Maternal age and Ethnicity in determining Demography and Selection Intensity parameters among North Indian Muslims

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Citation

Abstract
Reproductive fitness is best studied by taking together a number of parameters like the mean number of offspring produced, pre-adolescent mortality rate, sex ratio and the rate of selection intensity. 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. In the present study we have reported incidence of marriage, reproductive fitness, mortality and selection forces operative among women of high rank (Ashraf) and low rank (Ajlaf) of Muslims in the northern region. Ashraf comprises sheikh, Syed and Pathan, whereas Ajlaf have Qureshi, Saifi and Ansari biradaris. Maternal age was scored as above 45 and below 45 among each of the biradaris. Significant effects of maternal age were seen on fertility, mortality, and sterility and secondary sex ratio of the offspring, whereas populations did not show consistent difference except between Ashraf and Ajlaf taken separately.

INTRODUCTION
Reproductive behavior of a population is a major attribute of its lifecycle which affects the overall demographic pattern of the population. As a matter of fact, it can be studied in a number of ways, the physiological and psychological factors, the socioeconomic and demographic features, and finally, the demogenetic aspects. The latter is better studied at the population level mainly, in two ways – the reproductive performance and the reproductive fitness. The reproductive performance includes all the facets of reproductive cycle from menarche to menopause, estimating the rates of conceptions, foetal loss, neonatal, juvenile and adolescent deaths etc. Reproductive fitness, on the other hand, is best studied by taking together a number of parameters like the mean number of offspring produced, pre-adolescent mortality rate, sex ratio and the rate of selection intensity. One of the major evolutionary factors in Nature is selection that brings changes in the gene frequency of a population. Its intensity in various populations has been estimated by many workers in India and abroad.

The estimation of fertility and mortality rates of any population occupies the core of population studies. Fertility is a positive force through which the populations expand, countering the force of attrition caused by mortality. 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 and economy, mating pattern and birth control methods have their respective spheres of influence on fertility. Mortality refers to the events of death occurring in a population. The detailed study and estimation of mortality rates plays an important role in determining the pace of population growth. Mortality is a fundamental factor influencing population and is considered useful for determining the current demographic structure as well as understanding the prospects of potential changes in the future. Mortality rates differ from population to population depending upon various biological and socio-cultural factors such as age and sex composition, mating pattern, health care, disease, nutrition, education and income etc.

Muslims in India comprise more than 12 % of the population, yet their genetic structure has not been properly investigated. They belong to two major sects: Sunnis and Shias, and each sect have different biradaris, grouped under
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Ashraf and Ajlaf. The former comprise of higher rank Muslims like Syeds, Sheikh, Pathans and Mughals, while the latter comprises Qureshis, Ansaris, Saifis and other groups of lower occupation. A large number of latter may also be converts from local indigenous population of other faiths. 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 of different age groups have been surveyed to know the incidence and types of, marriage, marital age, fertility, mortality, sex-ratio and selection intensity.

MATERIALS AND METHODS

The survey is based on the sample of women attending primary health center of the Preventive and Social Medicine Department of J.N. Medical College and Hospital for administering medical aid and collecting health statistics. The women usually come from lower middle class Muslim households and some non-Muslims belonging to Civil Lines, Jamalpur, Hamdard Nagar, Badar Bagh, Chungi and Fort areas. This may slightly differ from direct household survey of women in different areas and the distance from primary health center may affect women attending this centre. Biradaris, sects, age and sex status of the individuals were noted and pedigrees were drawn. Death and abortions were included and types of disease were also noted. A master chart was drawn from the information given in the proforma, frequency tallies were made, and tables for calculation of mean mode, median, standard deviation and standard error were drawn for age of the parents, besides fertility, mortality and secondary sex ratio including selection intensity were calculated. We, thus, studied the following parameters- (i) Marriage incidence, mean marital age of the father, mother and the combined age, (ii) Fertility, mortality, secondary sex ratio and selection intensity of offspring.

Samples: The sampling of individuals was done with respect to the following factors.

Age of the parents: Women below 45 years and above 45 years of age were separated for the fertility study. (i) Caste: Ashraf (high rank Muslim women) Ajlaf (low rank Muslim women) (ii) Populations (Biradaris): Ashrafs include Syed, Sheikh, Moghal and Pathan, while the Ajlafs include Qureshi, Ansari, Saifis.

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 km². Aligarh has almost a dry climate throughout the year. During the winter, temperature is very low, though frost is not of frequent occurrence, or of great intensity; the mean temperature in December and January, the coldest month, 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.

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. 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.

RESULTS

MARRIAGE INCIDENCE

A total of 304 married women were surveyed out of which the 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 to around 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% of the sample as compared to 46% by Ajlaf (Table 1).
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Figure 1

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

<table>
<thead>
<tr>
<th>Populations</th>
<th>Above 45</th>
<th>%±SE</th>
<th>Below 45</th>
<th>%±SE</th>
<th>Total</th>
<th>%±SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syed</td>
<td>10</td>
<td>17.8±2.20</td>
<td>63</td>
<td>25.4±2.30</td>
<td>73</td>
<td>24.0±2.45</td>
</tr>
<tr>
<td>Sheikh</td>
<td>6</td>
<td>10.7±1.77</td>
<td>36</td>
<td>14.5±2.02</td>
<td>42</td>
<td>13.8±1.98</td>
</tr>
<tr>
<td>Pathan</td>
<td>11</td>
<td>19.6±2.28</td>
<td>36</td>
<td>14.5±2.02</td>
<td>47</td>
<td>15.4±2.07</td>
</tr>
<tr>
<td>Qureshi</td>
<td>11</td>
<td>19.6±2.28</td>
<td>38</td>
<td>15.3±2.07</td>
<td>49</td>
<td>16.1±2.10</td>
</tr>
<tr>
<td>Ansari</td>
<td>10</td>
<td>17.8±2.20</td>
<td>62</td>
<td>25.6±2.48</td>
<td>72</td>
<td>25.6±2.48</td>
</tr>
<tr>
<td>Safi</td>
<td>8</td>
<td>14.2±2.91</td>
<td>13</td>
<td>5.2±1.28</td>
<td>21</td>
<td>6.9±1.46</td>
</tr>
<tr>
<td>Ashraf</td>
<td>27</td>
<td>48.2±2.86</td>
<td>135</td>
<td>54.4±2.85</td>
<td>162</td>
<td>53.2±2.86</td>
</tr>
<tr>
<td>Ajlaf</td>
<td>29</td>
<td>51.7±2.86</td>
<td>113</td>
<td>45.6±2.85</td>
<td>142</td>
<td>46.7±2.86</td>
</tr>
<tr>
<td>Combined</td>
<td>56</td>
<td>18.4±2.22</td>
<td>240</td>
<td>81.5±2.27</td>
<td>304</td>
<td>100.0±0.00</td>
</tr>
</tbody>
</table>

Among Ashraf mothers, Syeds are highest for all the age groups (24%) while Pathans are the highest in above 45 years of age (19%), again among Ajlafs, Ansaris dominate in all age group, while Qureshis follow the same in above 45 years of age groups. The lower percentage in the late age group is mainly due to the result of higher mortality of women in the Indian subcontinent, an indicator of underdeveloped country and the 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 the frequency tables were prepared. The mean fertility for women of different populations and groups are shown in Table 1. In women of above 45 years of age group, the mean fertility value ranges from 5.33 (sheikh) to 7.0 (Qureshi), in the age below 45 year, it ranges from 3.16 (Qureshi) to 4.9 (Sheikh) in the combined age group it ranges from 4.69 (Syed) to 5.71 (Safi). On the whole Ajlaf is found to be more fertile than Ashraf (Table 2).

Figure 2

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

<table>
<thead>
<tr>
<th>Populations</th>
<th>Male(56)</th>
<th>%±SE</th>
<th>Female(54)</th>
<th>%±SE</th>
<th>Combined(110)</th>
<th>%±SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syed(23)</td>
<td>4.00</td>
<td>2.90</td>
<td>6.9</td>
<td>2.26</td>
<td>2.62</td>
<td>4.35</td>
</tr>
<tr>
<td>Sheikh(42)</td>
<td>2.30</td>
<td>2.83</td>
<td>5.3</td>
<td>2.46</td>
<td>2.36</td>
<td>4.91</td>
</tr>
<tr>
<td>Pathan(47)</td>
<td>3.54</td>
<td>2.91</td>
<td>6.6</td>
<td>2.47</td>
<td>1.91</td>
<td>4.33</td>
</tr>
<tr>
<td>Qureshi(49)</td>
<td>3.64</td>
<td>3.46</td>
<td>7.0</td>
<td>2.13</td>
<td>1.64</td>
<td>4.73</td>
</tr>
<tr>
<td>Ansari(48)</td>
<td>3.86</td>
<td>3.61</td>
<td>8.7</td>
<td>2.13</td>
<td>1.83</td>
<td>5.06</td>
</tr>
<tr>
<td>Safi(47)</td>
<td>4.22</td>
<td>3.21</td>
<td>8.0</td>
<td>2.22</td>
<td>1.78</td>
<td>5.00</td>
</tr>
<tr>
<td>Ashraf(112)</td>
<td>3.44</td>
<td>3.68</td>
<td>6.3</td>
<td>2.40</td>
<td>1.71</td>
<td>4.55</td>
</tr>
<tr>
<td>Ajlaf(140)</td>
<td>3.31</td>
<td>3.31</td>
<td>6.5</td>
<td>2.43</td>
<td>2.22</td>
<td>5.67</td>
</tr>
<tr>
<td>Combined(254)</td>
<td>3.22</td>
<td>3.11</td>
<td>6.4</td>
<td>2.40</td>
<td>2.23</td>
<td>5.02</td>
</tr>
</tbody>
</table>

MORTALITY

The percent mortality for either sex and for offspring of different age, and populations has been shown in Table 3 (a,b). There is a higher mortality in offspring of higher age women; being lowest among the lower age group, female mortality is lower among the female children, again the Ashrafs have higher mortality than the Ajlaf. Among Ashraf, Sheikh have the highest mortality and Syeds have the lowest. Among Ajlafs, Ansaris have highest mortality and Qureshi have the lowest. Qureshi have lowest mortality in all age groups.
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Figure 3
Table 3: Fertility and mortality of women of different populations and groups.

(a) of above and below 45 years of age
(b) of women of all age groups

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 the lower age women among Ashrafs, but it is lower (98.9 to 102.65) among Ajlaf women. Again Ashrafs have higher SSR than the Ajlaf. The lowest SSR is for Sheikhs (88.24) and the highest one is for Syed (137, 120) (Table 4).

Figure 4
Table 4: Secondary sex ratio for different groups among women of above and below 45 years of age.

SELECTION INTENSITY
For selection intensity, the highest value is found among Pathan (0.656), while the lowest one is found among Ansaris (0.377). The sex-wise selection intensity is found to be the highest for Syeds in both males and females (0.630, 0.691) and the lowest among Saifis (in case males, 0.190) and Ansari (in case of females, 0.414) for combined age group.

The Qureshis have lowest value among males (0.21) and Sheikhs have the highest (1.37) values for all the ages in the above 45 years of age group. In below 45 years of age, again Qureshis have lowest value (0.27) as compared to Sheikhs (0.8116) who have highest value (Table 5). Again, females have higher selection intensity than the males, which is quite strange and Ashrafs have the higher values than the Ajlafs. This may be the result of the Ajlafs belonging to the indigenous group of people in India and hence being more adapted.
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Figure 5
Table 5: Selection intensity in offspring for different populations and groups.

<table>
<thead>
<tr>
<th>Population</th>
<th>Above 45</th>
<th>Below 45</th>
<th>Combined</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>Female</td>
<td>Total</td>
<td>Male</td>
</tr>
<tr>
<td>Sikh</td>
<td>41</td>
<td>91</td>
<td>157.94</td>
</tr>
<tr>
<td>Hindu</td>
<td>16</td>
<td>70</td>
<td>86.24</td>
</tr>
<tr>
<td>Pathan</td>
<td>21</td>
<td>70</td>
<td>113.75</td>
</tr>
<tr>
<td>Gujrati</td>
<td>30</td>
<td>32</td>
<td>102.63</td>
</tr>
<tr>
<td>Assam</td>
<td>22</td>
<td>74</td>
<td>93.38</td>
</tr>
<tr>
<td>Sidi</td>
<td>22</td>
<td>64</td>
<td>106.46</td>
</tr>
<tr>
<td>Arab</td>
<td>92</td>
<td>171</td>
<td>151.20</td>
</tr>
<tr>
<td>Arya</td>
<td>102</td>
<td>191</td>
<td>108.83</td>
</tr>
<tr>
<td>Combined</td>
<td>168</td>
<td>374</td>
<td>150.55</td>
</tr>
</tbody>
</table>

Figure 7
Regression of women's age on mean fertility.

Regression equation: $Y = 0.2806 - 0.0235X$

Correlation: $r = -0.5147$

Figure 8
Regression of age of women on percent mortality of offsprings.

Regression equation: $Y = 5.315 + 1.246X$

Correlation: $r = 0.7510$

Figure 9
Regression of age on percent mortality of offsprings.

Regression equation: $Y = 4.121 + 0.1127X$

Correlation: $r = 0.7623$

REGRESSIONS

Regressions of mothers on fertility, mortality, regression secondary sex ratio and selection intensity equation are presented in table 6. Significant effects and r values are visible in all the parameters as given in fig. 1 to fig. 7.

Figure 6
Regression of mean fertility of ethnicity on mean fertility
Successful reproductive performances are never equal in each generation, due to various reasons. A number of sociocultural 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. The total survey of a population will give information on the total size, the size of breeding population, the effective size inside the breeding population, the rate of admixture, the fertility performances and the mortality picture.

As Drawinian fitness is exhibited by fertility performance, women are the most appropriate segment 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, on the other hand, mortality rate among Ajlafs is lower than that of the Ashrafs, also reported earlier.

Ashrafs thus do not show any reproductive compensation behaviors. There is a clear distinction between the different classes of society with respect to their present birth rate. Marriage rate is now lower and the age at marriage is greater than a generation ago. The marriage rate among Ashraf is distinctly lower than in the Ajlaf class, also the age at marriage is mainly greater in the former than in the latter. Marriages occur at a later age among Ashraf than among Ajlaf, perhaps due to lower population size or higher educational status of Ashrafs. Both the marriage age and rate are important as they influence the birth rate. It remains true that large families are nearly always begun early, and hence Ashrafs produce smaller families than the Ajlafs. Reduction in fertility rate of Ashraf is attributable also to the lack of availability of partners. The well-off classes have much smaller families than the poor. It may be argued that poverty is the result of considerably larger families. Among Ajlafs low wages or irregular employment, may also influence the number of children born. In present case, the level of education and economic status do not vary significantly and hence may not have significant effect on these parameters.

The comparison of age and ethnicity vs. populations shows some striking features. First, age is more important factor for reproductive fitness; the Ashraf and Ajlaf comparisons are also important. 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 the Ashraf and Ajlaf status which denotes respectively the lower and higher caste status of conversion from Hindu groups or the migrants and indigenous stock of Muslims respectively. A detailed study only can throw light on the status of reproductive fitness in these populations. The Ashraf and Ajlaf status may show higher and lower caste equivalents among Muslims; while the populations can be considered merely biradaris (homogamy) and hence occasionally, may go for inter-marriages.

The higher selection intensity measures among females in an unusual finding here, as females usually show less values than the males. This may be a result of negligence of the female child than the male ones due to lower socioeconomic strata of the population surveyed. A comparison with a posh colony area may throw light on this phenomenon and needs to be studied further.

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