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Fertility Pattern and Secondary Sex Ratio among Womenof Different Age, Caste and Populations of North Indian Muslims

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Abstract: Reproductive fitness is best studied by taking together a number of parameters like the mean number of offspring produced and the sex-ratio. The Muslims of Aligarh city are predominantly Sunnis, though a considerable number of Shias are also there. Among the Sunnis approximately one fourth of the population constitute Syed, Sheikh, Moghal and Pathan, while three fourth belong to various lower Biradaris. In the present study we have reported incidence of marriage, fertility and secondary sex ratio among women of high rank (Ashraf) castes and low rank (Ajlaf) castes of Muslims in the northern region. Ashraf comprises Sheikh, Syed and Pathan, whereas Ajlafs belong to Qureshi, Saifi and Ansari biradaris. Maternal age was scored as above 45 and below 45 years of age. Significant effects of maternal age were seen on sterility, fertility and secondary-sex ratio of the offspring, whereas populations did not show consistent differences except those between Ashraf and Ajlaf taken together.

Key words: Fertility, sterility, sex ratio, Ashraf-Ajlaf muslim women

INTRODUCTION

Fertility is a positive force through which the populations expand, countering the force of attrition caused by mortality (Bhende and Kanitkar, 1954). Many biological characteristics such as heredity, health and disease, menarche, menopause and biological age have considerable influence on fertility potential of a population. Similarly some socio-cultural variables like education, occupation, economy, mating pattern and birth control methods have their respective influence on fertility (Murry *et al*., 2005).

Fertility of women varies from population to population. The variations observed in the fertility rate of a population are related not only to the biological factors but also to the socio-economic variables (Freedman, 1987). With a view to explain the fertility and sex-ratio, study of the contribution of various biological and socio-economic factors is important. While the number of live born is a dependent variable, the independent variables include the present age of the mother, age at the present conception, age at menarche, age at marriage, per capita annual income, birth control measures, education and occupation (Murry *et al*., 2005).

Muslims in India comprise more than 12 % of the population yet their genetic structure has not been properlyinvestigated (Shariff, 1998). They belong to two major sects: Sunnis and Shias, while each sect hasdifferent biradaris, grouped under Ashraf and Ajlaf (Ansari, 1959). The former comprise of higher rank Muslims like Syeds, Sheikhs, Pathansand Moghuls, while the latter comprise Qureshis, Ansaris, Saifis andother groups of lower occupation (Ahmad, 1978). A large number of latter may also be converts from local indigenous population of other faiths (Afzal, 1984). Though Islam does not distinguish the groups on any material grounds, the social isolation may have led to differentiation of the differences in their gene pools. In the present study, Muslim women of Aligarh have been surveyed to knowthe incidence and types of, marriage, marital age, fertility and sex-ratio, with a view to see the difference among Ashraf and Ajlaf and various biradaris.

MATERIALS AND METHODS

Area: The Aligarh city in Uttar Pradesh (U.P.) is situated between latitude 27°28′ and 28°10′ north and longitude 77°29′ and 78°36′ east. The total area is 34.05 km^2. Aligarh has almost a dry climate throughout the year. During the winter, temperature is very low though frost is not of frequent occurrence. The mean of the temperature in December and January, the coldest months, is 8°C. The summer is decidedly hot. The maximum temperature of the district is 44°C. The district receives normal annual rainfall of 594.1 mms.

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People: The population of Aligarh (2,990,388 Census of India, 2001) comprises of Hindus Muslims Sikhs and Christians, there being no fewer than 64 castes among Hindus (Nevill, 1962). The Muslims of Aligarh city are predominantly Sunnis, though a considerable number of Shias are also there. Among the Sunnis approximately one fourth of the population is Syed, Sheikh, Moghal and Pathan, while three fourths belong to various lower biradaris.

Samples: The sampling of individuals was done with respect to the following factors. Caste (biradari): Ashraf (Syed, Sheikh, Pathan and Shia-Syed)Ajlaf (Qureshi, Ansari, Saifi), Age of the parents: Women blow 45 years and above 45 years of age were separated for the fertility study. The survey is based on the sample of women attending primary health care center of the Preventive and Social Medicine Department of J.N. Medical College and Hospital which gives medical aid and collects health statistics. The women usually come from lower middle class Muslim households including some non-muslim women also. This may slightly differ from direct household survey of women in different areas as distance from primary health center may affect women attending the primary health center. Biradaris, sects, age and sex status of the individuals were noted and pedigrees were drawn. A master chart was drawn from the information given in the proforma, frequency tallies were made and tables for calculation of mean mode, median, deviation and standard error were drawn for age of the parents and fertility pattern and secondary sex ratio were calculated. The parameters studied were: Marriage incidence, mean maritals age of father, mother and the combined age and Fertility, sterility and secondary sex ratio of offspring.

RESULTS

Marriage incidence: A total of 304 married women were surveyed, out of which majority (81.6%) came from below 45 years of age while only 56 (i.e., 18.4%) came from above 45 years of age. Again, biradari wise distribution shows Ashrafs to contribute about 48% to 54% in the above 45 and below 45 years of age groups respectively, while the Ajlaf shows the reverse trend i.e. 51% and 46%. Ashraf mothers in total contribute to 53%, as compared to 46% by Ajlaf (Table 1). Among Ashraf mothers, Syeds are highest for all the age groups (24%) while Pathans are highest in above 45 years of age (19%), again among Ajlafs, Ansaris dominate in all age groups and Qureshis follow the same in above 45 years of age groups. The lower percentage in late age group may be the result of higher mortality of women in the Indian subcontinent, an indicator of underdevelopment of the country for its lower socioeconomic status. As majority of the women belonged to non-consanguineous cases, these were included only in the study.

Fertility: The numbers of offspring produced were recorded against each mother and frequency tables were prepared. The mean fertility for women of different populations and groups are shown in Table 2. In women of above 45 age group, the mean fertility value ranges from 5.33 (sheikh) to 7.0 (Qureshi), in the lower age group

Table 1: Distribution of mothers of different ages in different populations for reproductive fitness study

Populations	Above 45 Yrs (%)±SE	Below 45 Yrs±(%) SE	Total (%)±SE	(N)	(N)	(N)
Syed	10	17.86±2.20	63	25.40±2.30	73	24.01±2.45
Sheikh	06	10.71±1.77	36	14.52±2.02	42	13.82±1.98
Pathan	11	19.64±2.28	36	14.52±2.02	47	15.46±2.07
Qureshi	11	19.64±2.28	38	15.32±2.07	49	16.12±2.10
Ansari	10	17.86±2.20	62	25.00±2.48	72	25.68±2.40
Saifi	08	14.29±2.01	13	5.24±1.28	21	6.91±1.46
Ashraf	27	48.21±2.86	135	54.44±2.85	162	53.29±2.86
Ajlaf	29	51.79±2.86	113	45.56±2.85	142	46.71±2.86
Combined	56	18.42±2.22	248	81.57±2.27	304	100.0±0.00

Table 2: Mean±SE value male and female fertility for women of different populations and groups

	Above 45 yr			Below 45 yr			Combined age		
Populations	Male	Female	Combined	Male	Female	Combined	Male	Female	Combined
Syed	4.00-±0.53	2.90±0.56	6.9±0.95	2.26±0.18	2.12±0.210	4.35±0.31	2.50±0.21	2.23±0.19	4.69±0.31
Sheikh	2.50±0.50	2.83±0.91	5.33±1.03	2.56±0.277	2.36±0.24	4.91±0.43	2.54±0.25	2.43±0.24	4.97±0.38
Pathan	3.54±0.70	2.91±0.392	6.36±0.823	2.47±0.277	1.91±0.267	4.53±0.453	2.70±0.267	2.25±0.228	4.95±0.38
Qureshi	3.64±0.366	3.46±0.619	7.0±0.772	2.13±0.213	1.94±0.193	3.16±0.275	1.55±0.139	2.28±0.24	4.73±0.36
Ansari	3.30±0.65	3.10±0.48	6.40±1.0	2.40±0.17	2.69±0.18	4.30±0.21	2.25±0.18	2.61±0.17	5.19±0.25
Saifi	2.87±0.51	3.37±0.53	6.25±0.88	3.15±0.51	2.23±0.39	3.33±0.377	3.04±0.17	2.33±0.29	5.71±0.50
Ashraf	3.44±0.35	2.88±0.31	6.33±0.51	2.40±0.12	2.17±0.13	4.55±0.21	2.57±0.12	2.26±0.12	4.84±0.19
Ajlaf	3.31±0.29	3.31±0.31	6.58±0.50	2.43±0.13	2.22±0.13	4.57±0.20	2.57±0.12	2.53±0.13	5.11±0.19

Table 3: Descriptive statistics of fertility for different populations and groups (sample size of women given in table)

	Range			Mean			Mode			Median			Variance			Standard Error		
Populations	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
Syed	2-11	0-11	0-11	6.90	4.35	4.69	5	3	5	6.5	5.5	5.5	8.29	5.97	7.06	0.95	0.31	0.31
Sheikh	3-8	0-11	0-11	5.33	4.91	4.97	3	4	3	5.5	5.5	5.5	5.33	6.63	6.21	1.03	0.43	0.38
Pathan	1-10	0-11	0-11	6.36	4.53	4.95	7	4	6	5.5	5.5	5.5	6.77	7.19	6.84	0.82	0.45	0.38
Qureshi	2-11	1-8	1-11	7.00	4.08	4.73	6	3	6	6.5	4.5	6.0	6.00	4.70	6.47	0.77	0.35	0.36
Ansari	2-11	1-9	1-11	6.40	5.00	5.19	8	4	6	6.5	5.0	6.0	9.04	3.77	4.73	1.00	0.24	0.25
Saifi	4-12	2-9	2-12	6.25	5.38	5.71	5	5	5	8.0	5.5	7.0	5.42	4.54	5.06	0.88	0.61	0.50
Ashraf	1-11	0-11	0-11	6.33	4.55	4.84	5	3	5	6.0	5.5	5.5	6.96	6.23	5.93	0.51	0.21	0.19
Ajlaf	2-12	1-9	1-12	6.58	4.57	5.11	5	3	6	7.0	5.0	6.5	7.00	4.40	5.49	0.50	0.19	0.19
Combined	1-12	0-11	0-12	6.46	3.82	4.99	5	3	5	6.5	5.5	6.0	6.99	5.41	6.20	0.35	0.15	0.14

A: Above 45 years of age; B: Below 45 years of age; C: Mothers of combined age; O: sterility

Table 4: T-diff table for mean fertility in different populations

Biradari	MXF	AXB
Syed	0.9540	2.552
Sheikh	0.3179	0.376
Pathan	1.2820	1.948
Qureshi	2.6320	4.686
Ansari	1.4540	2.055
Saifi	2.1100	3.050
Ashraf	1.7320	3.180
Ajlaf	0.2236	3.738
Combined	5.351	6.906

Table 5: Tdiff values for different groups for mean fertility

Group	AXB	MXF	Ashraf X Ajlaf
Ashraf	3.179	1.726	
Ajlaf	3.738	0.223	X
Combined	6.855	5.330	
Male	3.319		0.000
Female	3.732	X	0.466
Combined	6.855		0.982
Above 45 yr		0.353	0.347
Below 45 yr	X	1.207	0.068
Combined		5.330	0.982

it ranges from 3.16 (Qureshi) to 4.9 (Sheikh) whereas in the combined age group it ranges from 4.69 (Syed) to 5.71 (Saifi). However, Ajlaf is found to be more fertile than Ashraf (Table 2). The range, mean, mode, variance, standard deviation and standard errors were also recorded (Table 3).

Range: The range of children for all age group is zero to 12, for the group beyond 45 years, it is 1 to 12, there being no sterility or infertility. For Ashrafs, the range is from 0 to 11, for Ajlaf it is 1 to 12 (Table 3). The lack of infertility among Ajlaf may speak of higher fertility trend among them. The total absence of infertile women in the above 45 years of age may be also due to a smaller range as compared to the lower age group women with higher sample size.

Mean: The mean number of children per mother is higher, i.e., 6.46 for the 'above' group, as compared to 3.82 among 'below' group, while the combined figure is about 5 (Table 3). Ajlafs again score above the Ashrafs in all age groups. The highest value in the above category is for

Table 6: ANOVA table of mean fertility for different variables (age and caste of the mother and sex of offspring)

Source	Df	SS	MS	F
A_1A_2	1	-14.13	-14.13	-11.5469
B_1B_2	1	0.391	0.391	0.3195
C_1C_2	1	-5.47	-5.47	-4.47
Interaction				
AXB	1	14.00	14.00	11.44
AXC	1	19.87	19.87	16.23
BXC	1	5.349	5.349	4.371
AXBXC	2	19.479	9.739	7.958
Within gps	6	7.3425	1.2237	

A_1-Age abov+e 45 years, A_2 Age below 45 years, B_1-Male sex, B_2 female sex, C_1 Ashraf women, C_2 Ajlaf women

Qureshis (7.0) and for Saifis (5.71). Lowest mean is recorded for Sheikhs (5.33) for the 'above' and the lowest one for Qureshi (4.08) for the combined group. Lowest fertility is recorded for Syeds (4.69)

Mode: The modal value is higher for 'above' group i.e. 5, as compared to 'below' group i.e., 3. Again; mode is 6 (highest) for Ajlafs (Table 3).

Median: Median values range from 5.5 to 6 for Ashraf and 5 to 7.0 among Ajlafs (Table 3).

Variance: Variance is higher for the 'above' group (7.0) than the 'low group', 4.4 to 5.9 (Table 3).

Tdif: The comparison of fertility for different variables i.e., age of mothers, sex of the children born and biradari-wise variation (Ashraf and Ajlaf) is very interesting. The tdif value in mean fertility for male and female child is non-significant for all populations (Table 4 and 5) and for the categories of ages above and below the 45 year, mean fertility difference is non-significant except for Sheikh and Pathan. The difference in fertility among biradaris of women of above and below 45 year is significant. Obviously, age does affect fertility. The inter-population differences are non-significant for all cases except for Qureshis, who show significant differences with Sheikh, Syed and Pathan among the number of male children for women of all age groups and also, that from Saifi and

Table 7: Secondary sex ratio for different groups among women of above and below 45 years of age. andand

	Above 45				Below 45				Combined			
Population	Male	Female	Total	SSR	Male	Female	Total	SSR	Male	Female	Total	SSR
Syed	40	29	69	137.93	143	131	274	109.16	183	160	343	114.37
Sheikh	15	17	32	88.24	92	85	177	108.24	107	102	209	104.90
Pathan	38	32	70	118.75	89	74	163	120.27	127	106	233	119.81
Qureshi	39	38	77	102.63	81	74	155	109.46	120	112	232	107.14
Ansari	23	27	50	85.19	41	29	70	141.38	64	56	120	114.28
Saifi	33	31	64	106.46	149	161	310	92.55	182	192	374	94.79
Ashraf	93	78	171	119.23	324	290	614	111.72	417	368	785	113.31
Ajlaf	95	96	191	98.95	271	264	535	102.65	366	360	726	101.67
Combined	188	174	362	108.05	595	554	1149	107.40	783	728	1511	107.55

Table 8: ANOVA table for secondary sex ratio among the offspring

Source	df	SS	MS	F	P
A_1A_2	1	140.08	140.08	0.1966	NS
B_1B_2	1	168.75	168.75	0.2368	N S
Interaction					
AXB	1	270.75	270.75	0.3800	S
Within group		4	2849.34	712.335	-

Age, A_1- above 45 yr; A2- below 45 yr; B1 – male sex, B2 – female sex

Table 9: χ^2 differences in secondary sex ratio for different groups (calculated from SSR)

Age of mother	χ^2	Degree of freedom
Above 45	8.411	11
Below 45	195	11
Combined	1.91	11
Ashraf-Ajlaf		
Above 45	0.96	3
Below 45	0.113	3
Combined	0	3

Ansari. The Saifi also show significant difference with Ansaris. No significant difference is found among the number of female children born.

ANOVA: The effect of age is significant on fertility of mothers for the Ashraf, the Ajlaf and for combined group, as well as for male and female fertility and combined fertility. This shows age of the mother to be a significant factor for contributing to fertility, while sex of the child or Ashraf vs. Ajlaf status does not hold much difference. The factor analysis of fertility for age, sex and biradari shows age to be significant, while sex of the child and biradari do not have significant effect. Again the interactions of age and sex and age and biradari are significant while that for sex and biradari are nonsignificant. The interaction of age, sex and biradari are also significant (Table 6)

Secondary sex ratio: The number of male children born per hundred female children is higher in higher age group i.e. 119 to 112 among lower age women among Ashraf, but it is lower (98.9 to 102.65) among Ajlaf. Again Ashrafs have higher SSR than the Ajlaf. The lowest SSR is for Sheikhs (88.24) and the highest for Syed (137, 120) (Table 7). The values are statistically significant between

Table 10: χ^2 difference in secondary sex ratio on the male and female offspring Produced different of groups

Age	χ^2	Df	P
Above 45	2.69	11	< 0.9941
Below 45	3.621	11	< 0.979708
Combined	2.753	11	< 0.9935
Ashraf-Ajlaf			
Above 45	0.714	3	< 0.870
Below 45	0.5043	3	< 0.9179
Combined	1.0619	3	< 0.7862

Table 11: χ^2 difference in secondary sex ratio for different groups (calculated from SSR)

Age	χ^2	Degree of freedom
Above 45	8.411	11
Below 45	195	11
Combined	1.91	11
Ashraf-Ajlaf		
Above 45	0.96	3
Below 45	0.113	3
Combined	0	3

Table 12: χ^2 difference in secondary sex ratio on the male and female offspring produced in diffrent groups

Age	χ^2	df	P
Above 45	2.69	11	< 0.9941
Below 45	3.621	11	<0.979708
Combined	2.753	11	< 0.9935
Ashraf-Ajlaf			
Above 45	0.714	3	< 0.870
Below 45	0.5043	3	< 0.9179
Combined	1.0619	3	< 0.7862

the two groups (above and below 45 yr of women) (Table 8 and 9). The _χ^2 difference in SSR is significant for age (both above and below), but not so for Ashraf and Ajlaf status (Table 10-12). ANOVA for sex ratio is nonsignificant for age, sex and Ashraf Ajlaf factors.

DISCUSSION

The patterns of fertility and sex ratio among populations have been explained both on economic as well as genetic factors. Rodriguez and Cleland's (1981) and Cleland's (1985) analyses for many developing countries support the importance of cultural factors in explaining reproductive behavior. Freedman's analysis of World Fertility Survey data indicates that the relationship

between urbanization and socioeconomic status does not follow the standard pattern as described in the theory of demographic transition (1987). The relationships not only vary in size but even in the direction, viz. across and within the countries. Thomas's (1991) analysis of land holding and fertility in Nepal, India, Philippines, Bangladesh, Iran, Thailand and Egypt do not support the proposition that structural variables (land holding) influence fertility.Thomas suggests that fertility behavior should be examined in the wider institutional context.

Easterlin (1983) acknowledges that many non-economic factors might influence fertility behavior and that factors might be influential within the economic framework. Some population researchers are of the opinion that marital fertility transition is conditioned by a series of intermediate variables which, in turn, are strongly influenced by economic, social and cultural factors (Bogaarts, 1978; Lesthaeghe and Wilson, 1986).

The traditional sex-role distinction also influences perceptions of the value children. It is argued that in a society where women are usually financially dependent on men, women are given more value than the men in large families to strengthen the marital bond because women mainly rely on the conjugal relationship as a source of status. In societies where gender-related factors are prominent (husband holds a dominant position in society) like India and Pakistan, men are given greater emphasis than women on the value of sons for continuity of the family name (Zafar *et al*., 1995).

Successful reproductive performances are never equal in each generation, due to various reasons. A number of socio-cultural and biological factors are responsible for variation in reproductive success. Studying the influence of natural selection in human population has always been a challenging job (Deka and Ghoshmauik, 1991).The total survey of a population therefore gives information on the total size, the size of breeding population, the effective size inside the breeding population, the rate of admixture and the fertility performances.

As Drawinian fitness is exhibited by fertility performance, women are the most appropriate to measure it. Male contribution is also equally important, but not in the exact proportion, especially where polygyny is permissible and practiced. Fitness of reproduction thus mainly depends on the female section of a population.

The comparison of Ashraf and Ajlaf is very interesting. The Ashrafs are less fertile while the fertility rate is higher among Ajlafs (Aarzoo and Afzal, 2006). There is a clear distinction between the different classes of society with respect to their present birth rate (Rodriguez and Cleand, 1981; Cleland, 1985). The marriage rate is now lower while the age at marriage is higher than it was a generation ago (Combs and Freedman, 1979; Anderson, 1986; Wakkins, 1986). The marriage rate among Ashraf is distinctly lower than in the Ajlaf class, also the age at marriage is mainly higher in the former than in the latter. Marriage occurs at a later age among Ashrafs than among Ajlafs due to the lower population size. Both marriage age and the marriage rate are important as this influence the birth rate (Luc, 1993; Vareac, 1993). It remains true that large families are nearly always begun early, so Ashrafs produce smaller families than the Ajlaf. Reduction in fertility rate of Ashrafs is attributable also to delayed marriage or due to the lack of availability of partners (Goyal, 1988). The well-off classes have much smaller families than the poor. It may be argued that poverty is the result of large families. Ajlaf with low wages or irregular employment may also influence the number of their children (Zafar *et al*., 1995). In the present case, the level of education and economic status does not vary and hence may not have significant effect on these parameters.

The comparison of age and ethnicity viz a viz populations shows some striking features. Firstly, age is more important factor for reproductive fitness; however, the Ashraf and Ajlaf comparisons are also significant. As far as populations are concerned, there is no distinct trend in each and the differences need to be studied further with larger sample size in each. The gene frequency distribution data studied elsewhere are also not clear except for Ashraf and Ajlaf status denoting respectively the lower and higher caste status of conversions from erstwhile Hindu groups. A detailed study only can throw light on the status of reproductive fitness in these populations. At present, the Ashraf and Ajlaf status may indicate higher and lower caste equivalents among the muslims; while the populations denoted here seem to bemerely biradaris (result of homogamy) which may go for occasional inter-biradari marriages.

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