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Distribution of Age Associated with Marriage Migration

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Abstract: In this study attempt has been made to formulate a model for marriage according to the age difference associated with marriage and Muslim community. For this a single parameter exponential distribution has been proposed and compared with the pareto-exponential function. It was found the exponential distribution provided a good approximation at the survey area and therefore was considered suitable to describe the age associated with marriage in a Muslim community.

Key words: Age, community, distance, demography, marriage, migration

INTRODUCTION

The pattern of varies from society to society according to the customs and social norms of the society concerned. In fact, the age associated with marriage provides an idea about the social contact and it has become a subject of interest among social scientists. Researchers involved with the study of the special pattern of the society have been giving the more attention to the marriage field emphasizing it is relationship between marriage and associated age difference. A verity of models has been development to study of age associated with marriage in India and others parts of the world during the last few decades[1-7]. Sharma proposed a probability model to describe the distribution of age associated with marriage for Northern India based on the assumption (*i*) the distribution of marriages being uniform up to a certain age (say) D. The number of marriages is proportional to the area of the age difference interval d_1 to d_2. The number of marriages with age interval ($d_1<d_2<D$) is proportional to $\pi(d_2^2 - d_1^2)$. And (*ii*) after the age difference D in a particular direction, the distribution of age as follows an exponential form that is the number of marriages in the interval d_1 to d_2 ($D<d_1<d_2$) is

$$[e^{-\lambda(d_1 - D)} - e^{-\lambda(d_2 - D)}]\pi(d_2^2 - d_1^2) \quad \text{..... (1)}$$

Where λ is the risk parameter. The concept behind taking this model was that the age factor is immaterial up to a certain age and marriages are arranged without giving due to consideration to the age. After that particular age as mentioned above the marriage probabilities will be a decaying function of the age keeping in mind the Hindu society involved in the process. Abedin *et al.*[7] extended the model proposed by Sharma as follows:
If M is the number of marriages at age x; then

$$M < 2\pi x f(x)dx \quad \text{.....(2)}$$

$$\text{Where} \quad f(x) = \begin{cases} e^{-\lambda(x - D)} & \text{if } x > D \text{.....(3)} \\ 0, \text{ otherwise} & \text{if } x \leq D \end{cases}$$

This model provided a better an approximation as compared to the Sharma's[6] model. It should however, be noted that the above models for the age associated with marriage have been proposed/developed keeping in mind the Hindu society involved in the process. In a Hindu society, most of the marriages usually take 15 to 20 for male and women take (10-18). All the boys and girls of a village are related as brothers and sisters. 2.3% boys and girls are marriage with teen-age there relations[8]. The problems that arise in marriage and family life apparently have not discouraged persons from entering into such relationships. As a matter of fact, more people are marring today than 20 years ago. In 1998 it was found that 7.8% of all males and 7.02% of all females 35 and over married. Only, 1.02% people had never married.

The age at which people are marrying has also been changing. The first half of this country should a steady decline in the boyhood age at first marriage. This trend is continued until the1971s and 1981s.

After varying periods of unhappiness and readjustment most divorced persons eventually remarry and the likelihood of this second marriages proving successful is almost as great as that for first. Therefore the models proposed by Sharma[6] and Abedin *et al.*[7] are

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not suitable to describe the marriage age of Muslim society. Fortunately, a set of data is an available from a sample survey entitled "Impact of migration on fertility in Bangladesh: A study of Dinajpur district. The Dinajpur district is bounded on the south by Joypurhat zilla and north by Thakurgoan and on the east Rangpur, Gaibandha, Kurigram district. It is one of the oldest districts of Bangladesh. The cluster survey sampling methodology adapted for the selection of sample. A total 2686 sample household from 10 clusters has been interviewed. A study of Dinajpur district survey can be seen in Hossain[9]. Hossain tried to fit the models mentioned earlier. This model did not provide a good fit and Hossain[9] than applied the pareto-exponential function proposed by Morril and Pitts[2] to describe the age difference associate with marriage for this data of Bangladesh. Through this model is provided better approximation than the models proposed by Sharma[6] and Abedin *et al.*[7] but still did not adequately fit the data set utilized. It seems that a model to describe the distribution of age associated with marriage in a Muslim community should be based on the assumption that the number of marriages is a decaying function of age *i.e.* age increases the number of marriages tendency decreases. Exponential distribution may be a good example for this situation and it is proposed in this study.

Model

Pareto-Exponential Function: Abedin[10] applied Morril and Pitts's[2] model to study age associated with marriage on the data of Bangladesh. In brief this model is if Y is the number of marriages, X is the age associated with marriage then Pareto-Exponential Function[2] may be expressed as follows:

$$Y = ax^{-b} e^{-cx} \quad \text{..... (4)}$$

Where a, b and c are the parameters. Taking logarithms on both sides of the above equation, the equations take the linear form:

$$\text{Log } e^{Y} = \log e^{a-b} \log e^{x-cx} \quad \text{..... (5)}$$

Table 1: Distribution of the age associated with marriage for different marriage cohorts, Dinajpur, Bangladesh

	Total Marraiges			Before 1971			1971-1980		
Age in year	Obs.	Exp. M.A.	Exp. M.B.	Obs.	Exp. M.A.	Exp. M.B.	Obs.	Exp. M.A.	Exp. M.B.
12-15	48	51.75	54.55	18	15.49	16.45	10	10.30	9.79
15-18	87	106.78	106.98	31	31.99	33.43	14	18.64	19.64
18-21	792	788.47	806.98	294	286.34	280.22	155	172.59	158.57
21-24	442	431.98	441.47	121	137.12	137.94	90	69.52	79.05
24-27	219	217.43	209.80	74	66.16	67.90	37	34.86	39.41
27-30	29	24.91	27.81	7	7.50	8.10	5	9.09	8.52
30-33	18	11.93	14.18	3	5.39	5.95	4	-	-
33-36	4	5.70	7.23	2	-	-	0	-	-
Total	1639	1639.00	1639.00	550	550.00	550.00	315	315.00	315.00
$\hat{\theta}$	-	-	0.22	-	-	0.23	-	0.23	0.23
$\hat{a}$	-	6.98	-	-	6.02	-	-	-	-
$\hat{b}$	-	-0.25	-	-	0.24	-	-	-	-
$\hat{c}$	-	0.14	-	-	0.01		-	-	-
χ^2	-	8.44	9.98	-	3.52	5.24	-	9.12	4.82
d.f.	-	4.00	6.00	-	3.00	4.00	-	2.00	4.00

	1981-1990			1991-2000		
Age in year	Obs.	Exp. M.A.	Exp. M.B.	Obs.	Exp. M.A.	Exp. M.B.
12-15	13	18.04	16.81	7	10.9	11.45
15-18	27	31.62	31.80	15	20.1	21.92
18-21	203	225.90	215.36	140	166.8	153.65
21-24	131	105.39	113.82	100	73.3	80.28
24-27	62	56.54	60.16	46	37.5	41.95
27-30	11	10.43	8.88	6	6.1	5.98
30-33	7	6.07	7.15	4	5.3	5.06
33-36	0	-	-	2	-	-
Total	454	454.00	454.00	320	320.00	320.00
$\hat{\theta}$	-	-	0.21	-	-	0.21
$\hat{a}$	-	5.75	-	-	5.46	-
$\hat{b}$	-	-0.16	-	-	-0.17	-
$\hat{c}$	-	-0.23	-	-	-0.25	-
χ^2	-	11.33	5.45	-	18.79	10.53
d.f.	-	3.00	5.00	-	3.00	5.00

Exp. M.A. = Exponential distribution of marriage A of the Muslim community
Exp. M.B. = Exponential distribution of marriage B of the Hindu community
d.f. = Decay function

The parameters a, b and c can easily be estimated from equation (5) using the methods of least squares.

Exponential distribution: Due to the reasons as pointed out above the number of marriages at different ages in Muslim community may be a decaying function of age *i.e.* the number of marriages tends to fall quite rapidly for higher ages. Consequently exponential distribution may appear to be a suitable on to describe the age associated with marriage. Suppose, P denote the age associated with the marriage then the probability density function of X is follows:

$$f(p) = \begin{cases} \theta e^{-(\theta P)} & \text{if } p \geq 0 \\ 0, \text{ otherwise} \end{cases} \quad \text{.....(6)}$$

Where θ is the risk parameter. Then the cumulative distribution function of females getting married at age less than or equal to p is given by:

$$f(p) = \begin{cases} 1 - \theta e^{-(\theta P)} & \text{if } p \geq 0 \\ 0, \text{ otherwise} \end{cases} \quad \text{.....(7)}$$

This distribution contains only one parameter θ, which is to be estimated. The maximum likelihood estimate of θ is given by:

$$\hat{\theta} = \frac{1}{\bar{P}} \quad \text{..... (8)}$$

Where $\bar{p}$. is the observed sample mean age associated with the marriage.

Application: Both the pareto-exponential and exponential models are applied to the data of Bangladesh for different marriage cohorts as taken by Abedin[10]. Table 1 shows the number of marriages according to the age in different marriage cohorts. It was found that the pareto-exponential model suitably describe the data for the marriage cohort before 1971-1981 and 1981-1991 but did not fit well for the marriage cohorts 1991-1997 whereas the exponential model was found suitable the data sets. Thus a better fit of the age associated with the marriage, particularly for marriages of Muslim community could be obtained by the exponential distribution as compared to the pareto-exponential function as applied by the Abedin[10].

In this study the distribution of the age associated with marriage has been studied using pareto-exponential function and the exponential distribution. The finding indicated that the exponential distribution provides a better approximation to the distribution of age associate with Muslim community.

REFERENCES

1. Libbe, M.J. and D.E. Shopper, 1975. Marriage and Migration in Rural India
2. Morril, R.L. and F.R. Pitts, 1967. Marriage, Migration and the Mean Information Field, Annals, Association of American Geographers, 57: 401-22
3. Perry, P., 1969. Marriage distance Relationships in North Otago 1875-1914. New Zealand Geographers, 25: 36-43
4. Perry, P., 1969. Working class Isolation and Mobility in Rural Dorset 1837-1936: A Study of Marriage Age, Trans. Inst. Geographer, 47: 102-140
5. Samuel, M.J., 1994. Patterns of Female Migration. In Maithili Vishwanathan (eds.) Women and Society, IV, printed well, Jaipur, India
6. Sharma, L., 1984. A study of the pattern of out migration from rural areas, Ph.D. Thesis in Statistics, Banaras Hindu University, India
7. Abedin, K. M., A.M. Ripon and M.A. Rahim, 1988. On the distribution of age Associate with Marriage in Rural Areas of Uttar Pradesh, India
8. Abedin, K.M., M.Z. Hossain and Islam, 1998. Distribution of age associated with Marriage in Rural Areas of Bangladesh, The Bangladesh J. of Sci. Res., 16: 201-207
9. Hossain, M. Z., 2000. Some demographic models and their applications with special reference to Bangladesh., Ph.D. Thesis in statistics, Banaras Hindu University, Varanasi, India
10. Abedin, K.M., Soni-Srivastava and Sabina, 2000. Distribution of age associated with marriage migration in rural areas of Bangladesh, 1: 49-54