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Most Recent Birth Intervals in a Traditional Society: A Life Table and Hazards Regression Analysis

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Abstract

The fertility of the Indian rural population is close to natural. High levels of fertility exist in spite of low levels of fecundability associated with longer birth intervals. The birth rate of a female generally is equal to the inverse of her mean closed birth interval. In the present research, the most recent birth interval (MRB)—which is defined as the interval between last and next-to-last birth prior to the survey date—is analyzed for the state of Assam, India. Single-decrement life table techniques and multivariate hazards regression models are applied to the data. The hazards analyses show that covariates like age at first marriage, present age of women, parity of mother, age difference between spouses, survival status of next-to-last birth, and family income have significant effects on the length of the most recent birth interval. The interactions of age of mother with the level of education, and sib size of the family have highly significant effects on the duration of MRB intervals. The level of natural fertility in this traditional society can be considerably affected by policies that foster an increased bride's age at marriage, a reduction in the infant death rate through better health care programs, improved literacy levels of mothers of the community, and increasing family incomes.

Résumé

La fécondité de la population rurale indienne est proche du taux naturel. Des niveaux élevés de fécondité existent malgré de bas niveaux de fécondabilité associés à des intervalles génésiques plus longs. En général, le taux de natalité de la femme est égal à l'inverse de la moyenne de son intervalle génésique fermé. Dans la présente étude, l'intervalle génésique le plus récent, qui se définit comme l'intervalle entre la dernière et l'avant-dernière naissance qui a précédé la date de l'enquête, est analysé pour l'État d'Assam (Inde). Les données ont été soumises aux techniques des tables de mortalité à extinction simple et à des modèles de régression des hasards à plusieurs variables. Les analyses des hasards montrent que les covariances telles que l'âge au premier mariage, l'âge actuel des femmes, la parité de la mère, la différence d'âge entre épouses, le statut de survie de l'avant-dernier enfant et le revenu de la famille ont des effets significatifs sur la longueur de l'intervalle génésique le plus récent. Les interactions entre l'âge de la mère, le niveau d'éducation et le nombre de frères et soeurs dans la famille ont des effets significativement plus élevés sur la durée des intervalles génésiques. Dans cette société traditionnelle, le taux de fécondité naturel peut être considérablement affecté par les politiques qui encouragent le mariage de la femme à un âge plus tardif, une réduction de la mortalité infantile grâce à de meilleurs soins de santé, un meilleur niveau d'alphabétisme des mères de la collectivité et un revenu familial plus élevé.

Key Words: Present age of mother, parity, survival status, spouse

The process of human reproduction in traditional societies starts with the consummation of marriage and ends with divorce, menopause or death of either spouse. It is affected by a number of socio-economic and cultural factors on the one hand and a number of biological factors on the other. Further, socio-economic and cultural factors affect fertility through biological factors.

Birth intervals in human populations offer an interesting, fruitful, and intriguing area for scientific inquiry into fertility patterns. In traditional societies, birth spacing has been probably the most effective means of regulating reproductive capacity. Also, the analysis of birth intervals provides a useful framework for examining biological and sociological factors determining the level of fertility in human populations. Interest in this study was aroused by the works of Henry (1956), Potter (1963), Perrin and Sheps (1964), and Srinivasan (1967). Henry showed that the birth rate of a woman is equal to the inverse of her mean closed birth interval.

Many retrospective surveys on fertility and family planning undertaken in the developing as well as in the developed countries in recent years have compiled information on fertility histories of women included in the surveys. Fertility histories include data on the timing of various significant events in the life cycle of a woman, such as her marriage, and the dates (usually the month and calendar year are recorded) of first, second, and the last live birth. These data permit calculation and analysis of birth intervals which can be categorized into two broad types: the *closed interval,* which is the interval between the successive live births of a woman and the *open interval,* which is the interval from the date of last live birth to the date of the survey, calculated for each woman. The study of birth intervals—both closed and open—has gained considerable importance as they are used as sensitive indices of fertility and for detecting current changes in the natality pattern of women who are still in reproductive ages. In some ways, the timing of births is more sensitive to changes in actual behavior of fertility than traditional aggregative measures such as the crude birth rate or the total fertility rate.
Birth intervals measured retrospectively from the date of the survey provide information about the fertility performance of women prior to the survey

point. In developing countries, however, sample survey data on birth intervals that occurred in the long past suffer from non-sampling errors arising from recall lapses of respondents. These errors, which are sometimes serious, often vitiate the data if the duration of time elapsed since the occurrence of the event is large (Das Gupta, Som, Mazumdar and Mitra, 1955; Hobcraft, 1985). In this context, data on the MRB interval, which is defined as the interval between last and next-to-last birth prior to the survey date, seems to be less effected by such memory biases because it is easier for women to recall their most recent birth intervals rather than those occurring in the remote past. In most cases, errors based on faulty reports and memory bias are likely to be distributed randomly across the analytical groups of interest within a fairly homogeneous population and would not systematically affect the kinds of multivariate analysis presented here (Rindfuss and Morgan, 1983, p.262). Thus, MRB data will be more reliable than other closed birth intervals (Srinivasan, 1967). Simulation experiments have shown that last closed intervals are quite sensitive to immediate changes in fertility parameters and are also robust with respect to nonfertility parameters (Sehgal, 1971). The MRB interval of a female contains the following four components: (i) the period of post-partum amenorrhoea (PPA) following the birth of a child, (ii) the total duration of menstruating intervals between the two live births, (iii) the periods of pregnancy and post-termination amenorrhoea (if any) of abortion or still births in the interval between the two live births, and (iv) the period of pregnancy associated with the live birth. The first component, the duration of PPA, during which conception usually does not take place due to the absence of ovulation, is influenced by the health conditions and nutritional status of the women as well as the breast-feeding practices prevailing in the community. The second component, the sum of waiting time to conceptions that occurs between two live births, is influenced by socio-cultural and biological factors. The third component of the birth interval is the contribution of fetal losses which occur to the women between two consecutive live births. The fourth component, the duration of pregnancy associated with a live birth, is the least variable part of the MRB interval.

Thorough studies of child-spacing patterns in India are lacking, perhaps because of non-availability of appropriate data. In societies where contraception is non-existent, such as rural parts of India, the length of birth interval may be considered a measure of fecundity. The spacing of birth intervals is influenced by various biological and social factors such as age at marriage, age of mother at child birth, number of parities to the mother, income, religion and caste. Social customs and taboos relating to marital customs may also influence the birth interval, and such cultural factors vary by regions in India.

The structure of birth intervals in India seems to be different from that of Western nations (Leridon, 1980; Rao and Balakrishnan, 1989; Suchindran and Lingner, 1977; Marini and Hodson, 1981). For Indian mothers, birth intervals (except for the first birth) are comprised of long durations of PPA associated with a nearly universal prolonged pattern of breast-feeding (Bhattacharya, Pandey and Singh, 1988; Singh and Singh, 1989; Nath, Singh, Land and Talukdar, 1993b). Previous studies have estimated that the duration of PPA varies between 2 and 13 months. Post-partum abstinence taboos play a key role in determinants of birth intervals in traditional Indian society. In some parts of India, the practice of abstinence depends on the developmental characteristics of the child, such as walk, sitting up, or cutting teeth (Santow, 1978). Religious customs and taboos also play important roles as determinants of birth intervals in India. Generally, among Hindus, the majority observe sexual abstinence during certain occasions such as religious festivals, the new moon day, and the day following the full moon day.

In this paper, we examine the structure of the most recent (last closed) birth interval, irrespective of parity, after subtracting the actual length of PPA in a traditional Indian society. Life tables of birth intervals and median birth intervals are reported for several subgroups of the study populations. Multivariate hazards regression techniques are used to estimate the net effect of each explanatory variable and interactions among the variables.

Data and Their Characteristics

Data for the research presented in the paper come from a retrospective survey: "A Study on Effects of Socio-Economic Factors on Fertility Among Scheduled Caste Population in the Rural Areas of Karimganj District, Assam" conducted during 1988-89 (reference date of the survey was 15th June, 1988) under the auspices of University Grants Commission (UGC), New Delhi.

The objectives of this survey were to obtain reliable data relating to fertility, studying the socio-economic and behavioral factors affecting fertility, and estimating bio-cultural parameters of human reproduction in traditional societies. In addition to other information, data were collected regarding age at marriage, total number of children ever born and surviving, including details about duration variables—PPA, timing of births, etc.—for all births occurring within the last seven years for each married eligible female in the household. Life history events were dated to the year and month through the use of a calendar of local events such as notable ceremonies like Annaprasen (introduction of rice as a solid food for the first time), festivals such as Durga Puja, Holi, Dipavali, Makovr, Sankranti; severe drought, eclipses, and administrative or political incidents.

The survey was confined to only the scheduled caste population—the socially backward and economically deprived class of the Indian population. The Karimganj district of Southern Assam is predominantly a Bengali speaking area, where a large number of villages are identified as scheduled caste villages. If at least 10% of the village population belongs to the scheduled castes, the village is considered to be a scheduled caste village by the Directorate of Economics and Statistics, Assam. From the list of scheduled caste villages of the district, a sample of 39 villages were selected by simple random sampling. Then all scheduled caste households were enumerated. The survey comprises 1805 scheduled caste households from selected villages.

A couple is defined as *eligible* for the present study if both the partners are alive on the reference date of the survey and the age of the female spouse was less than 50 years. Only those eligible couples who did not practice any method of family planning, and for which husband and wife were normal residents of the village, were considered. As the UGC survey was restricted to the scheduled caste population, a grouping of sub-castes was done for the present analysis with each group having its own distinct social organization and culture. Educational attainment among these groups of people is very low and most of them are still engaged in traditional occupations such as agriculture, fishing, laundering, hair cutting, cane works, pot-making, and basket making. Only a small number of persons were employed in government or nontraditional private sector jobs. They were placed in the lowest class of Hindu society. Mothers were categorized according to level of education as (i) those who had no schooling or 1-3 years of schooling, or (ii) 4 or more years of schooling. The monthly per capita income of the family may be considered as an indicator of both social status and health status of mother and children. On the basis of per capita income (PCI), two economic groups were formulated as family having per capita income equal to as (I) PCI≤ Rupees. 60, (II) PCI >Rupees. 60.

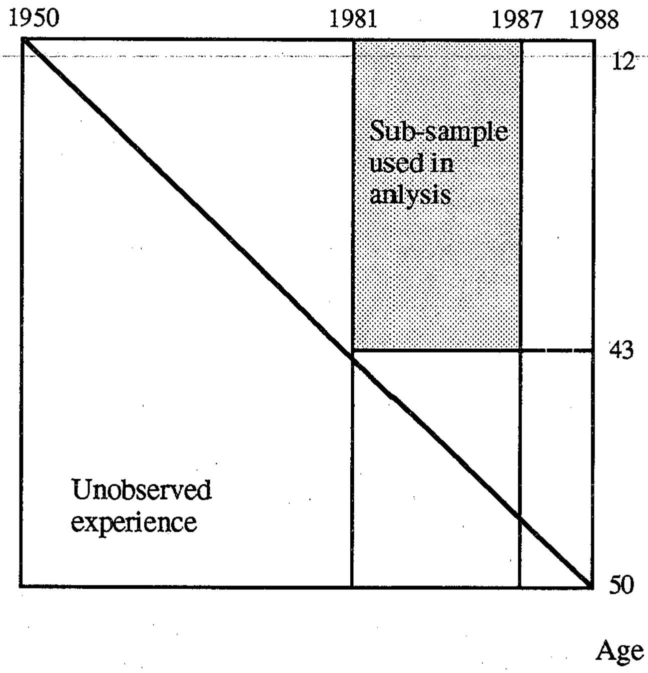
In this society, most marriages take place before the bride reaches menarche and marriage is arranged by the parents or other senior members of the household of the bride or bridegroom. Couples usually live together after marriage. Data on age at marriage of females were grouped into four cohorts: (I) ≤ 13 years, (II) 14 or 15 years, (III) 16, 17 or 18 years, and (IV) ≥ 19 years to observe the effect of age at marriage on the MRB interval. The first group represents the prepuberty group, the second and third group early and late adolescence, and the final group consists of women starting sexual activity post-adolescence. Further, mothers were classified according to their number of children ever-born as parity groups (I) 1-2 parities, (II) 3-4 parities and (III) 5 and more parities. These grouping may indicate families with small, medium, and large family norms respectively. Further, to investigate the effect of age, mothers were categorized according to their present age as: (I) < 25 years, (II) 25-30 years, (III) 30-35 years and (IV) 35-43 years groups. The status of the next-to-last births are categorized as: (I) death as infant (i.e, if child dies within first year of the birth), and (II) surviving the first year of life. In this traditional society, marriages are arranged by the parents, relatives or a senior member of the household of the bride and groom. There is a cultural preference for younger brides. In this study, all the husbands were older than their respective wives. An indicator of the degree of egalitarianism in the relationship between a wife and her husband is the age difference between the two. The age difference between spouses (present age of husband minus present age of wife) are classified as (I) ≤ 5 years, and (II) ≥ 5 years.

Analytical Methods

The major problem in using retrospective birth interval data collected from a cross-sectional survey is the incompleteness of the maternity histories of the women, except for the oldest cohorts. This incompleteness generally creates two types of problems, viz., selectivity and censoring, which are difficult to tackle both statistically and substantially. Selectivity occurs since the transition from parity i to (i+1) can only be studied for women who have reached at least the (i+1)th parity at the time of survey. But such women will have different durations of marriage and thus do not represent the whole population. Censoring arises because some of the women who have reached parity i did not reach parity (i+1) as they were not given adequate time due to the short exposure period by the reference date of the survey. The problem of censoring can be statistically handled through the application of life table techniques.

The selection bias in demographic studies arising from retrospective surveys has been addressed by several authors (Rodriguez and Hobcraft, 1980; Rindfuss, Palmore and Bumpass, 1982; Vaupel and Yashin, 1985; Heckman and Walker, 1990; Rogers, 1992). Rindfuss et al. (1982) suggested a method for overcoming selectivity bias when birth interval data from a retrospective survey are analyzed. In a recent study, Nath, Singh, Land and Talukdar (1993a) demonstrated the use of this technique in analyzing retrospective data on the time of first birth. Following the guidelines of Rindfuss et al., we selected a subset of the available set of retrospective data for analysis—bounded by current (at survey date) ages of 12 and 43 and which occurred in the seven years ending a year before survey as indicated (shaded area) in the Lexis diagram shown in Figure 1. This provides a set of MRB intervals to be analyzed which is unbiased by age at beginning of interval (Rindfuss et al., 1982, p.9).

FIGURE 1. ILLUSTRATION OF ALL MRB INTERVALS INITIATED SEVEN YEARS ENDING A YEAR BEFORE THE DATE OF THE SURVEY



Life tables of recent intervals for groups defined by a single variable were constructed first. Two summary measures, median birth intervals (measuring the tempo of fertility) and the proportion not conceiving within 97 months (indicating quantum of fertility), were calculated by standard life table techniques (Namboodiri and Suchindran, 1987).

Because of interrelationships among many of the covariates studied, the use of conventional single-decrement life tables alone does not show which factors are independently associated with the length of the MRB interval. To investigate these interrelationships, multivariate analysis was used to determine the effects of each variable. Cox's (1972) proportional hazards regression model has been recognized as a useful multivariate analysis model for analyzing cross-sectional data obtained from demographic surveys.

Cox's model combines the merits of both life table and regression techniques. The hazard or instantaneous-risk function at time t is given by

$$log_e h(t) = log_e h_0(t) + \beta_1 X \qquad (1)$$

where $h_0(t)$ is an arbitrary non-negative unspecified baseline hazard function not dependent on the covariate, β_1 is a vector of unknown regression coefficients to be estimated, and X is set of independent variables. From the Cox model, the relative risk of having a birth prior to the date of survey (irrespective of order of parity) was estimated for each group of interest. All women with at least one birth were considered. Those women who had not had a second birth were censored at the time of the survey. In all cases, birth intervals related to twins are excluded from the present analysis.

To estimate possible interactions among covariates, the following specification of the model was used:

$$log_e h(t) = log_e h_0(t) + \beta_1 X + \beta_2 (X*Y) \qquad (2)$$

where Y is also set of independent variables and the coefficients β_2 measures interactive effects of the set of independent variables. The hazard function allows estimation of relative risks of other groups in relation to baseline group by the exponent of the regression coefficient exp(·). Each exponentiated coefficient represents the effect of a covariate on the hazard functions relative to a reference group. When there is no covariate present, the exp(·) term reduces to unity. Values greater than unity indicate the relative risk of birth is greater for this group, compared with the reference group, whereas values less than unity indicate a decrease in the risk. Throughout this analysis, birth intervals are used after excluding the post-partum amenorrhoea period.

TABLE 1(a). LIFE TABLE ESTIMATES OF MEDIAN LENGTH OF MOST RECENT BIRTH (MRB) INTERVAL AND PROPORTION OF FEMALES HAVING MRB INTERVAL WITHIN SPECIFIED MONTH BY SELECTED CHARACTERISTICS.

Covariates	*Median MRB interval*	*Proportion of females whose length of MRB interval is less than (in months)*				
		18	*24*	*36*	*60*	*N*
Overall						
Age at marriage	27.05	8.79	26.74	57.01	82.15	1395
≤13 years	30.48	15.00	26.36	49.24	70.55	124
14-15 years	29.18	8.38	23.52	51.64	76.06	457
16-18 years	26.07	6.27	26.47	60.85	87.53	649
≥19 years	21.99	15.11	40.48	69.08	93.08	165
Present age of women						
<25 years	20.43	8.82	40.67	78.52	97.29	562
25-30 years	26.50	10.42	27.55	60.82	90.85	346
30-35 years	33.94	8.40	18.31	44.01	75.80	319
35-43 years	53.54	6.10	11.91	29.13	50.23	169
Women's parity						
1-2	24.13	8.63	31.68	64.04	89.22	874
3-4	30.27	9.02	22.11	49.56	76.18	352
≥5	32.29	9.01	17.79	46.39	67.70	169
Age difference between Spouses						
≤5 years	21.81	16.94	35.61	73.25	97.59	140
≥5 years	27.76	7.90	25.78	55.30	80.48	1255
Type of Next-to-last birth						
Death as infant	17.87	22.61	50.61	69.53	82.67	151
Survived	27.88	7.04	23.62	55.39	82.16	1244
Mother's education						
Illiterate/Nominal	27.02	9.38	27.36	57.19	81.35	1097
Literate	27.11	6.53	24.26	56.38	85.76	298
Income group						
≤Rs.60.00	26.51	9.30	27.54	58.38	85.86	926
≥Rs.60.00	27.37	8.52	26.29	56.21	79.78	469
Sub-caste						
Namasudra	27.37	9.92	26.46	55.99	81.17	858
Kaibarta	26.83	7.99	27.49	58.18	84.46	372
Others	26.07	4.71	26.40	59.50	84.24	165

Results

Table 1(a) presents a summary of the life table median birth intervals and proportion of females who had their last child (except first births) prior to the reference date within 18, 24, 36, and 60 months from next-to-last birth for Assam mothers. The overall median MRB interval for scheduled castes females is 2.25 years. The average length of MRB interval is shortest (1 year and 6 months) following an infant death. The maximum length of the MRB interval (4 years and 6 months) corresponds to the oldest female birth cohort.

The results show that the groups differ widely in their birth intervals. As age at marriage decreases, and present age, parity of mother, and age difference between spouses increase, the length of MRB interval increases. Further, as family income goes up, the length of MRB interval also increases. The MRB interval does not vary within sub-castes.

A nonparametric statistical procedure (the generalized Wilcoxon test) was used for group comparisons of these differences because some variables are not normally distributed. It is used to test for significance differences between the survival functions for various groups. Age at marriage, present age of women, parity, age difference between spouses, survival status of next-to-last birth, and family income are found to create statistically significant difference between groups (Table 1(b)).

TABLE 1(b). THE VALUES OF CHI-SQUARE BASED ON WILCOXON LOG-RANK TEST FOR GROUP COMPARISONS.

Groups	*d.f.*	*Chi-square*
Age at marriage	3	21.974**
Present age of women	3	135.120**
Women's parity	2	32.355**
Age difference between spouses	1	23.047**
Type of next-to-last birth	1	44.362**
Mother's education	1	0.262
Income group	1	3.882*
Subcaste	2	0.035

* Significant at 5% level
** Significant at 1% level

The proportion of mothers who had their last birth prior to the survey date within 18, 24, 36 and 60 months from the date of next-to-last birth reveal the differential timing of MRB interval among the subgroups considered. In this sample, only 5 to 23% of the females had their birth interval less than 18 months prior to the survey in different subgroups of the population. Approximately 18% of mothers failed to have their last birth within 5 years from the birth of the next-to-last child.

A comparison of MRB intervals classified by specified covariates while controlling other covariates was performed through multivariate hazards regression analysis and is presented in Table 2. The results show that groups classified by age at marriage, present age of women, parity of mother, age difference between spouses, survival status of child, and family income groupings differ widely in their MRB intervals. Females married at the age of 19 years or higher are more likely to have a long MRB interval as compared to females married at the age 18 or earlier. The youngest female cohort (<25 years), highest parity (5 and above) and the females belonging to lower household income are more likely to have a long birth interval. We observe that age at marriage, present age of mother, parity, household status, and family income have significant effects on the length of MRB interval. The hazards model shows that the youngest birth cohort has a risk of having the MRB more than two times higher than that of oldest birth cohort mother. The hazards model showed that when the child died as an infant, the adjusted risk of the next birth was 1.69 times higher than for women who had not experienced a death.

Examining the interaction model (Model 2), we find highly significant interaction effects of present age of mother with parity and education. As the present age of female increases, the length of MRB interval for (i) a literate mother, and (ii) a mother belonging to lower parities, are more likely to decrease significantly. All other types of such two-factor interactions are statistically insignificant (not shown).

Discussion

It is now widely accepted that the component most influential in determining the length of the birth interval, except the first, in conditions of natural fertility, is the period of PPA which accompanies prolonged lactation. In the present analysis, we have investigated the effect of different bio-social variables on the length of MRB interval after subtracting the length of PPA.

TABLE 2. ESTIMATES REGRESSION COEFFICIENTS FROM COX'S PROPORTIONAL HAZARDS MODEL

	MODEL 1			*MODEL 2*		
Co-variates	β	*exp* (β)	*S.E.*	β	*exp* (β)	*S.E.*
Age at marriage[a]						
≤13 years	-0.7187***	0.487	0.1740	-0.8783***	0.415	0.1767
14-15 years	-0.7022***	0.495	0.1320	-0.8795***	0.415	0.1357
16-18 years	-0.4257***	0.653	0.1210	0.5249***	0.592	0.1229
Present age of women[b]						
<25 years	2.3084***	10.059	0.1843	1.2439***	3.469	0.2852
25-30 years	1.6598***	5.258	0.1729	1.1359***	3.114	0.2306
30-35 years	0.8359***	2.307	0.1562	0.7293***	2.074	0.1681
Women's parity[c]						
1-2	-1.0118***	0.364	0.1680	3.0220***	20.533	0.7431
3-5	-0.5448**	0.580	0.1427	2.0893***	8.079	0.8036
Age difference between spouses[d]						
≤5 years	0.3583***	1.431	0.1127	0.2956***	1.344	0.1138
Type of Next-to-last birth[e]						
Death as infant	0.5215***	1.685	0.1060	0.4998***	1.648	0.1068
Mother's education[f]						
Literate	-0.0357	0.965	0.0927	0.662	1.947	0.5472
Income group[g]						
≤Rs. 60.00	0.1271**	1.136	.00744	0.1250**	1.333	0.0747
Sub-caste[h]						
Kaibarta	-0.0357	0.965	0.0830	-0.0122	0.988	0.0829
Others	0.0913	1.096	0.1122	0.1117	1.118	0.1123
Interaction						
PAGE*Parity[k]						
PAGE*Small				-0.1385***	0.871	0.0251
PAGE*Medium				-0.0815***	0.972	0.0207
PAGE*literate[l]				-0.0279***	0.972	0.0207

Statistical significance ***p<0.001 **p<0.01 *p<.05

Omitted categories: a: ≥19 years, b: 35-43 years, c: ≥6, d: ≥5 years, e: Survived, f: Illiterate/Nominal, g: >Rs. 60.00, h: Namsudra, k:PAGE*Large, [l]PAGE*Illiterate/Nominal.

PAGE: Present age of female

S.E.:standard error β= regression coefficient

This study found median MRB intervals of 18-53 months. This corresponds to an extended period of median PPA of approximately 9-13 months for Assam (see Nath et. al., 1992a). The long duration of MRB interval is an indication of the populations' low fecundability. These unusually long MRB intervals may be due to intrauterine mortality and periodical abstinence due to various social customs and taboos practiced during conjugal life in Indian traditional society such as:

(i) generally among Hindus, the majority observe sexual abstinence during certain occasions such as religious festivals, new moon days, the day following the new moon and full moon days;
(ii) intercourse with a lactating women is also taken to be an unethical practice in societies which may extend the period of abstinence; and
(iii) during early parities, a female usually visits her parent's house for delivery and remains for a long period.

Further, very young wives may find it difficult to interact frequently with their much older husbands. Without contraception, a decrease in the age difference between the spouses may therefore lead to an increase in fertility through free and easy sexual intercourse.

Primary or permanent sterility does not directly influence the observation of birth intervals. However, there might be temporary sterilities, either after a birth, in which case they are included in the non-susceptible period, or during the fecund period, in which case they play a role similar to that of non-susceptible periods related to intrauterine deaths.

The quantum or proportion in the sample population having a birth within five years of the previous birth when this occurred in the periods 0-5 years before the survey shows considerable variability. The low value of quanta for the oldest birth cohort of mothers may be due to presence of larger numbers of adolescent sterile couples or may be due to low coital frequency.

Our findings are consistent with the findings of similar birth interval analysis in non-contracepting populations which have reported that median length of birth interval is 34 months in Bangladesh (Chen, Ahmed, Gesche and Mosley, 1974) and 27-32 months in Pakistan (Sathar, 1988). Leridon (1980) studied the birth intervals in natural fertility of moderately Malthusian conditions. He reported that the average birth interval of females (of parity 1-12) was between 20.5 to 34.8 months for historical families (seventeenth and eighteenth centuries), 20.8 to 39.2 months for Japan and 19.9 to 30.3 months for the Hutterite population. Based on United

States fertility data, Marini and Hodson (1981) observed that age at marriage bears little relationship on the spacing of the second birth. In contrast, our findings lend support to the hypothesis that age at marriage has a strong negative relationship with the MRB interval. The parity of the mother also has a significant negative effect on the MRB interval. The analysis shows that fertility decreases as the age difference between the spouses increases. An infant death has been found in other studies to shorten the subsequent birth interval. We similarly find that, when a child died as an infant, the mother's subsequent birth interval was nearly 10 months shorter than the birth intervals of women who had not experienced an infant death. Educational attainments of the women of this society are very low. Most of the mothers who were categorized as literate in this study could not complete their tenth-grade graduation. The effect of education, however, is weak and there is a slight gradient, suggesting the risk is marginally higher for women with lower levels of educational attainment (i.e., no formal qualification or 1-3 years of schooling). The desire to postpone births also appears to increase with level of income.

The use of the multivariate hazards model to find differentials of child spacing between subgroups of Indian traditional society produces some interesting results. The pace at which the last child is born is slower for women marrying at younger ages, belonging to older cohorts, having lower parities, lower in income groups, with higher age difference between spouses, and having a surviving child. These findings support other evidence that fertility is usually found to be positively correlated with age and negatively correlated with age at first marriage (Feyisetan, 1984; Feyisetan and Adewuyi, 1988).

Interaction effects of the present age of mother with covariates like parity and education have strong negative effect on the length of MRB intervals. For females who have lower parities and are literate, the length of the MRB interval becomes longer as the current age of mother increases. It appears that reproductive behavior is more strongly related to current age of mother than to achieved parity.

Estimates of fecundability among Indian females are low (Singh, 1969) compared to Western standards. Poor nutrition and a low rate of coitus are hypothesized to be reasons for the low fecundability status of the population. Post-partum abstinence taboos also play a key role in determinants of birth intervals in this society.

The main limitations of our study are absence of data on coital patterns, spontaneous abortions, health and nutritional status of mothers. To take these factors into account, other studies are necessary. Nonetheless, the present analyses contribute to an understanding of the mechanisms governing MRB intervals in a traditional society.

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