives of fertility control and early population stabilization.

IX. FACTOR STRUCTURE OF THE SIX SELECTED INDICATORS

The evolved factor structure of the seven interconnected variables based on the Kaiser criterion of Eigen value greater than unity is presented in Table 2. Interestingly, the selection of six RCH indicators and demographic variables was such that all of them seem to depict strong interconnectedness and the number of retained factors turns out to be just one. The Eigen roots of the correlation matrix of the six variables depict that only the first Eigen value turned out to be 3.52 and all others were less than unity resulting into retention of just one factor which accounts for almost 59 percent of the inter-district variations in the selected indicators. The elicited factor structure or component matrix is presented in Table 2.

Table 2: Factor Structure of Six Selected RCH Indicators for RCH-Status Index

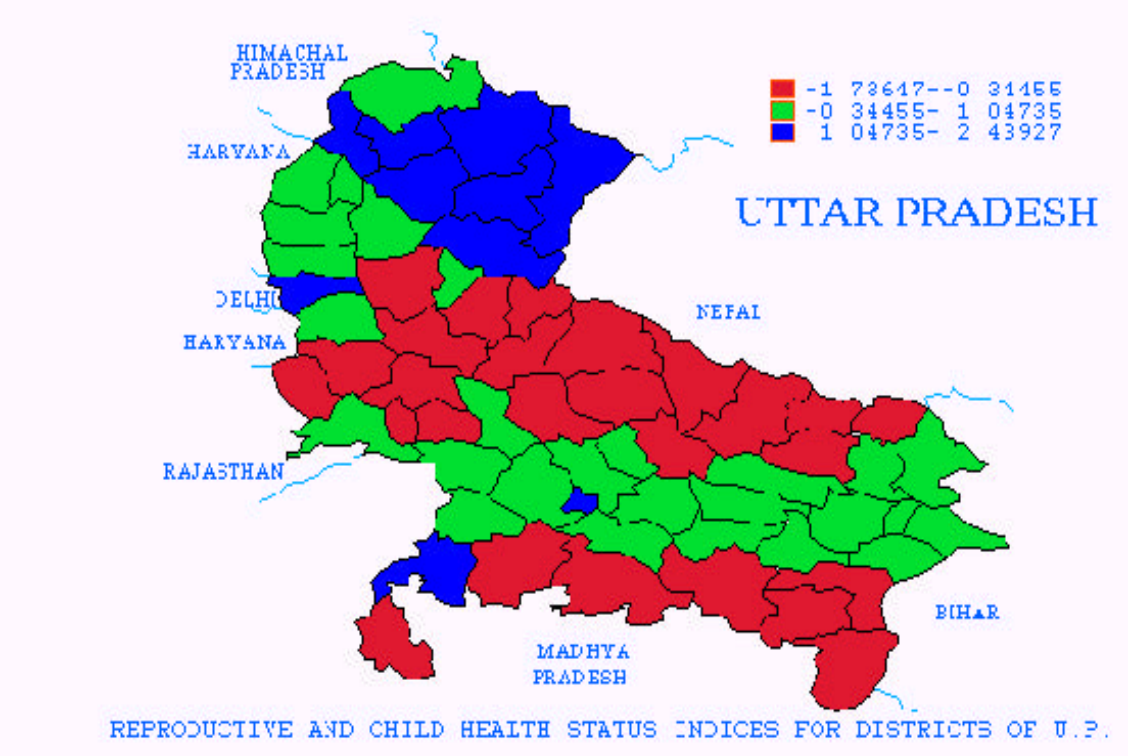
Variable	Component	Communality
1.Child Women Ratio (CWR)	-.923	.853
2.Percent Births of Order 3+ (PBO3+)	-.782	.611
3.Percent Couples Using Any Method (CUAM)	.734	.539
4.Percent Girls Marrying Below 18 (PGMB18)	-.738	.544
5.Percent Safe Deliveries (PSD)	.638	.407
6.Percent Children With Complete Immunization (PCWCI)	.758	.574
Eigen Value	3.528	

The nature of linkages amongst the six selected variables turn out to be consistent with the general expectations. Districts with a higher usage of contraception depict a lower fertility characterized by the child woman ratio as well as percent births of order 3+. Furthermore, the lower age at marriage depicted by the higher percentage of girls marrying below 18 years of age depicts the promotive impact on fertility and inhibitive impact on usage of contraception. Furthermore, districts depicting a higher extent of safe deliveries depict relatively stronger linkages with fertility, contraception, and age at marriage.

It may be of interest to mention that factorial investigations do not presume any cause and effect relationship. It is possible that a higher utilization of delivery care facilities bwer infant and maternal mortality and which in turn motivates a higher usage of contraception by couples to control fertility because of the sense of confidence imparted regarding the survivability of children and mothers. Thus, districts with higher factor scores based on the elicited factor structure or factor loadings depict a better performance on the RCH care utilization front and demographic advancement. Alternatively, districts with higher factor scores depict a better status compared with districts with lower scores and thus lower RCH status. Interestingly, the factor solution entailing just one factor also depicts that the factor structure is not subjected to any orthogonal or oblique rotation and thus the elicited factor solution turns out to be unique. The elicited factor score coefficients for all the districts of Uttaranchal and Uttar Pradesh are presented in Appendix Table 3. The scores depicting RCH status of the districts will have the inbuilt characteristics of zero mean and unit variance. Interestingly, the factor solution entailing just one factor also depicts that the factor structure is not subjected to any orthogonal or oblique rotation and thus the elicited factor solution turns out to be unique.

X. DISTRICTWISE RCH-STATUS INDICES OF UTTAR PRADESH AND UTTARANCHAL

Mapping of the composite RCH-status indices is presented in the following map-1. It is observed that most of the hilly districts have a good status on the demographic and reproductive health care utilization front. Dehradun is placed at the top with RCH-status index of the order of 2.4. Other hilly districts doing well are Garhwal (2.20), Almora (2.11), Chamoli (1.92), Nainital (1.88), Pithoragarh (1.82), Tehri-Garhwal (1.41), and Utttar Kashi (1.00). Some other districts doing well on the demographic and RCH front are Kanpur Nagar (2.23), Jhansi (1.21), Ghaziabad (1.19), Lucknow (.93), and some other districts like Hardwar, Mathura, and Agra.



MAP 1

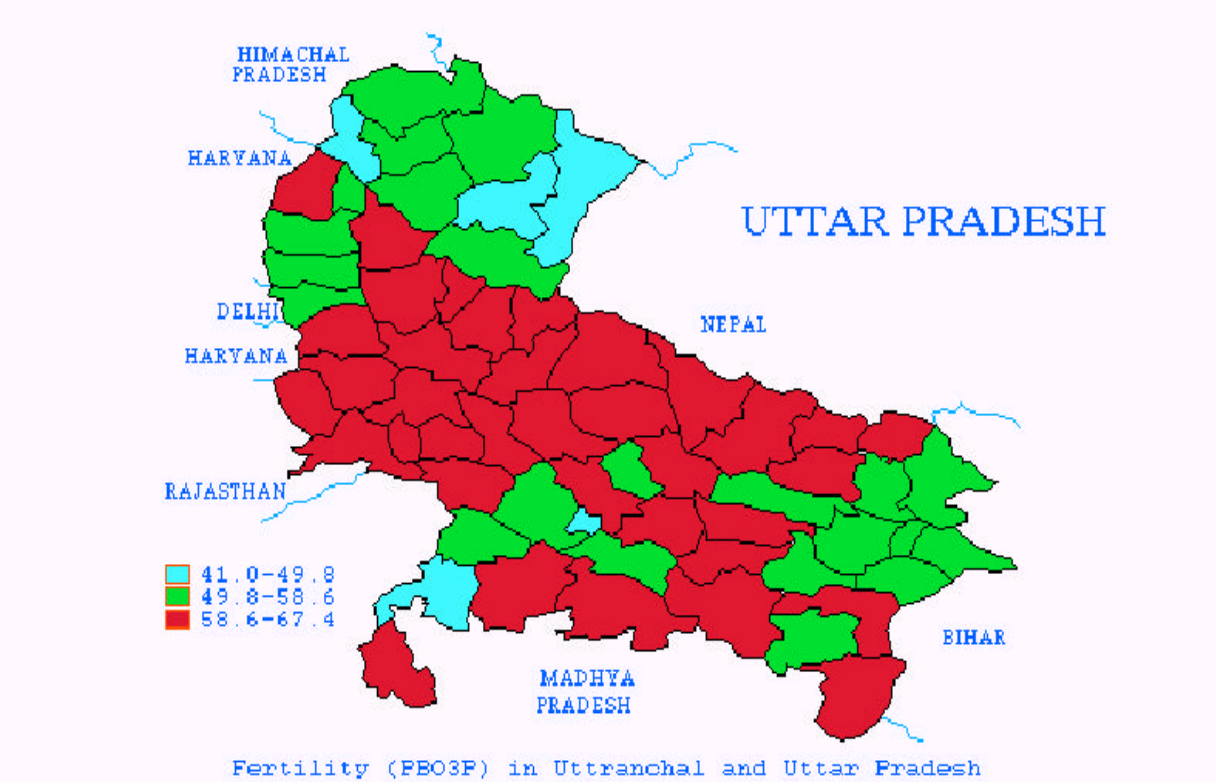
Demographically sensitive districts, which are found to be on the lower rungs of the RCH-status scale, are Bahraich (-1.74), Budaun (-1.67), Siddharthnagar (-1.43), Etah (-1.32), Gonda (-1.20), Maharajganj (-1.14), and Sonbhadra (-1.05). Other districts, which are found to be demographically backward, are Firozabad, Bareilly, Moradabad, Allahabad, Aligarh, Mirzapur, etc.

Overall we find that hilly districts do much better on the RCH-status scale compared with districts that stretch over the plains of Uttar Pradesh. Furthermore, within the plain districts that districts with a higher percentage of Muslim population are comparatively worse compared to other plain districts.

XI. DISTRICTWISE HIGHER ORDER BIRTHS IN UTTRANCHAL AND UTTAR PRADESH

A districtwise profile of the percent of higher-order births (PBO3P) amongst currently married women aged 15-44 years from RCH surveys in 1998-9 has been presented in Map 2 to highlight the regional configuration of fertility in Uttar Pradesh. It may be of interest to mention that most of the fertility characteristics, namely higher order births, child women ratio, crude birth rate, total fertility rate, etc. depict strong linkages and rank order correlations between them are highly significant. Rather usage of these alternate fertility characteristics has often been found in the official documents to highlight fertility variations. The regional configuration of the extent of higher order births is presented in the district level map.

Map 2: Districtwise Higher Order Births (PBO3P) in Uttar Pradesh



MAP – 2

The district level map for higher order births (PBO3P) clearly reveals that most of the hilly districts depict much lower levels of fertility compared with districts of Uttar Pradesh. Furthermore, within the Himalayas we find that hilly districts like Almora (46.4) and Pithoragarh (47.6) depict low levels of fertility alongwith Dehradun in the foothills of Himalayas. The general fertility levels are much lower in hilly districts compared to the district in the plains of Uttar Pradesh. Within plain areal districts we find that districts in the western parts of Uttar Pradesh depict relatively higher levels of fertility compared to the eastern parts. However, within the eastern parts we find that the districts of Ballia (55.57) and Mirzapur (55.7) depict high levels of fertility. Further, most of districts in the high fertility category in western Uttar Pradesh turn out to be dominated by Muslims inhabitants like Bulandshahar, Budaun, Bareilly, Shahjahanpur, Aligarh, Bahraich, Kheri, etc. However, the nature of linkages between

fertility and religious affiliation will be highlighted using multivariate analytical techniques in the coming sections.

Interestingly, we find that there are only two districts, namely Jhansi and Kanpur Nagar; among the original 58 districts of Uttar Pradesh in the study which depict a lower fertility than the three in low fertility category from the hilly districts.

XII. PARAMETRIC ESTIMATES OF FERTILITY EQUATION

The parametric estimates of the multiple regressional equation of the birth order 3 and above (pbo3+) have been presented in Table 3. Selection of the explanatory variables was partly facilitated through a scanning of the correlation matrix among the variables and also through an examination of the factor structure, which enabled accounting for the problem of multicollinearity.

The structural analysis through the parametric estimates highlights the exact nature of linkage and the magnitudes of the effects of different explanatory variables under consideration.

Among demographic and reproductive health components we find that usage of contraceptive methods depict a significant and negative impact of fertility. Furthermore we find that percent safe deliveries signifying extent of professional attendance at the time of birth, whether in health institutions or in homes, depict a significant and negative impact of fertility. Here the role of trained birth attendants for deliveries at homes due to cultural considerations have often been linked with enhancement in safe deliveries amounting to reduction in maternal mortality. The extent of immunization amongst children impacting the predominantly post-neonatal component of infant mortality also depicts a significant and inhibitive impact of fertility.

Table 3: Parametric Estimates Of Multiple Regression Model For PBO3+

Explanatory Variable	B-Coeff.	Beta Coeff.	T-Value	Significance Level
PGMB18	.001	.029	.19	.85
PCUFPM	**-.273**	-.450	-3.34	.00
PPANC	.023	.064	.44	.66
PDS	**-.192**	-.272	-1.92	.06
PCWCI	**-.125**	-.306	-2.41	.19
CFLR	.003	.067	.56	.58
FWPR	**-.142**	-.287	-1.99	.05
PMUS	**.199**	.338	2.82	.01
PVNCPR	-.023	-.078	-.61	.54
HDUM*	2.528	.149	.87	.39
CONSTANT	79.225		14.81	.00
R-Square = 0.594**, N** = 67				

Note: * HDUM: Hill-Dummy with value 1 for hilly districts and zero otherwise.

Women's participation in the workforce depicts significant and inhibitive impact on fertility. Thus, gainful employment of women which enables their empowerment seems to be an important factor in increasing women's autonomy and thus in the lowering of fertility.

Perusal of the parametric estimates reveals that percent Muslim population (PMUS) depicts a significant and positive impact on fertility. Alternatively, districts with higher Muslim population proportions or Muslim dominated districts depict significantly higher fertility compared with other districts despite accounting for important predictors like usage of contraception, women's empowerment enabling factors like women's education and work-participation, utilization of RCH care like antenatal and delivery care, etc. in the multiple regress- ional equation. An earlier study also depict that other fertility related issues like usage of contraception and reproductive and child health care is lower in Muslim dominated districts not only in Uttar Pradesh and Uttaranchal but also in districts over other parts of India (Gulati S C and Sharma Suresh, 2001) Similarly, incidence of RTI's is also higher in the Muslim dominated districts compared to the other districts. The results dearly suggest that the Muslim dominated districts have higher fertility and thus need a targeting of fertility curtailment and population stabilization objectives.

Hill dummy (HDUM) has been introduced to capture the difficult terrains in the hilly districts compared with districts stretched over the plains of Uttar Pradesh and Uttranchal. Possibly, the outreach of reproductive and child health services becomes difficult in the hilly terrains and otherwise also we find lack of social infrastructural facilities in the hilly terrains all over India. However, we find that even introduction of a hill dummy has neither improved the explanatory power of the model nor is it statistically significant. Possibly, the impact has been picked up by other predictors already under the purview of the study.

XIII. SUMMARY AND POLICY IMPERATIVES

The analysis highlighted linkages between fertility and other select components of RCH with other socio-economic and demographic variables. Interestingly, we find that fertility depicted significant linkages with all the parameters under the purview of the study. The direction of the linkages with all the variables turned out to be consistent with general expectations such as negative with age at effective marriage and usage of contraceptive methods, positive with the incidence of RTIs/STDs, negative with the women's status characteristics like education and work participation, etc.

The factorial investigations highlighted strong interconnections between fertility, marriage age patterns, usage of contraception, antenatal care, safe deliveries, and female literacy and other components of RCH care like utilisation of antenatal care, safe deliveries, and children's immunization. Furthermore, we find that overall economic developmental characteristics and road-infrastructure developmental variables also depict strong linkages with fertility and RCH care utilization characteristics.

The multiple linear regressional equation of fertility (PBNO3+) with select explanatory variables depicts that usage of contraception depicts a significant and inhibitive impact on fertility. Reproductive health care utilization characteristics like extent of safe deliveries and children's immunisation depict a significant and inhibitive impact on fertility. Possibly, reproductive health care utilization such as antenatal and delivery care is responsible for the lowered neonatal component of infant mortality and thus lowered infant mortality bears a negative impact on fertility. Furthermore, women's empowerment enabling factors like female education and work-participation also depict a significant and inhibitive impact on fertility. Interestingly Muslim dominated districts depict higher levels of fertility despite accounting for other important predictors in the fertility equation.

The relative significance of alternate predictors of fertility adjudged by standardized regression coefficients reveals that usage of contraception plays the most significant role towards containment of fertility. The unmet need for both spacing and limiting methods of contraception depict a lot of scope for family planning programme strategies to increase the usage of contraception to facilitate further reduction in fertility. Furthermore, we find that the provision of better reproductive health care like safe deliveries and children's immunization can play an important role in fertility reduction. Provision of quality RCH-care services to improve the quality of life has been one of the most important components of the Family Welfare Programme especially after the ICPD conference.

The results clearly suggest that we should strive for integrated health and family welfare programme to control fertility. Usage of contraception and reduction in maternal and infant mortality have often been highlighted as important predictors of fertility in the theoretical and empirical literature. Thus, the widespread availability and utilization of RCH care like antenatal and delivery care and children's immunization should be prioritised alongwith family planning programme to control fertility and thus, population stabilization. Women's status and overall economic development also reveal a strong impact on fertility reduction and RCH care utilization. However, focussed attention on the Muslim dominated districts towards better utilization of RCH care and contraception and thereby fertility reduction and population stabilization is also indicated.

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APPENDICES:

Appendix Table-1: List Of The Selected Variables

No	**Abbreviation**	**Description of the Variable**
1	PBO3P	% Births of Order 3+
2	CWR	Child women ratio
3	PGMB18	% Girls Married Below 18 Years of Age
4	PCUFPM	% Couples Using Family Planning Methods
5	RCANC	% Mothers Received Complete Antenatal Care
6	PDS	% Deliveries Safe
7	PCWCI	% Children (12-23) With Complete Immunization
8	PFSRTI	% Women Suffering From RTIs
9	FLR	% Females Literate
10	FWPR	Female Work Participation Rate
11	PURB	Percent Urban Population
12	PMUS	% Muslim Population
13	DDIO	District's Development Index
14	PVNCPR	% Villages Not Connected By *Pucca* Road

Appendix Table-2: Summary Statistics for the Selected Variables

No.	Variable	Mean	Std Dev	Minimum	Maximum
1	PBO3P	58.10	6.06	36.20	67.40
2	CWR	462.42	61.87	309.28	567.42
3	PGMB18	45.74	21.32	5.6	83.80
4	PCUFPM	31.31	10.01	13.80	53.10
5	RCANC	46.77	16.49	14.40	80.80
6	PDS	21.23	8.58	6.90	47.10
7	PCWCI	46.80	14.83	18.80	82.60
8	PFSRTI	36.03	10.44	19.70	58.00
9	FLR	46.29	12.00	23.27	88.64
10	FWPR	15.12	12.78	1.75	49.59
11	PURB	19.05	14.80	3.50	84.20
12	PMUS	15.37	10.73	.50	47.95
13	DDIO	-.24	.42	-.86	.91
14	PVNCPR	40.92	20.77	0.00	84.50

Appendix Table 3: **INDICES AND SELECTED VARIABLES OF DISTRICTS IN UTTAR PRADESH AND UTTARANCHAL**

	DISTRICT*	UPRCHINB	PBO3P	CWR	PGMB18	PCUFPM	PPANC	PSD	PCWCI	PFSRTI	FLR	FWPR	PURB	PVNCPR	PMUS	DDIO	ANM
Uttaranchal																	
1	Hardwar	.70857	56.5	458.80	12.5	39.0	40.5	55.0	48.2	47.4	52.60	4.10	31.0		30.07	-.24	57.45
2	Uttar Kashi	.99675	54.8	408.44	17.1	48.5	41.0	51.4	50.2	21.7	47.48	49.21	7.2	58.27	.90	-.65	99.70
3	Udham Singh Nagar	1.14785	53.8	440.50	28.2	47.0	37.6	37.2	66.7	48.2	54.16			25.98			
4	Tehri Garhwal	1.40909	50.3	365.07	13.1	41.3	34.8	43.5	66.5	56.5	49.76	46.19	5.7	83.87	.83	-.86	43.26
5	Pithoragarh	1.81937	47.6	348.58	22.8	43.3	49.1	41.6	79.2	33.9	63.14	49.46	7.4	69.50	.50	-.76	99.75
6	Nainital	1.87570	50.9	352.49	9.5	40.5	46.2	55.7	82.6	40.6	70.98	22.56	32.7	25.98	15.23	.44	84.86
7	Chamoli	1.92196	50.6	342.19	7.8	51.5	42.4	43.8	78.0	44.8	63.00	47.67	8.9	76.25	.72	-.66	111.24
8	Almora	2.10606	46.4	329.89	14.0	41.7	40.5	53.8	79.4	39.1	61.43	49.59	6.4	68.23	.63	-.65	99.45
9	Pauri Garhwal	2.20444	50.8	310.44	6.7	49.9	51.7	56.4	78.5	25.3	66.14	36.99	11.9	84.50	2.27	-.65	67.25
10	Dehra Dun	2.43927	49.1	309.28	14.2	49.4	69.7	87.9	64.9	24.9	71.22	14.75	50.3	43.59	9.63	.54	59.96
Uttar Pradesh																	
1	Bahraich	-1.73647	62.5	538.67	78.6	16.2	47.3	10.7	22.1	28.6	23.27	17.22	7.9	56.49	29.92	-.73	34.48
2	Budaun	-1.67200	64.0	565.74	50.5	16.7	14.4	18.5	20.6	55.9	25.53	3.74	17.6	53.71	20.66	-.41	50.28
3	Siddharthnagar	-1.43507	65.0	531.46	72.6	19.0	52.4	12.5	37.7	37.2	28.35	19.50	3.5	68.85	28.76	-.24	18.09
4	Etah	-1.32171	66.2	518.91	57.5	14.3	23.9	30.2	36.0	38.7	40.65	6.38	16.7	22.90	11.32	-.31	22.85
5	Gonda	-1.20282	62.3	490.28	71.1	19.8	51.9	12.5	31.7	41.1	27.29	16.42	7.4	38.05	25.36	-.73	24.32
6	Mahrajganj	-1.14659	62.0	532.15	82.0	35.6	51.4	11.2	32.9	24.4	88.64	23.19	5.0	58.83	15.89	-.24	37.76
7	Sonbhadra	-1.05356	60.5	540.47	67.0	30.5	37.0	24.4	18.8	19.7	34.26	28.58	13.4	67.29	4.94	-.67	54.79
8	Hardoi	-.95745	62.9	509.75	44.2	13.8	25.7	29.5	35.6	37.7	37.62	5.10	11.7	54.27	12.58	-.64	46.92
9	Kheri	-.95022	62.6	507.09	54.0	25.2	47.7	11.4	38.6	29.6	35.89	3.96	10.7	40.84	18.07	-.44	22.61
10	Shahjahanpur	-.94937	62.7	506.58	64.5	21.3	20.4	15.1	48.1	49.0	34.68	1.89	20.8	61.90	17.57	-.24	39.00
11	Sitapur	-.93321	61.1	508.08	64.2	24.4	41.9	24.5	45.8	35.1	35.08	4.54	12.0	59.98	17.37	-.61	47.60
12	Pilibhit	-.92456	60.5	516.09	55.7	28.1	24.8	18.8	37.2	47.6	35.84	4.48	18.5	28.27	23.12	-.16	41.54
13	Firozabad	-.85573	63.9	520.60	51.4	28.2	24.9	23.2	32.6	49.9	53.02	2.00	26.6	50.71	10.76	-.11	45.33
14	Barabanki	-.85248	63.7	509.97	56.2	27.0	48.7	16.5	39.3	51.7	35.64	12.31	9.3	38.20	21.66	-.51	25.05
15	Banda	-.84333	61.9	518.30	71.6	24.6	37.9	21.9	35.4	36.2	37.10	32.45	12.9	49.23	6.36	-.67	31.25
16	Bareilly	-.77696	67.4	524.03	29.6	20.1	24.8	34.0	36.4	56.0	35.13	2.23	32.8	30.89	32.69	-.18	47.17
17	Bhadohi	-.74380	64.6	502.09	67.9	31.0	57.5	23.1	41.7	37.4	38.72			38.01			
18	Mainpuri	-.71180	62.8	489.38	50.0	28.9	23.5	14.9	41.2	43.8	52.67	1.87	13.2	29.33	5.09	-.27	35.69
19	Lalitpur	-.70034	58.6	545.89	83.8	27.0	54.8	21.5	46.0	21.0	33.25	28.86	14.0	55.54	2.73	-.69	33.24
20	Hamirpur	-.62980	60.0	468.13	49.6	38.3	67.6	8.5	28.0	31.4	40.65	26.36	17.4	37.71	7.28	-.58	37.10
21	Basti	-.62347	62.6	491.00	77.4	19.1	58.2	22.0	63.7	32.9	39.00	14.71	6.4	62.71	16.51	-.66	32.24
22	Moradabad	-.58582	60.6	536.05	29.5	27.4	23.6	39.5	32.8	58.0	33.32	4.52	27.7	39.67	42.70	.06	12.67
23	Allahabad	-.52363	63.5	446.81	52.4	30.0	49.0	30.6	42.1	37.5	46.61	18.89	20.8	11.72	12.94	-.12	67.75
24	Hathras	-.52359	64.8	489.96	47.3	33.0	30.7	20.8	39.6	51.1	47.16			24.11			

Appendix Table 3: Contd..

	DISTRICT	UPRCHINB	PBO3P	CWR	PGMB18	PCUFPM	PPANC	PSD	PCWCI	PFSRTI	FLR	FWPR	PURB	PVNCPR	PMUS	DDIO	ANM
PLAIN Districts																	
25	Aligarh	-.49162	64.4	477.44	42.6	23.5	32.6	40.3	43.1	44.5	43.88	8.22	25.1	14.21	14.63	.14	39.05
26	Mirzapur	-.47437	55.7	508.89	58.6	32.9	59.7	24.3	29.3	29.4	39.89	19.42	13.8	43.42	6.98	-.55	64.21
27	Mathura	-.40618	58.9	514.55	42.1	22.1	34.0	38.2	40.2	39.1	43.77	6.04	23.6	24.11	8.12	.08	56.49
28	Varanasi	-.37362	62.6	463.22	72.2	30.7	47.0	38.2	36.6	22.1	48.59	15.06	27.2	38.01	12.84	.10	40.08
29	Ambedkar Nagar	-.30822	60.1	462.06	70.0	29.0	70.9	19.6	55.5	25.7	45.98			42.91			
30	Fatehpur	-.28534	58.5	478.60	46.5	30.7	53.9	24.0	43.7	35.0	44.62	21.12	9.9	62.64	12.57	-.41	35.91
31	Farrukhabad	-.26554	64.0	457.44	37.2	28.7	25.9	21.3	46.9	49.7	50.35	4.13	18.6	36.53	14.17	-.11	43.89
32	Bijnor	-.24803	59.9	499.79	16.2	23.0	39.3	64.5	32.9	23.0	47.28	3.57	25.1	23.95	40.35	-.06	39.76
33	Mahoba	-.24065	58.7	498.55	65.2	37.1	52.0	24.3	43.2	32.7	39.57			37.71			
34	Pratapgarh	-.20045	61.7	446.01	55.2	24.2	68.3	28.6	39.0	37.1	42.63	17.81	5.5	45.52	13.25	-.66	39.22
35	Rampur	-.17184	36.2	542.86	50.0	25.6	24.2	31.2	41.2	43.8	27.87	5.66	26.1	14.16	47.95	.03	31.75
36	Mau	-.15940	57.1	502.71	38.5	26.3	74.0	30.1	40.6	40.2	50.86	20.74	16.9	44.33	17.91	-.42	52.71
37	Sultanpur	-.15018	58.7	456.76	65.5	19.0	64.1	30.9	56.5	22.7	41.81	13.39	4.5	36.40	12.94	-.42	20.56
38	Ghazipur	-.10563	57.5	481.74	61.0	28.3	68.2	34.8	45.8	28.7	44.39	13.77	7.4	55.76	10.07	-.36	28.39
39	Rae Bareli	-.07876	62.6	446.96	45.9	20.8	60.0	27.0	47.1	48.9	40.44	18.50	9.0	39.78	11.35	-.19	56.91
40	Saharan Pur	-.07757	59.8	461.90	18.6	29.4	35.6	58.2	36.4	22.4	51.42	3.81	25.5	7.46	36.12	.21	63.79
41	Azamgarh	-.07261	58.0	468.41	64.1	17.8	78.1	32.8	61.5	22.0	42.44	15.44	7.2	50.97	13.01	-.41	28.35
42	Gorakhpur	-.02791	57.6	451.89	66.2	31.8	73.3	23.9	52.7	28.4	44.48	11.59	18.8	62.96	8.09	-.40	49.22
43	Faizabad	-.00222	58.0	443.03	64.9	34.6	62.3	24.9	45.8	25.8	43.35	12.53	11.7	42.91	13.39	-.33	32.43
44	Etawah	.00031	58.6	452.93	44.7	33.6	23.4	16.0	42.6	35.7	58.49	1.75	15.7	44.08	6.63	-.22	36.90
45	Buland Shahar	.03879	60.2	464.11	27.2	26.4	28.1	35.6	54.8	42.8	42.82	7.42	20.8	10.34	19.79	.23	38.25
46	Muzaffar Nagar	.06005	58.1	486.57	21.2	33.7	30.1	54.3	36.1	42.8	48.63	12.33	24.6	.00	34.52	.41	42.36
47	Deoria	.11501	55.7	443.16	56.8	27.7	64.6	24.2	55.6	36.6	43.56	15.53	7.4	39.20	20.18	-.42	30.68
48	Jaunpur	.32802	53.7	462.19	56.4	31.2	47.3	32.1	54.3	22.5	43.53	12.81	6.9	50.90	9.74	-.44	25.01
49	Agra	.46493	60.6	438.25	38.2	39.1	42.0	37.2	42.0	41.0	48.15	3.63	40.4	19.09	10.97	.26	52.78
50	Meerut	.59200	52.8	428.39	14.4	31.2	41.8	88.8	30.8	21.5	54.12	8.00	37.0	.00	27.49	.74	54.53
51	Jalaun	.59440	57.3	413.48	60.4	43.3	53.8	33.9	39.9	34.5	50.66	14.65	22.1	21.04	9.27	-.19	49.45
52	Unnao	.63636	62.3	436.22	45.6	25.0	41.1	21.7	74.1	19.7	42.40	11.55	13.6	60.96	10.66	-.52	39.40
53	Kanpur Dehat	.69832	57.9	450.06	34.5	42.6	57.1	16.4	62.8	30.8	54.49	4.71	5.7	40.11	6.91		23.06
54	Ballia	.72197	54.5	444.52	53.6	30.7	61.8	35.2	71.5	27.6	43.92	11.91	9.9	45.78	6.03	-.46	29.48
55	Lucknow	.93585	54.4	352.46	35.3	49.6	80.0	42.0	51.9	31.6	61.22	7.68	62.7	54.45	19.66	.91	105.51
56	Ghaziabad	1.18572	51.5	426.94	19.3	43.7	47.7	59.5	51.4	39.4	59.12	8.58	46.2	.00	21.16	.85	49.67
57	Jhansi	1.21394	41.0	393.15	42.4	51.1	67.7	36.3	56.7	23.9	51.21	18.91	39.6	57.33	8.42	-.23	70.01
58	Kanpur Nagar	2.23554	44.5	315.92	5.6	53.1	77.0	56.3	41.9	44.6	72.50	2.88	84.2	.00	17.80	.60	51.81

Note: * The District's configuration is as of 1991 Census.