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Fertility and Mortality Differentials Among the War Khasi of Meghalaya

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It is widely accepted that fertility and mortality are influenced by a large number of biosocial factors like maternal age, parity, education, religion, economic conditions and so on (Caldwell, 1979, 1983; Lee, 1979; Nag, 1981; Cochrane, 1983; United Nations, 1985; Kost and Amin, 1992; Bicego and Boerma, 1993; Freeny and Feng, 1993; and others). For example, demographic transition from high to low levels of fertility and mortality is considered to be associated with the economic development of a population, or rising in the income of a household. However, recent studies have also suggested that the effect of economic condition is rather slow in comparison with other social variables like education, particularly female education (Murthi *et al.*, 1995). For example, Kerala recorded the lowest fertility rate in India during the 1980s, though the per capita income in the State was lower than that in many other States. Similarly, according to the National Family Health Survey in 1993, the per capita income in Mizoram is the lowest in North-East India, but the State has recorded the lowest fertility rates. The studies in Bangladesh by the World Bank (Cleland *et al.*, 1994) have also indicated that the lower fertility in that country with low per capita income is mainly because of the efficient implementation of family planning programmes.

Education is generally considered a key factor of development. It has a profound influence on demographic variables and other indicators of health and nutritional status of a population, or a Nation as a whole. Thus it is suggested that the best health development agenda for the developing countries is to increase investment in formal education, particularly in female education (Caldwell, 1979). It is believed that female education has a significant impact on maternal and child health as it enhances the knowledge and skills of mothers in health care practices concerning age at marriage, contraception, nutrition, prevention and treatment of diseases (Mosley and Chen, 1984). This also means that the higher infant and child mortality rates among the poorly educated mothers are due to their poor hygienic practices and lack of access to modern medical facilities. Moreover, maternal education is related to child health because it reduces the cost of public health programmes relating to information on health technology, increases household income and productivity of health inputs (Schultz, 1984 Mcintosh and Finkle, 1995).

Besides, several studies have revealed that female education is more important than paternal education in exerting a negative effect on fertility, though the influence of the latter is also significant in certain studies (Murthi *et al.*, 1995). Female education is expected to reduce birth rates for the following reasons : First, educated women are likely to have more voice with regard to lightening the burden of repeated pregnancies because they have more control over household resources and personal behaviour. Second, educated women are likely to be less dependent on their children as a source of social status and old age security, thereby leading to a reduction in a desired family size. Third, educated women have higher aspirations for the better achievements of their children, which is conducive to a reduction in a desired family size. Fourth, educated women often have a higher age at first marriage, which is in turn affecting fertility rate. Fifth, educated women often have higher rate of adoption of family planning method, despite certain contradictory results.

With this end in view, the purpose of the present study is to understand how education particularly female education

regulates the fertility and morality differentials in the Christian and non-Christian War Khasi, allowing for the effects of other factors like maternal age, parity, and age at marriage.

MATERIALS AND METHODS

The materials and methods of the present study were also reported elsewhere for different purposes (Khongsdier, 1993, 1994, 1995). A systematic random sampling of the total villages in the War area of the East Khasi hills district of Meghalaya was adopted for the selection of villages. Then, a complete enumeration was carried out in each of the five selected villages, namely, Nongkenbah, Mawsiangei, Nongla, Wahumlein, and Lapalang.

The entire demographic data were collected from all the three hundred sixty households in the five selected villages after a prolonged stay in the field for developing a good rapport with the people. The household schedule designed for getting information on age, sex, marital status, tribe, religion, occupation, income, education, community affiliation, place of birth, place of residence, etc., was completed through in-depth interview with the head of the household, or in his/her absence with other elderly member of the household, who was capable of furnishing all the relevant information.

The fertility schedule was completed by filling in information on the number of conceptions, number of live births, number of reproductive wastage (abortion and still birth), sex, present age, age at death, and birth order from all the ever-married women. Pedigrees were also collected for cross-checking of data on reproductive history of the mothers. Sometimes, information given by the mothers were cross-checked from their respective husbands. It may be mentioned that great difficulties were experienced in the assessment of age, particularly that of the elderly women, since many of them were not aware of their real age. Consequently, in such cases, age was estimated with reference to some important events and also with the help of other persons in the household/village. So there could be some mistakes, in some cases in the estimation of age.

For analysing data on educational level, the individuals who were not able to read and write in any language are

grouped as *Illiterate.* Those who could read and write in any language and those who had education up to standard III are placed under the category of *Primary Level.* All other academic, vocational and professional types of education are included in the category of *Secondary Level,* since the number of persons having such educational standards is very few in the present sample.

RESULTS AND DISCUSSION

Fertility Differentials

Table 11.1 shows the number of live births and surviving children by age groups of the mothers. The table also shows that the number of live births and surviving children tends to increase with the increasing age of the mothers. The coefficient of regression (b) on the effect of maternal age (independent variable) on the number of live births and surviving children (dependent variables) also shows that there is a significant positive relationship between them (Table 11.2). These findings hold true for both the religious groups. Further, Table 11.1 shows that the number of live births per ever-married woman is slightly lower in the Christians (4.87) than in the non-Christians (4.90). But the mean number of surviving children is slightly higher in the Christians (4.38) than in the non-Christians (4.29). These differences between the two religious groups are not statistically significant in respect of both the number of live births ($t=0.11$, $P > 0.05$) and number of surviving children ($t=0.32$, $P > 0.05$).

Table 11.3 shows the age-specific fertility rate (ASFR) according to religious groups. It is found that the total fertility rate (TFR) is slightly higher in the Christians (6.35) than in the non-Christians (6.26). It is also seen that the ASFR reaches its peak when the mothers are in the age group 20-24, then it starts decreasing with the rise in age of the mothers (Figure 11.1). This is true for both the religious groups.

Table 11.4 shows the mean number of live births per ever-married woman by age at marriage. It is seen that the mean number of live births decreases with the rise in age at marriage in both the religious groups. The coefficient of correlation (r) shows that this negative relationship is statistically significant for both the Christians ($r= -0.89$, $P < 0.05$) and non-Christians ($r = -0.93$, $P. < 0.05$). The analysis of variance also indicates that the differences between the marriage age groups in respect of live births are statistically

significant for both the Christians (F=9.78, D.F. = 3,178, < 0.005) and non-Christians (F = 2.80, D.F. = 3, 235, P < 0.05).

The relationship between fertility and educational levels is shown in Table 11.5. It is found that the mean number of live births (unadjusted for maternal age) decreases significantly with the increasing level of maternal education in both the Christians and non-Christians. After controlling the maternal age, the effect of education on fertility is however not statistically significant for both the religious groups. Thus it suggests that maternal age is more important than education for regulating the fertility rate in this population. It is however seen that the mean age of mothers also decreases significantly with the increasing educational level. In other words, the married women, who could not read and write, are much elder than those with primary and secondary levels of education. As a result, most of the *illiterate* women in the present population might have completed their reproductive period, taking into consideration their mean age (Table 11.5), whereas the mothers with *primary* and *secondary* levels of education are mostly younger, thereby they are yet to complete their reproductive performances.

Table 11.1

Live Births and Surviving Children by Age Groups of Mothers

Age groups	*Mothers*	*Live births*			*Surviving children*		
(years	*(n)*	*Number*	*Mean*	*SE*	*Number*	*Mean*	*SE*
Christians							
≤ 24	26	42	1.62	0.26	40	1.54	0.27
25-29	34	100	2.94	0.29	93	2.74	0.30
30-34	23	109	4.74	0.41	100	4.35	0.47
35-39	22	150	6.82	0.47	139	6.32	0.59
40-44	15	90	6.00	0.54	83	5.53	0.66
45+	61	391	6.41	0.35	37	5.52	0.36
Total	181	882	4.87	0.21	792	4.38	0.21
Non-Christians							
≤ 24	28	65	2.32	0.30	59	2.11	0.28
25-29	39	107	2.74	0.29	99	2.54	0.30
30-34	34	160	4.71	0.37	147	4.32	0.39
35-39	32	178	5.56	0.38	160	5.00	0.41
40-44	22	139	6.32	0.58	125	5.68	0.64
45+	83	516	6.22	0.33	430	5.18	0.34
Total	238	1165	4.90	0.19	1020	4.29	0.18

Table 11.2

Regression of Live Births and Surviving Children on Maternal Age

Variable	*Estimated number*	*Regression coefficient (b±E)*	*F-value*	*r^2 (%)*
Christians				
Live births	-2.14	0.20±0.05	16.00*	81.00*
Surviving children	-1.54	0.17±0.05	12.86*	75.69*
Non-Christians				
Live births	-1.47	0.18±0.03	39.90**	90.91*
Surviving children	-2.03	0.19±0.02	76.39***	94.31*

*P < 0.05, **P < 0.005, ***P < 0.001.

Table 11.3.

Age Specific Fertility Rate by Religious Groups

Age group (years)	*Christians*			*Non-Christians*		
	Married women (n)	*Live births*	*ASFR*	*Married women (n)*	*Live births*	*ASFR*
15-19	181	87	0.48	238	120	0.50
20-24	177	258	1.46	236	341	1.44
25-29	158	218	1.38	212	297	1.40
30-34	126	167	1.33	173	200	1.16
35-39	102	93	0.91	139	120	0.86
40-44	76	52	0.68	105	59	0.56
45+	61	7	0.11	83	28	0.34

Fig. 11.1 Age-specific fertility rate

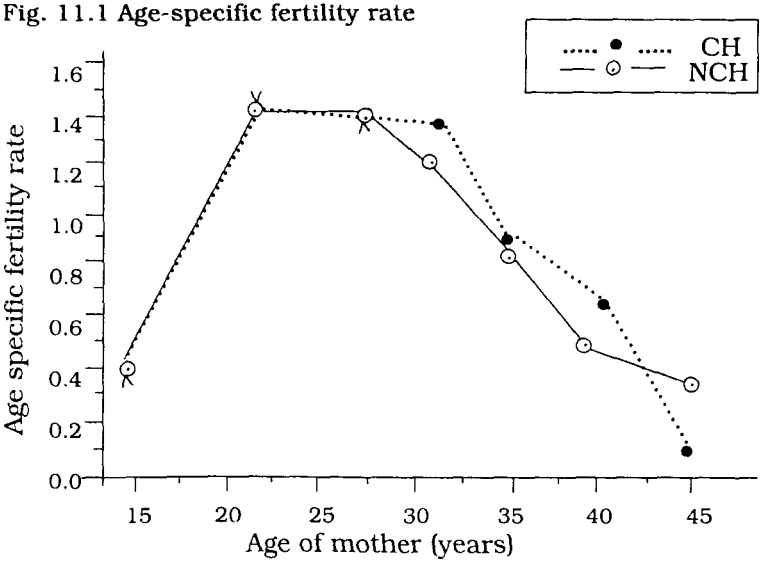

Table 11.4

Number of Live Births by Age at Marriage

Parameters	*Age at marriage (in years)*			
	≤ 19	*20-24*	*25-29*	*30 +*
Christians				
Number of mothers	87	66	22	6
Number of live births	519	258	72	21
Mean number of live births per mother (± SE)	5.97 ± 0.28	3.91 ± 0.31	3.86 ± 0.57	3.50 ± 0.50
Non-Christians				
Number of mothers	140	72	20	6
Number of live births	729	343	72	21
Mean number of live births per mother (± SE)	5.21 ± 0.24	4.76 ± 0.29	3.60 ± 0.47	3.50 ± 0.39

F-statistics : Christians = 9.78, $P < 0.05$; Non-Christians = 2.80, $P < 0.005$. Correlation of coefficient (r) : Christians = -0.89, $P < 0.05$; Non-Christians = -0.93, $P < 0.005$.

Table 11.5

Analysis of Variance and Co-variance on the Effect of Maternal Education and number of live births

Parameters	*Illiterate*	*Primary*	*Secondary*	*F-value*
Christians				
Number of mothers	100	51	30	-
Mean age (years) of mothers	40.70	36.10	33.47	5.37**
Number of live births	528	240	114	-
Mean number of live births (unadjusted)	5.28	4.71	3.80	4.56*
Mean number of live births (adjusted)	4.90	5.03	4.51	0.98
Non-Christians				
Number of mothers	121	93	24	-
Mean age (years) of mothers	39.31	37.47	29.83	7.69**
Number of live births	647	428	90	-
Mean number of live births (unadjusted)	5.35	4.60	3.75	4.01*
Mean number of live births (adjusted)	5.08	4.63	5.00	1.03

*$P < 0.05$, **$P < 0.01$

Infant and Juvenile Mortality

Table 11.6 shows that the infant and juvenile mortality rates are higher in males than in females. However, the binomial test for equality of proportions shows that the sex differences in infant and juvenile mortality rates are not statistically significant for both the Christians and non-Christians (Table 11.7). It is also seen that the infant mortality rate is higher in the non-Christians (9%) than in the Christians (7%), though it is not statistically significant (d = 1.36, P > 0.05). The juvenile mortality rate is also higher in the Non-Christians (4%) than in the Christians (3%), despite the absence of statistical significance (d = 0.74, P > 0.05).

Table 11.6

Infant and Juvenile Mortality According to Sex

Sex	Number of live births	Number of deaths		Morality rate (%)	
		< 1 year	< 15 years	Infant	Juvenile
Christians					
Male	460	34	15	7.39	3.26
Female	422	28	13	6.64	3.08
Total	882	62	28	7.03	3.17
Non-Christians					
Male	607	54	24	8.89	3.95
Female	558	47	20	8.42	3.58
Total	1165	101	44	8.67	3.78

Table 11.7

Value of d (Binomial Test of Proportions between Sexes)

Section of population	Infant mortality rate	Juvenile mortality rate
Christians	4.30×10^{-1}, P > 0.05	1.50×10^{-1}, P > 0.05
Non-Christians	2.60×10^{-1}, P > 0.05	3.30×10^{-1}, P > 0.05

Table 11.8 shows that the infant and juvenile mortality rates increase with the increasing birth order in the present population. The coefficient of correlation between infant mortality rate and birth order is found to be positively significant for both the Christians (0.89, P < 0.01) and non-Christians (r = 0.76, P < 0.05). Also, the coefficient of regression (b) on the effect of birth order (independent variable) on infant mortality rate (dependent variable) is positively significant for both the religious groups (Table 11.9). The form of relationship between infant mortality rate and

birth order is expressed by the following equations:

Christians : Infant mortality rate = 2.59 + 1.31 × Birth order

Non-Christians : Infant mortality rate = 3.88 + 1.53 × Birth order

Table 11.8

Infant and Juvenile Mortality Rates by Birth Order

Birth order	*Christians*			*Non-Christians*		
	Number of live births	*Infant mortality rate(%)*	*Juvenile mortality rate(%)*	*Number of live birth*	*Infant mortality rate (%)*	*Juvenile mortality rate (%)*
1	180	4.44	2.67	212	9.91	3.15
2	198	6.06	2.02	253	5.53	3.56
3	160	6.88	3.75	206	6.31	2.91
4	118	5.08	3.38	173	6.94	2.89
5	101	7.93	1.98	153	9.80	4.58
6	66	12.12	4.55	98	14.29	6.12
7 +	59	12.25	6.78	70	17.14	5.71
Coefficient of correlation (r)		0.89±0.21**	0.71±0.31		0.76±0.29*	0.83±0.25**

*P < 0.05, **P < 0.01.

Table 11.9

Regression of Infant and Juvenile Mortality Rates on Birth Order

Variables	*Intercept (± S.E.)*	*Regression coefficient (b ± S.E.)*	*F-value*	r^2 *(%)*
Christians				
Infant mortality	2.59 ± 1.37	1.31 ± 0.31	18.12**	77.44**
Juvenile mortality	1.36 ± 1.09	0.56 ± 0.24	5.44*	50.41
Non-Christians				
Infant mortality	3.88 ± 2.60	1.53 ± 0.58	6.89*	57.76*
Juvenile mortality	2.06 ± 0.71	0.52 ± 0.16	10.71*	68.16**

*P < 0.05, **P < 0.01.

The correlation between juvenile mortality and birth order is also found to be positive, but it is not significant in the Christians (Table 11.8). Similarly, the regression coefficient indicates that the juvenile mortality rate increases with the increasing birth order for both the religious groups, though

it is insignificant in the Christians (Table 11.9). The relationship between juvenile mortality rate and birth order in both the religious groups is expressed by the following equations:

Christians : Juvenile mortality rate = 1.36 + 0.56 × Birth order

Non-Christians : Juvenile mortality rate = 2.06 + 0.52 × Birth order

The infant and juvenile mortality rates by age groups of mothers are given in Table 11.10. It shows that the infant mortality rate tends to increase with the increasing age group of the mothers, though it is higher in the first age group among the non-Christians. The coefficient of correlation is found to be positively significant in the Christians (0.93 ± 0.18, $P < 0.05$), but it is not so in the case of the non-Christians (0.79 ± 0.31, $P > 0.05$). The regression coefficient (Table 11.11) in the Christians is found to be 0.144 ± 0.03, $P < 0.01$, which is expressed by the equation : Infant mortality rate = 1.42 + 0.14 x Maternal age. Among the non-Christians, on the other hand, this pattern of linear relationship between infant mortality rate and maternal age is not statistically significant (0.212 ± 0.08 $P > 0.05$).

Table 11.10

Infant and Juvenile Mortality Rates by Maternal Age

Age group (years)	*Christians*			*Non-Christians*		
	Number of live births	*Infant mortality rate (%)*	*Juvenile mortality rate (%)*	*Number of live births*	*Infant mortality rate (%)*	*Juvenile mortality rate (%)*
≤ 24	42	4.76	0.00	65	6.15	3.08
25-29	100	5.00	2.00	107	4.67	2.80
30-34	109	5.50	2.75	160	5.63	2.50
35-39	150	6.00	1.33	178	6.74	3.37
40-44	90	6.67	1.11	139	7.19	2.88
45+	391	8.70	5.12	516	11.82	4.85
Coefficient of correlation (r)	0.93 ± 0.18*		0.65 ± 0.38	0.79 ± 0.31		0.64 ± 0.3

*$P < 0.05$.

The relationship between juvenile mortality rate and maternal age is not clearly perceptible in the present study. Table 11.10 shows that the coefficient of correlation is not significant in both the Christians (0.65 ± 0.38, $P > 0.05$) and

non-Christians (0.64 ± 0.39, P > 0.05). Thus it indicates that maternal age has an insignificant effect on juvenile mortality rate, though the oldest mothers (i.e., those who are aged 45 + years) have experienced a higher rate than those in any other age groups (Table 11.10),

Table 11.11

Regression Infant Mortality Rates on Age Group of Mothers

Section of population	*Estimated rate (a)*	*Regression coefficient (b ± S.E.)*	*F-value*	r^2 *(%)*
Christians	1.420 ± 0.94	0.144 ± 0.03	26.29**	86.49*
Non-Christians	0.158 ± 2.76	0.212 ± 0.08	6.65	62.41

*P < 0.05, **P < 0.01.

Table 11.12

Infant and Juvenile Mortality Rates by Educational Levels of Mothers.

Educational level	*Number of live births*	*Infant mortality rate (%)*	*Juvenile mortality rate (%)*
Christians			
Illiterate	528	7.77	3.79
Primary	240	6.67	2.50
Secondary	114	4.39	1.75
Non-Christians			
Illiterate	647	10.20	4.02
Primary	428	7.01	3.50
Secondary	90	5.56	2.63

Table 11.13

Regression of Infant and Juvenile Mortality on Educational Level Adjusted for Maternal Age

Variables	*Mothers (n)*	*b (unadjusted)*	*t-value*	b_1 *(adjusted)*	t_1*-value*
Christians					
Infant mortality	181	-0.119	-1.99*	0.117	1.67
Juvenile mortality	181	-0.070	-1.74	0.076	1.91
Non-Christians					
Infant mortality	238	-0.188	-2.35*	0.175	2.92*
Juvenile mortality	238	-0.048	-0.96	0.043	0.85

*P < 0.05.

The infant and juvenile mortality rates according to educational levels are presented in Table 11.12. It is seen from the table that both infant and juvenile mortality rates decrease with the increasing educational levels for both the Christians and non-Christians. However, Table 11.13 shows that there is no significant relationship between juvenile mortality and educational level. It is true for both the religious groups. On the other hand, the effect of education on infant mortality, unadjusted for age, is found to be negatively significant for both the religious groups ($P < 0.05$). Allowing for the effect of maternal age, the regression coefficient (b) shows that the negative relationship between education and infant mortality is not statistically significant for both the religious groups (Table 11.13). Thus it indicates that both education has a very little effect on infant and juvenile mortality in the present study.

In fine, the present study has revealed the factors like maternal age and age at marriage play a significant role in regulating the fertility rate in the War Khasi population. The effect of maternal education was not statistically significant after allowing for the maternal age factor. The mortality rate, particularly infant mortality rate, was also significantly associated with the maternal age and birth order. With regards to religion, the fertility and mortality rates are more or less same in both the religious groups, though they are slightly lower in the Christians than in the non-Christians. Thus the present findings are quite contrary to the general observation in many Indian populations. This is perhaps due to the fact that the number of mothers with higher education is very small in the present population. However, it may be suggested that further demographic studies are needed to have a better understanding of the relationship between reproductive performances and other biosocial factors in the present population.

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