SEX COMPOSITION IN UTTARPRADESH: A SPATIAL ANALYSIS

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Abstract

Sex composition of population is measured in terms of ratio ie. number of males per thousand females.

It has been observed that the sex ratio has witnessed declining trend in Uttar Pradesh as well as for India as a whole. The male deficiency region occurs in the northeastern districts. This deficiency is a strong testimony to highly male selective migration taking place from these districts to the metropolises under the push effect of relatively limited resources and very high levels of socio-economic backwardness. The over all assessment of the thirty three variables taken in this study and their associations with sex composition of population leads to the conclusion that the socio-economic structure, migration and landuse etc. are the chief determinants of the sex composition of population. On almost all counts and variables, wide spatial variations are visible. The spatial patterns of sex composition deserve to be considered as one of the most important resultant of prevailing socio-economic milieu in the state.

Introduction

Most extensively discussed Feminist Movement, very strongly supported feminism, widely recognized gender equality in international conferences, very strong opinion about new legislation granting freedom and parallel rights to women make us study our gender statistics more analytically than ever (Bhutani, 1999). Sex composition indicates the relative proportion of the male and female components of a population. According to the Indian Census, the term 'Sex Ratio' cannotes the number of females per thousand males. The study of sex ratio is of great interest to geographers because of the contrasting roles played by two sexes in economy and society (Mehta and Kaur, 1983). The sex ratio is very significant attribute of population. Apart from its impact on fertility, it also determines the socio-economic pulse of people (Gosal, 1999).

Sex ratio in India is singularly low compared with most large human population (Coale, 1991). This has been attributed to the unusually high mortality of Indian females relative to their male counterparts. The excess mortality of females is believed to result from discrimination against females, a term commonly used in the Indian geographic literature to describe a set of practices that includes less favourable access to food and health care for females (Kundu and Sahu, 1991). Agnihotri (2000), focused on proportion of women, usually expressed as 'sex ratio' in India's population and found that women's proportion has been declining and it has reached at an alarming low level, i.e., how it becomes a problem to be analysed with rapt seriousness.

Bhutani (1999) has implied in her study that number of males in the world as a whole, exceded the number of females. This may be attributed to the universal fact of higher masculinity at birth. Benerjee (1977) studied sex ratio and its correlates in the tribal district of Singhbhum in south Bihar. He observed that the sex ratio in the area has been strongly influenced by pattern of migration. It was also revealed that gradually declining sex ratio is attributed to higher female mortality. Ayyar and Shrivastava (1978) observed that sex ratio was inversely correlated with size of urban centres and also with the proportion of scheduled castes in urban areas of Madhya Pradesh. Rural-urban differential in sex ratio in Haryana has been attributed to the rural character of small towns (Krishan and Chandna, 1973). Chandna and Sidhu (1979) focused primarily on determinants of sex ratio, i.e., sex ratio at birth, male-female differential in mortality, and migration. Besides, factors like wars, femines, and status of women also make notable impact on sex ratio. An eleborate discussion on regional variations of sex ratio in the population of Haryana was made by Siddiqui and Ahmad (1971). Siddiqui (1982) made a study of regional aspects of sex structure of population in Uttar Pradesh. The analysis reveals that socio-economic structure and urbanization emerge as the most important variables responsible for characteristic pattern of sex ratio in the state. A similar study but of a highly generalized nature on Punjab, was conducted by Gill and Singh (1985). Siddiqui and Siddiqui (1993) have made a critical evaluation of changes in sex composition of population in Deoria district, Uttar Pradesh. Hassan (1999) has attempted to analyse the sex ratio of Haryana's population to investigate the possible reasons of recent change in sex ratio and to examine the socio-economic and demographic correlates of the patterns of sex ratio.

The imbalances between the two sexes lead to a number of social problems such as prostitution, promiscuity, perversion, etc., and affect the health of the community (Census of India, 1961). If males are in excess many will not be able to get married (Chaddock, 1956). Moreover, this excess trends to lower the age of marriage for females, since the number of females falls short of the number of the opposite sex. This results, quite aften, in considerable variation in age between husbands and wives and in increased incidence of widowhood. If females predominate there will be relatively large proportions of unmarried women. Countries such as France, United Kingdom and United Germany etc., which suffered from unprecedented deficiency of males caused by heavy toll of Second World War, developed a peculiar war psychosis which led to all sorts of deviant behaviour envolving a variety of social and moral misconducts.

The direct socio-economic implication of the imbalance in sex ratio is that it affects the rate of male and female participation in work. In areas of relative male deficiency female participation may tend to be relatively high whereas in female deficiency areas their participation may be appreciably lesser than the average. This appears to be one of the reasons why in countries like India with a relatively more masculine population the female participation is much less than what it is in European countries of high ratio. In socio-economic sphere, it has rightly been observed that the exess of males will contribute more workers, whereas high proportion of females mean fewer workers and a great degree of economic dependence (Census of India, 1961) because females cannot undertake all the works which are taken by males.

Of course, the systematic spatial analysis of the sex composition of population

constitutes an important foundation for the social stratification of society, especially that of a modern, industrial and urbanized nation. It also serves as the connecting link between different institutions and spheres of social life and manifests the allocation of manpower to various institutional spheres. This also serves as a working link between the economy and the family through which the economy affects the family's status and the family supplies manpower to the economy in the society.

Study Area

The state of Uttar Pradesh has been taken as the study area, which is comprised of seventy districts (according to the Census of India, 2001). Uttar Pradesh is the most populous state of India contributing to 16.17 per cent of the country's population, its share in the geographical areas is 7.34 per cent and the density of population is 689 persons/km². The study area lies within the latitudinal extension of 23° 52' north to 30° 25' north and the longitudinal extension of 77° 04' east to 84° 38' east (Fig. 1). Due to its gigantic population size, it commands the Indian polity by way of sending largest number of peoples representatives. From demographic and socio-economic point of view the state represents the typical Indian conditions, and therefore, it is an ideal field to investigate and analyse the spatial variations in the patterns of sex composition of population.

Objective

The main objectives of the present study therefore, are: to analyse the trends of sex composition of population since post independence period; to study spatial distribution patterns of sex composition pertaining to years of 1991 and 2001; to find out recent change in sex composition of population during 1991-2001 and; to examine the demographic and socio-economic correlates of the distribution patterns of sex composition of population during 2001.

Database and Methodology

The data for the present analysis have been obtained from the secondary sources like, Census of India, Directorate of Economics and Statistics, Uttar Pradesh, and some other offices of the state government.

This study is aimed at the sex composition of population and thirty three variables covering vital rates of population, labour force, income, agriculture, urbanization, industries, transport and health status are taken into consideration (Table 1). These variables are selected keeping in mind the diversified socio-economic structure of Uttar Pradesh. Correlation Matrix' has been used to assess the relationship, and t-test is adopted to find out the determinants which are significant at 1 per cent or 5 per cent level.

Temporal Trends of Sex Composition, 1951-2001

The sex ratio, in the state of Uttar Pradesh was 908 in 1951 and since then there has been considerable decline in the sex ratio till 1971 afterwards it increased steadily in 1981. The sex ratio declined by 1 point during 1961, 31 points during 1971 and 6 points during 1991.It recorded a sizeable improvements of 6 points and 22 points during 1981 and 2001 respectively (Table 2).

The sex ratio of the population in twentieth century has shown a gradual declining trends in India since 1951 except some marginal improvements in the Censuses of 1981 and now in 2001. The sex ratio during 1951-2001 decreased to 10 points in Uttar Pradesh and 13 points in India. As obvious, the decline in sex ratio was lower in Uttar Pradesh than in the country as a whole (Table 2).
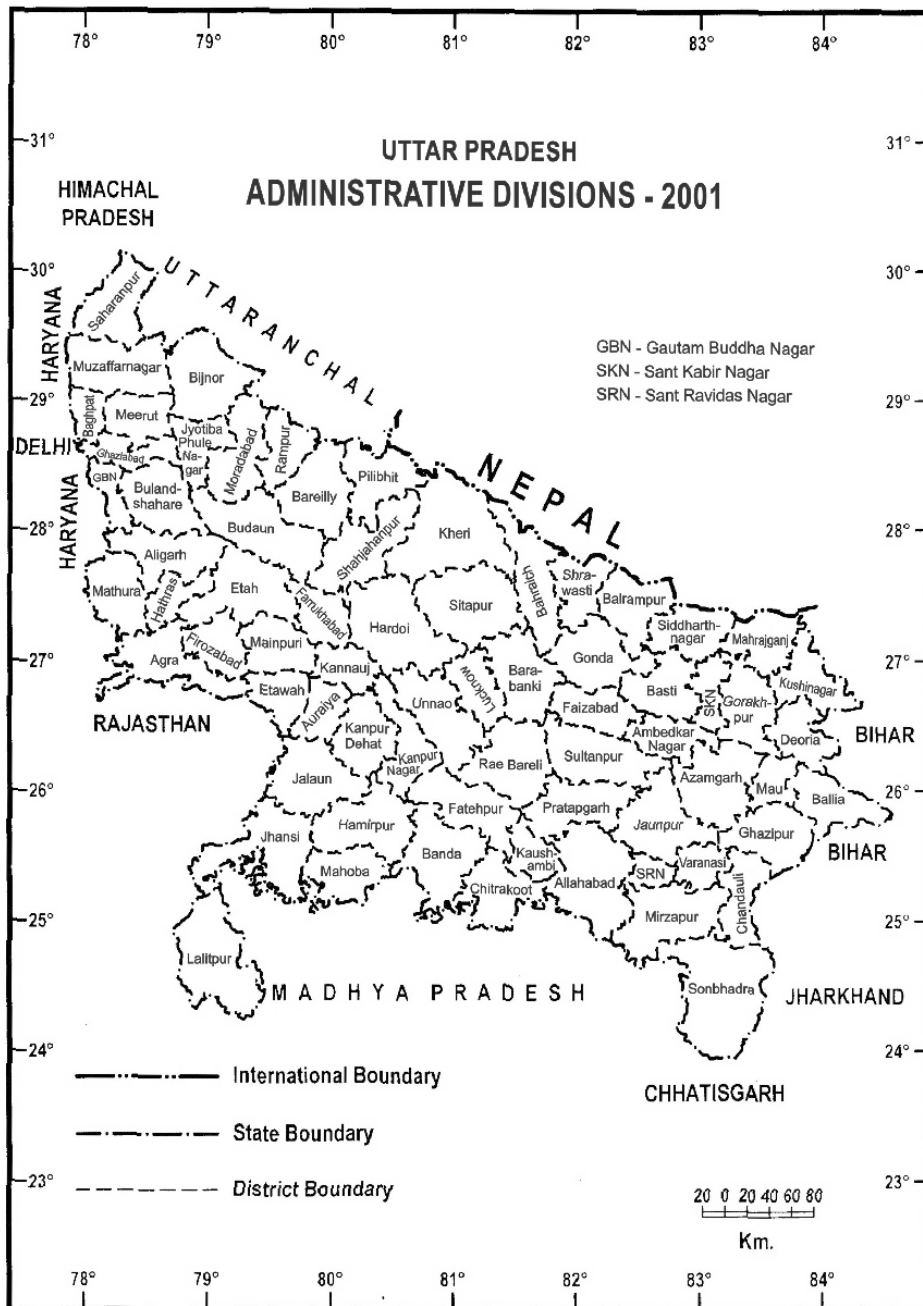
Fig. 1

However, the sex ratio of the state remained lower than that of the country throughout since 1951 to date. This unusually lower sex ratio in the state has mainly been attributed to a relatively large excess of males over females at birth, and a higher death rate among females than males in all ages (Gosal, 1961) apart from male selective out - migration.

In short distance migrations in more developed countries, the selectivity appears to turn in favour of females. In India short distance migrations are also male selective so that the

Table 1
Uttar Pradesh : Variable -wise Values of Correlation Coefficient, 2001

Variables	Sex Composition (correlation coefficients)
Percentage of rural population (X1)	0.39*
Percentage of urban population (X2)	-0.39*
Net migration rate (X3)	-0.33*
Male net migration rate (X4)	0.35*
Female net migration rate (X5)	-0.32*
Density of population (X6)	0.29**
Birth rate (X7)	0.28**
Death rate (X8)	-0.02
Infant mortality rate (X9)	-0.04
Child/woman ratio (X10)	-0.15
Per capita income (X11)	-0.44*
Percentage of net sown area to the total reporting area (X12)	-0.02
Intensity of cropping (X13)	0.19
Average size of land holding (X14)	-0.47*
Percentage of area under commercial crops to total cropped area (X15)	-0.35*
Percentage of irrigated area to total cropped area (X16)	-0.04
Length of pucca roads in km. per 1000 km. sq. area (X17)	0.12
No. of persons engaged in registered factories per 100,000 population (X18)	-0.23
Juvenile dependency ratio (X19)	0.50*
Senile dependency ratio (X20)	0.63*
Male work participation rate (X21)	-0.58*
Female work participation rate (X22)	0.33*
Percentage of workers in primary group (X23)	0.22
Percentage of workers in secondary group (X24)	0.21
Percentage of workers in tertiary group (X25)	-0.29**
Literacy rate (X26)	-0.08
Male literacy rate (X27)	0.05
Female literacy rate (X28)	-0.12
No. of medical hospitals/dispensaries per 100,000 population (X29)	-0.09
No. of hospital beds per 100,000 population (X30)	-0.16
No. of doctors per 100,000 population (X31)	-0.11
Percentage of SC and ST population to total population (X32)	0.07
Levels of urbanization (X33)	-0.22

* Significant at 1 per cent level = 0.302 (r-value) and 2.65 (table-value)
** Significant at 5 per cent level = 0.274 (r-value) and 1.99 (table-value)

Source : Computed and compiled by the author based on the
demographic and socio-economic data for the period of 2001
collected from Census of India, 2001 and Statistical Abstract, Uttar Pradesh, 2001.

Table 2
Uttar Pradesh: Trends of Sex Composition, 1951-2001

Census Year	Uttar Pradesh	India
1951	908	946
1961	907	941
1971	876	930
1981	882	934
1991	876	927
2001	898	933

Source : Census of India and Uttar Pradesh, 1951-2001

population of in-migration areas tends to become more masculine whereas the proportion of females tends to increase relatively in areas of out-migration (Siddiqui and Siddiqui, 1993). Obviously, migration or spatial redistribution of population is the single most important factor affecting temporal and cross sectional variation in sex ratio at the spatial level (Kundu and Sahu, 1991).

Spatial Patterns of Sex Composition - 1991

The districtwise distribution of sex composition in Uttar Pradesh is not uniform. It varies from 810 in Budaun district to 1007 in Azamgarh district (Table 3). State average (876) stands somewhat midway between the two extremes and lies well below the national average (927). The scarcity of females, though a common feature is however, of relatively considerable magnitude in Uttar Pradesh. On the basis of this significantly large range of spatial variations the state has been divided into five broad regions (Fig. 2).

It can be observed from the map that quite a large part of the state i.e., about nine per cent of the districts namely Mathura, Etah, Budaun, Shahjahanpur, Hardoi and Kanpur Nagar have emerged as a region of considerably very low sex ratio upto 825. This region lies in the central-western plain of the state. Sixty per cent districts fall under the category of low sex ratio (826 to 875) which form a single compact contiguous region in the state (Fig. 2). Two distinct areas can be seen under the category of medium sex ratio (876 to 925). One lies in the southeastern part comprising the districts of Fatehpur, Pratapgarh, Sant Ravidas Nagar, Varanasi, Chandauli and Mirzapur and an other in the northeastern part including Faizabad, Ambedkar Nagar, Basti, Sant Kabir Nagar, Gorakhpur, Maharajganj and Siddharthnagar districts. The fourth subdivision defined by high grade of sex ratio (926 to 975) comprising seven districts is sub-divided into two small regions; one lies in the extremely eastern margin of the state while the other is located in the central part of the state. The last category of very high sex ratio (more than 975) consists of only two districts Jaunpur (994) and Azamgarh (1007) which lie in the eastern part of the state. The reason for this high sex ratio may be migration of workers which is highly male selective. The heavy pressure of population in the eastern region (areas of low sex ratio) involves a grim struggle for base existence and the starving work force and the rack rented small tenants are forced to move out to host

Table 3
Uttar Pradesh : Change in Sex Composition - 1991-2001

Districts	1991	2001	Change points	Districts	1991	2001	Change points
Saharanpur	851	868	17	Jhansi	863	870	7
Muzaffarnagar	860	872	12	Lalitpur	863	884	21
Bijnor	871	896	25	Hamirpur	841	852	11
Moradabad	852	885	33	Mahoba	841	866	25
Rampur	852	882	30	Banda	841	860	19
Jyotiba Phule Nagar	852	885	33	Chitrakoot	841	872	31
Meerut	852	871	19	Fatehpur	882	892	10
Baghpat	852	848	-4	Pratapgarh	887	983	96
Ghaziabad	832	860	28	Kaushambi	875	894	19
Gautam Buddha Nagar	832	842	10	Allahabad	875	882	7
Bulandshahare	856	881	25	Barabanki	858	886	28
Aligarh	842	861	19	Faizabad	924	940	16
Hathras	842	856	14	Ambedkar Nagar	924	977	53
Mathura	816	841	25	Sultanpur	934	980	46
Agra	832	852	20	Bahraich	841	865	24
Firozabad	832	851	19	Shrawasti	841	859	18
Etah	824	847	23	Balrampur	873	896	23
Mainpuri	833	855	22	Gonda	873	899	26
Budaun	810	841	31	Siddharthanagar	913	946	33
Bareilly	839	872	33	Basti	916	916	0
Pilibhit	853	876	23	Sant Kabir Nagar	916	978	62
Shahjahanpur	816	838	22	Mahrajganj	909	933	24
Kheri	842	875	33	Gorakhpur	924	959	35
Sitapur	833	862	29	Kushinagar	967	961	-6
Hardoi	818	843	25	Deoria	967	1003	36
Unnao	873	898	25	Azamgarh	1007	1026	19
Lucknow	866	891	25	Mau	974	984	10
Rae Bareli	931	949	18	Ballia	946	952	6
Farrukhabad	835	860	25	Jaunpur	994	1021	27
Kannauj	835	868	33	Ghazipur	957	974	17
Etawah	831	856	25	Chandauli	895	922	27
Auraiya	831	856	25	Varanasi	896	908	12
Kanpur Dehat	843	856	13	Sant Ravidas Nagar	896	918	22
Kanpur Nagar	824	869	45	Mirzapur	883	897	14
Jalaun	829	847	18	Sonbhadra	862	896	34
				Uttar Pradesh	876	898	22

Source : Census of India and Uttar Pradesh, 1991 and 2001.

UTTAR PRADESH
SEX RATIO - 1991

Females Per Thousand Males

975

925

875

825

20 0 20 40 60 80

Km.
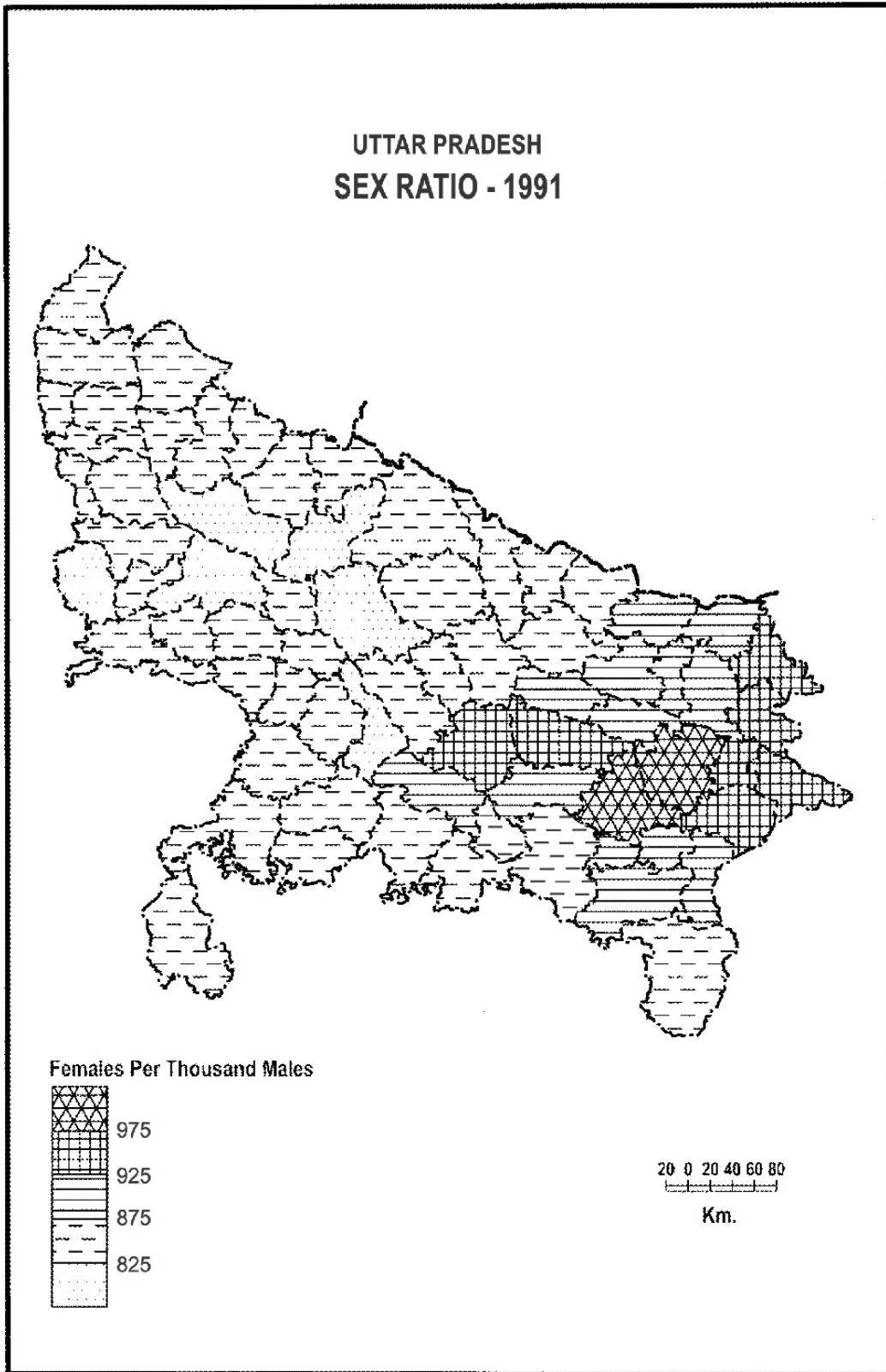
Fig. 2

areas that offer inducement (Sen, 1963).

Spatial Patterns of Sex Composition - 2001

Among the districts of the state, Shahjahanpur recorded lowest (838) sex ratio while, the maximum of 1026 was witnessed by Azamgarh district in 2001 against the state average of 898 which was 876 in 1991 (Table 3). This range and districts average show that the decadal disparity between sex ratio of 1991 and 2001 is marked by a relatively high proportion of females in the subsequent census year (2001). About 30 per cent of the districts have sex ratio above the state average, whereas, about nineteen per cent of the districts have recorded higher sex ratio which is in favour of females. Fig. 3, showing the distribution of sex ratio in the state indicates that the sex ratio is low in northern, central and southern parts of the state. A small region of relatively very low sex ratio (upto 850) is found in area which is composed of four districts namely Shahjahanpur (838), Budaun (841), Hardoi (843) and Etah (847). Sixty per cent districts recording low sex ratio (851 to 900) are located in northern, western, central and southern parts of the state (Fig. 3). The third category of moderate (901 to 950) sex ratio comprises seven districts of Varanasi, Basti, Sant Ravidas Nagar, Chandauli, Maharajganj, Siddharthnagar and Rae Bareli. Except Rae Bareli all these districts belong to eastern plain. This is however not a single contiguous region but divided into three detached parts. The eastern districts of the state constitute a distinct region of relatively high sex ratio of 951 to 1000 (Fig. 3). The region of very high sex ratio (more than 1000), lies in the eastern plain which separates the region of relatively high sex ratio. It is comprised of Deoria, Jaunpur and Azamgarh districts.

The overall distribution of sex ratio during 2001 depicts that it generally declines from east to west. As a concluding remark it can be said that the vital rates of birth and death and the tendencies of population redistribution are the controlling forces of the sex ratio which in turn are related for a number of economic, social and cultural factors which themselves are not of the same potency for all areas (Verma, 1992).

Change in Sex Composition, 1991-2001

The calculated values of all the districts of the state, with few exceptions depict an increase in female proportion in 2001. This may be the result of many changes in societal outlook. People migrating from rural to urban areas have resorted to settle down in these districts with their families. The selectivity of migration in favour of males is therefore, tends to decrease. But this differential in points is dissimilar among the districts, it varies from -6 to +96 points with a maximum increase in Pratapgarh and a minimum decrease in Kushinagar, whereas the state accounts for +22 points (Table 3).

On the basis of sex ratio differentials the districts may be divided into two parts having recorded positive and negative differentials. The negative differential of sex ratio is recorded by two districts (Kushinagar and Baghpat) situated in the eastern and western parts of the state (Fig. 4). The category of positive very low sex ratio differential upto 15 points encompasses nine districts forming three small regions. One lies in the central-southern part and include the four districts of Kanpur Dehat, Fatehpur, Hamirpur and Jhansi. The second is located in the south-eastern part and comprises the three districts of Allahabad, Mirzapur and Varanasi, and last in the eastern part of the state comprising two districts of Mau and Ballia. The former two regions are separated by the district of Kaushambi under
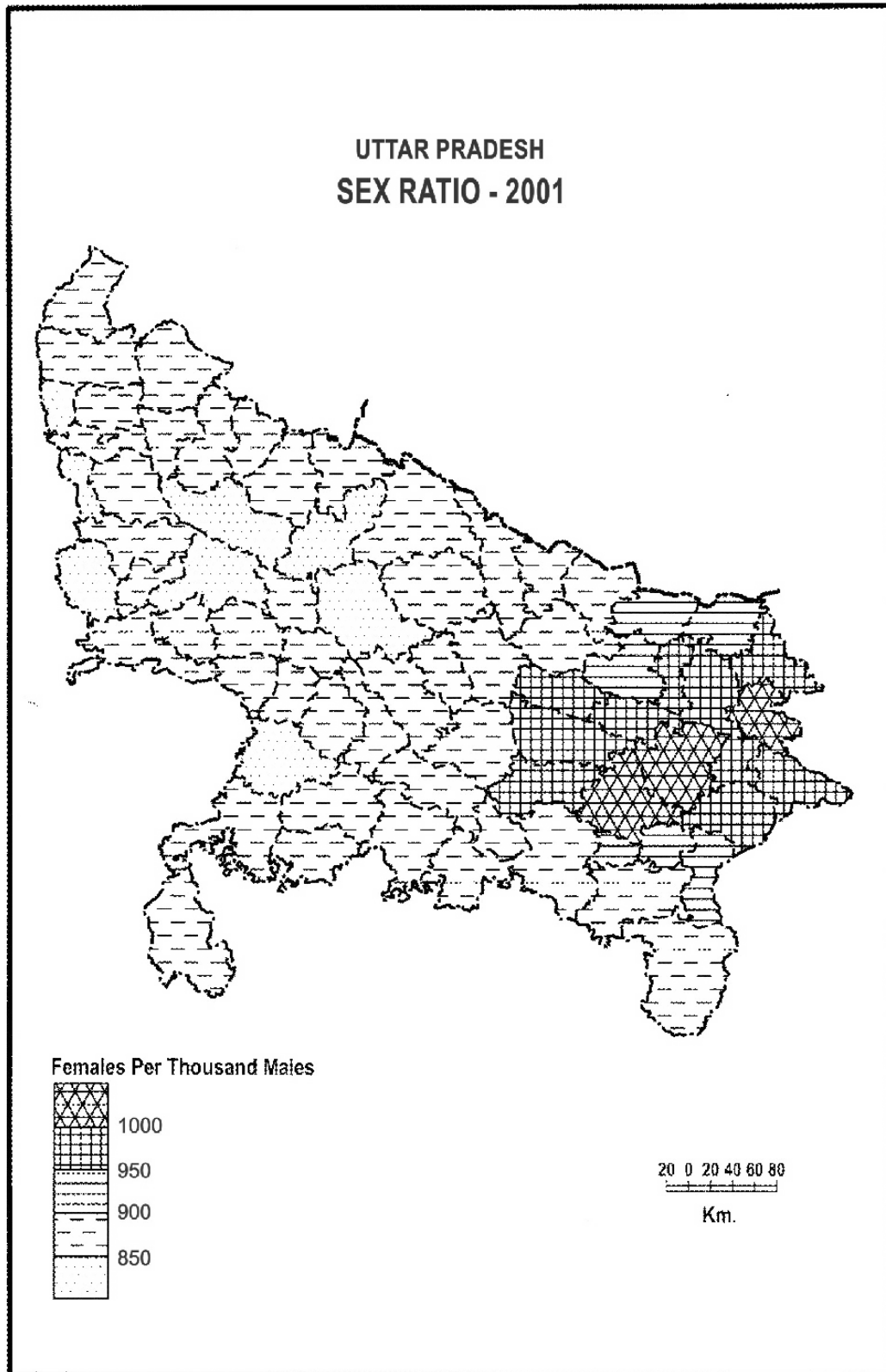
Fig. 3

UTTAR PRADESH
CHANGE IN SEX RATIO : 1991-2001
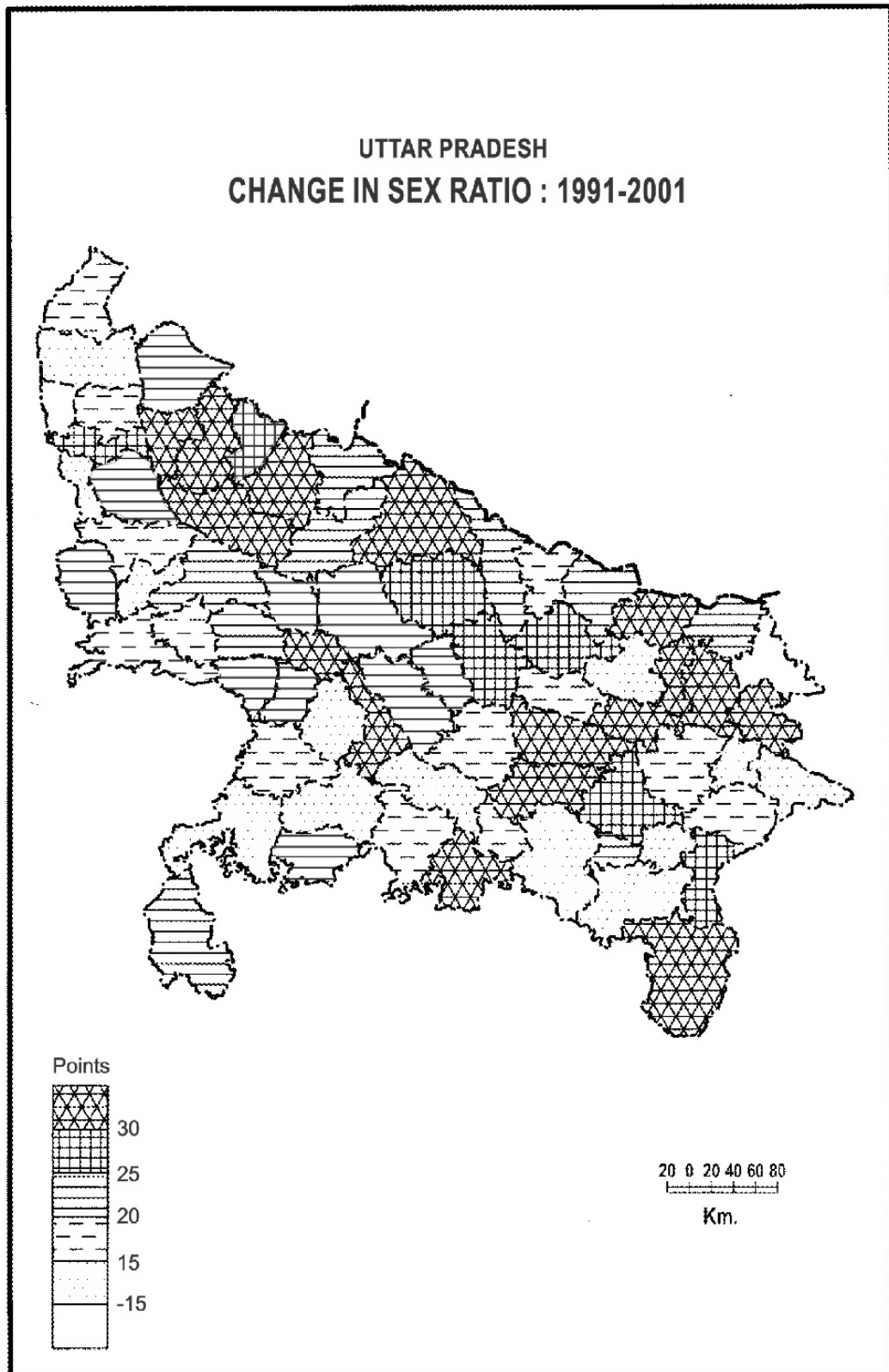
Points

30
25
20
15
-15

20 0 20 40 60 80
Km.

Fig. 4

the category of 16 to 20 points. The districts recording low differential in sex ratio (16 to 20 points) are scattered in various parts of the state (Fig. 4). Six districts – Etah, Mainpuri, Farrukhabad, Hardoi, Lucknow and Unnao forming a small belt under the medium category of (21 to 25 points), lies in the west-central plain. Three districts – Gonda, Barabanki and Sitapur have recorded high sex ratio differential (26 to 30 points) forming a very small distinct region in the central part of the state. Remaining districts are scattered and they do not exhibit any recognizable region. Two distinct regions can be identified under the category of very high sex ratio (more than 30 points). One which is dominant includes about seven districts namely Pratapgarh, Sultanpur, Ambedkar Nagar, Sant Kabir Nagar, Siddharthanagar, Gorakhpur and Deoria, located in the eastern part of the state. The other comprising only four districts - Jyotiba Phule Nagar, Moradabad, Bareilly and Budaun delimit a small region in the western plains of the state.

For the state as a whole, it may be concluded that sex ratio was substantially low as compared to the nation as a whole in 2001. It may be mentioned the magnitude of decline in sex ratio in Uttar Pradesh was higer than that recorded by the country. Uttar Pradesh has experienced out-migration under continuing strain of chronic population pressure. It is not the rural-urban migration but the male selective out-migration to other parts of the country that led to decline in sex ratio. Migration of both sexes does not affect sex ratio.

Relationship of Sex Ratio and other Demographic-Socio-Economic Variables Dimensions of Correlation and Levels of Significance

In order to understand the strength of association between the sex ratio and 33 independent social, economic and demographic variables, the coefficients of correlations have been computed and tested at 95 per cent level of confidence. These determinants of sex ratio are tested with assumption that linear relationship existed in all cases (Table 1).

The null hypothesis formulated is that the high sex ratio is not significantly related with the selected variables. The t-test gives the value which goes well above the adopted level of significance for sex ratio. The variables X1 (percentage of rural population), X2 (percentage of urban population), X3 (net migration rate), X4 (male net migration rate), X5 (female net migration rate), X6 (density of population), X7 (birth rate), X11 (per capita income), X14 (average size of land holding), X15 (percentage of area under commercial crops to total cropped area), X19 (juvenile dependency ratio), X20 (senile dependency ratio), X21 (male work participation rate), X22 (female work participation rate) and X25 (percentage of workers in tertiary group) are significantly correlated with sex ratio at 5 per cent level. X1, X4, X19, X20 and X22 obtained high positive correlation and X2, X3, X5, X11, X14, X15 and X21 obtained high negative correlation with sex ratio and these are significant even at 1 per cent level. X6 and X7 variables have positive and only X25 variable has negative correlation with sex ratio. These are well above the adopted level of significance and therefore the null hypothesis is rejected. This means that there is acceptable validity in the assumption that the districts with high percentage of rural population, male net migration rate, density of population, birth rate, juvenile dependency ratio, senile dependency ratio and female work participation rate, have high sex composition of population whereas the districts with high percentage of urban population, net migration rate, female net

migration rate, per capita income, average size of land holding, percentage of area under commercial crops to total cropped area, male work participation rate and percentage of workers in tertiary group have low sex ratio of population (Table 1).

The author is aware of the fact that many variables which have high degree relationship with the dependent variable (sex-ratio) cannot be explained in terms of direct causal relationship. Obviously, some are accidently correlated while others have indirect bearings. In explaining socio-economic realities, sometimes it becomes very difficult to identify the independent variables. However, the results of correlation analysis do tend to establish and corroborate the nature and strength of the relationship.

Conclusion

A very wide range of variations have been found in the spatial distribution of sex ratio of population in Uttar Pradesh. These range from 810 to 1007 females per thousand males and 838 to 1026 females per thousand males during 1991 and 2001 respectively. On the whole the state's population in strikingly masculine as it is found that only one and three of the seventy districts the ratio exceeded 1000 during 1991 and 2001 respectively. The male deficiency region occurs in the eastern parts. This deficiency is a strong testimony to highly male selective migration from these districts to the metropolises taking place under the push effect of relatively limited resources and high-socio-economic backwardness.

The magnitudes of sex ratio have been tested with each of the thirty three variables whch are excepted to be the determinants of sex composition of population. The overall assessment of these variables and their associations with sex composition leads to the conclusion that the socio-economic structure,

migration and landuse etc. are the chief determinants of the sex composition of the population. Sex composition of population plays a vital role in shaping the trends, patterns and rate of socio-economic milieu and that for planning a legitimately diversified but regionally balanced socio-economic development. The spatial patterns of sex composition of population therefore deserve to be rated as one of the most important items of consideration.

Acknowledgements

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