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First Birth Interval: A Comparative Study of Two Indian States

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Abstract: First birth interval has always been at the forefront of demographers due to its impact on all demographic and non-demographic characteristics of a female. In our present paper we analysed the data from N.F.H.S.-3 for two states viz; Kerala and Rajasthan. We tried to identify the link between various socio-economic and demographic factors with first birth interval of a female. In addition to statistical measures, proportional hazard analysis in combination with life table was applied to investigate the impact of various factors on first birth interval.

Keywords: Marriage, fertility, birth rate, hazard, birth interval etc.

1 Introduction

Henery [12] was the first to demonstrate the existence of inverse relationship between first birth interval and fecundability of females, which drawn the attention of demographers towards the analysis of the first birth interval. The first birth interval and females age at marriage are two important factors of fertility (Bongaarts [3], Bongaarts and Greenhalgh [2]). It is an established fact that larger the first birth interval and late marriage will slow down the population growth. In recent years, a substantial decline in fertility has been observed in southern and south-eastern Asia, as a sizable number of females are delaying their marriage and first birth (Prachuabmoh [23]). A couple, who is willing to have only one or two children, either they may prolong their first birth interval or stop their fertility after completing their desire. Thus, delaying the first birth might not be an important objective of state only, but also it might work in favour of individual couples (Zheng [33]). In India, the age at first birth of females is relatively low in comparison to developed countries. It was about 19.8 years in 2005-06, though age at effective marriage rose to 20.7 years in 2011 (MoHFW-2011, IIPS and Macro international 2007 [14]). Transition to motherhood sets a stage for all future demographic events to take place and it has considerable implications for completed fertility and health of both mothers as well as of children. Despite of its importance, very less attention has been paid to the studies of first birth interval in India. But some studies have got very significant findings about the role and implication of sociological and demographic factors on first birth interval (Bloom and Reddy [1], Singh et al. [28], Mishra et al. [19]). India is still, predominantly a traditional society, in which parental and societal pressure to give birth soon after marriage is considered another important factor in shortening the first birth interval. As children are considered a means to prove the fecundity and sustainability of marriage, the findings on birth interval are considered as the indices of human reproduction. We can explain the reproductive process of women as a sequence of events in her life time and the time at which these events happen. It starts with the beginning of biological capacity to reproduce, bearing first child, second child etc., and finally the end of reproduction either through sterility or death, whichever comes first (Rodriguez et al. [27]). Since we can measure the fertility levels over time through the birth intervals, the role of determinants of birth interval becomes of considerable importance. The birth interval, particularly, first birth interval, shows a clear picture of the way in which different variables affect fertility. It helps in attaining a better understanding of the variables and the pathways, through which those variables directly or indirectly, affect the fertility level. In this paper, we systematically tried to examine some aspects of first birth interval in two states of India viz; Rajasthan and Kerala, including the role played by various socio-economic and demographic factors. The present

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study aims to give the basic answers, the importance of first birth interval and more importantly, the mechanism and pathways, that how the various factors determine the first birth interval and, consequently, the completed fertility in two different Indian societies. There is a remarkable cultural, social, developmental and regional difference, which set apart these two states, particularly when it comes to the gender role, marriage practices and autonomy of females. On one side little autonomy is provided to females due to age old kinship and patriarchal structure of the society (Stephenson et al. [30]), while on the other side women in south Indian society have more autonomy, better level of education and easy access to family planning facilities (Rocca et al. [26]).

2 Data and methodology

The National Family Health Survey (NFHS-3) [14] was conducted under the stewardship of Ministry of Health and Family Welfare, implemented by International Institute for Population Science, during 2005-06. All of 29 states were covered in both the phases. Kerala is a state of low fertility, high age at marriage, somewhat even economic distribution and with almost full literacy. Due to all these characteristics, it has drawn the attention of demographers to study the implications and role played by various socio-economic and demographic factors. On the other hand, Rajasthan is placed at the lower rank among all the states with respect to all the parameters of population development. It has high fertility, very low age at marriage, wide spread illiteracy and still, a large chunk of population unaware about modern method of birth control. So, the objective of choosing these two states is to compare the two extremes of population and to investigate the effect of various factors on first birth interval. Two kinds of problems arise in the study of first birth interval viz. selectivity

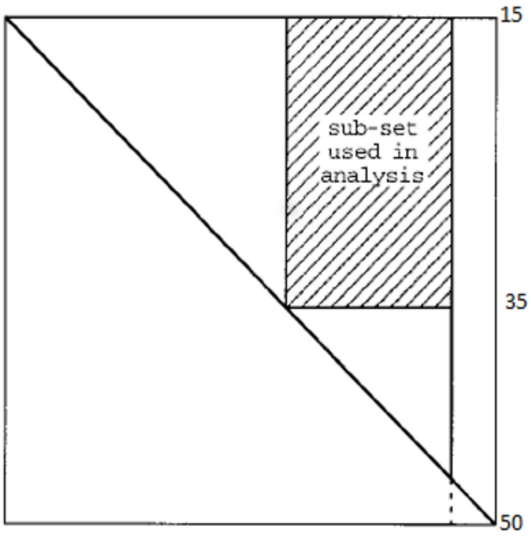

Fig. 1: Lexis diagram for the selected sample

and censoring (Yamaguchi [32]). In retrospective survey, birth history of females, except those falling in oldest cohort, is incomplete, due to short exposure period cut short by the reference date. The problem of censoring can be managed easily through the application of life table technique in combination with multivariate procedures (Cox [6]). Rindfuss et al. [25] devised a methodology to overcome the problem of sample selectivity. According to this method, a subset from the whole data set is selected. The selected sub set comprises of the birth events bounded by current ages of 15 to 35 years and which took place in the 15 years ending a year before the survey. The shaded area in the following lexis diagram indicates the subset selected for the study.

The cases with shorter birth intervals (less than 8 months) and longer intervals (above 120 months) were dropped from the study. The cases with shorter birth interval were considered as inconsistent, as the premarital births are not found common in traditional Indian society. The females with longer birth interval are considered as sub-fecund, because their fertility pattern is not normal due to sexually transmitted infections and complications in pregnancies (Duncan et al.[8]).The first birth interval (in months) was selected as the outcome variable for the study. All women (ever married) aged 15-35 years, who were permanent residents, were asked questions on their background characteristics, education, media exposure, current age and age at marriage etc. Every female was asked about their permanent residence and was

recorded as rural or urban. Since there is a substantial amount of socio-economic and cultural difference between the two backgrounds, we presumed that it might influence the decision of a female of entering motherhood. Economic status of the household is another important factor that might influence the fertility level of a couple. It was grouped as poorest, poorer, middle, richer and richest. Since observations were few on many of them poorest and poorer subgroups were merged into poor, as well as richer and richest into rich. Every female was asked whether she or her husband had ever been to school. If so, then how many years of schooling they had completed. We categorized them primary (0-5 years), secondary (6-12) and higher (more than 12). Religion has always played an important role in determining the fertility decision of a female, due to different customs and taboos prevailed among the followers of different religion. To investigate the effect of religion on the fertility level of two backgrounds, religion was also taken into account. Since majority of population belonged to Hindu community and very few were from Muslim, Sikh, Christian, Jain, Jewish, Buddhist etc. So the religion was grouped into Hindu and non-Hindu. To study the effect of age at marriage (A.M.) on the first birth interval, females were categorized into two subgroups, (i) A.M.=18 (ii) A.M.¿18, on the basis that legal age at marriage of females is 18 years in India. Occupation is another important covariate, presumed to affect the timing of first birth. Every female was asked about the occupation of both husband and wife and then categorized into working and non-working class. Current age of females was divided into four categories to assess the effect of age on fertility level. Biologically, it is ovulation which leads to conception. A female can simply, predict her menstruation cycle, but difficult to know about ovulation period. Keeping this fact in mind, knowledge of ovulatory cycle was included as a predictor covariate to examine its influence on fertility level. The length of first birth interval depends on many demographic and socio-economic factors. In order to assess the study variable, cox proportional hazard model and Kaplan Meier plot were employed, in addition to the descriptive methods. The Cox model has the advantage of both life tables as well as of multivariate regression approach. With a view to enquire the partial effect of several covariates on the dependent variable, hazard model is a suitable technique for the study. The key equation for the Cox model is;

$$h(t,z) = h_0(t).Exp(\beta_1 z_1 + \beta_2 z_2 + \beta_3 z_3 + \cdots \beta_i z_i)$$

In the above equation, time variable t denotes the first birth interval. The outcome variable $h(t)$ denotes the hazard rate i.e. the rate at which birth takes place or the risk of having first birth at time t. The term h_0 is the baseline hazard function that varies only with t. The term $\beta_1, \beta_2, \beta_3, \cdots \beta_i$ are the regression like coefficients showing the effect of covariates on outcome variable. The model shows, how the predictor representing the behaviour of a subgroup of woman affect their risk of entering motherhood as compared to the baseline group. If $exp(\beta)$ is greater than one, it means that the concerned covariate has the effect of raising the hazard rate or the risk of early birth relative to the baseline group, and if it is less than one, the risk becomes lower. It becomes neutral if $exp(\beta)$ is one. Kaplan Meier plot or the survival curve shows the probability of entering motherhood by a female before or at the time of survey (Klinbaum and Klein [16]).

Table 1 shows the frequency distribution of selected females under study by their socio-economic and demographic characteristics. As mentioned, we selected two states Rajasthan and Kerala for comparison. Geographically, both these states are situated at the two ends of Indian Territory. One is the Hindi speaking population and other non-Hindi. We can observe the marked difference between the populations of two states with respect to their background characteristics. In Rajasthan, more than 70% of females are very less educated, where as it is just around 7% in Kerala. There is also a lot of difference between middle educated and highly educated proportion of both states. In Rajasthan, only 21% females completed their 12 year of schooling, while in Kerala this figure is 74%. The proportion of urban and rural residents is almost equal in both the states. Around 33% and 66% females belonged to urban and rural category respectively. Media exposure was found to be quite low among majority of females (64.6%) in Rajasthan and the corresponding proportion is 17.4% in Kerala. A big chunk of females (88%) belonged to Hindu community in Rajasthan, while in Kerala about 56% belonged to Hindu and non-Hindu sect respectively. Economic status of more than half of the females was found to be lower or middle in Rajasthan. A very good proportion of females in Kerala (83%) belonged to rich category. A substantial part of population, 69% and 65% was engaged in labour work in Rajasthan and Kerala respectively. More than 90% of females in both the states belonged to non-working class. In Rajasthan, more than 85% females did not know about ovulatory cycle. Despite all efforts of state and central government of promoting the age at marriage, more than three fourth of marriages were taken place before reaching to the legal age at marriage. In Kerala too, 36% females got married well below the legal age at marriage. In both the states, around 8% and 2% females belonged to latest cohort respectively. No event is considered as big as marriage in India. Marriage practices and behaviour are highly varied in Indian society across different groups and regions. Table 2 depicts the median age at marriage and spread. Going through all the covariates under study, it is apparent that females with less education, residing in rural settings, with a poor media exposure, low income group, Hindu and those with no work have a lower mean age at marriage relatively. Though, there is a greater degree of variation with respect to different covariates, but, the trend continues to be more or less the same throughout both the states. Table 3 demonstrates the mean first birth interval with spread by different socio-economic background characteristics for both the states. Over all mean first birth interval was found to be 29.86 and 27.48 months for Rajasthan and Kerala respectively. There has been a difference of about two months between low educated and highly educated females in Rajasthan, while in Kerala; mean first birth interval is highest for those females who got education

Table 1: Distribution of the females according to the background characteristics in both the states

Background characteristics	Rajasthan		Kerala	
	percentage	N	percentage	N
Female Education				
Up to Primary	72.2	338	7.6	25
Up to Secondary	20.7	97	74.4	244
Above Secondary	7.1	33	18.0	59
Residential Status				
Urban	33.1	155	33.8	111
Rural	66.9	313	66.2	217
Media exposure				
Poor	66.0	309	17.4	57
Good	28.6	134	59.9	196
Excellent	5.3	25	22.6	74
Religion				
Hindu	88.0	412	56.1	184
Non-Hindu	12.0	56	43.9	144
Economic Status				
Poor	32.7	153	4.9	16
Middle	24.8	116	12.2	40
Rich	42.5	199	82.9	272
Husband's Occupation				
Agriculture and labour work	69.0	323	65.2	214
Professional	31.0	145	34.8	114
Female's Occupation				
Not working	95.1	445	86.9	285
Working	4.9	23	13.1	43
Ovulatory Cycle				
Does Not Know	88.2	413	59.8	196
Knows	11.8	55	40.2	132
Age At Marriage				
Less than 18	76.9	360	35.7	117
Above 18	23.1	108	64.3	211
Current Age Of Mother				
15-18	7.7	36	1.8	6
18-21	13.2	62	7.9	26
21-24	16.7	78	11.9	39
25 & Above	62.4	292	78.4	257

only up to the secondary level. Mean birth interval is higher for urban females relative to their rural counterparts. It seems that mass media plays a crucial role in Rajasthan in determining the mean first birth interval as the difference is highest between poorly and well informed females. Again the religion has emerged a dominating factor in both the states, though, in different direction. Economic status has the significant impact on both the states and it is more dominating for Kerala, since the difference of more than four months exists between low income and high income group females. Occupation of both husband and wife has shown a marked difference in its own way. As the working husbands have the tendency of having a longer first birth interval than their counterparts in both the states. It can be observed from the table that working females have longer first birth interval in both the states. As noted and expected, knowledge of ovulatory cycle has significant role to play. In both populations, females, who know ovulatory cycle correctly, have the higher first birth interval. In Rajasthan, females who got married before legal age at marriage have the higher mean birth interval, while in Kerala, situation is somewhat opposite. Mean birth interval has been found to be lower in latest cohort relative to the oldest cohort in Rajasthan, while in Kerala it is higher for the age group 15-18.

It is clearly evident by table 4 that overall median first birth interval as well as percentages of females, who did not have the first birth after 97 months of marriage is higher for Rajasthan than for Kerala. The higher first birth interval can be explained by the lower age at marriage (Table 3) as compared to Kerala, but at this stage, it is difficult to conclude anything about the higher percentage of childless females in Rajasthan. Since, it might be either voluntarily act or in fecundity. But being a highly male dominating and traditional society, the possibility of voluntarily choosing not to have a baby after such a long time, seems to be very fading. This factor needs some in-depth investigation. Median first birth

Table 2: Some statistical measures for age at marriage (in years) according to the background characteristics in both the states

Background characteristics	Rajasthan			Kerala		
	Mean	Tri mean	Spread	Mean	Tri mean	Spread
Over all	**16.65**	**16.25**	**3.00**	**20.32**	**20.25**	**5.00**
Female Education						
Primary	15.84	15.75	3.00	19.00	19.00	5.50
Secondary	17.63	17.25	3.00	19.66	19.25	5.00
Above Secondary	22.06	22.75	3.50	23.63	23.75	3.00
Residential Status						
Urban	18.06	17.25	5.00	20.80	20.50	6.00
Rural	15.95	15.75	3.00	20.07	20.00	4.00
Media exposure						
Poor	16.05	16.00	4.00	19.86	19.75	5.00
Good	17.54	17.00	4.00	19.98	20.25	5.00
Excellent	19.36	19.25	6.50	21.58	21.00	6.00
Religion						
Hindu	16.60	16.25	3.00	21.07	21.12	5.75
Non-Hindu	17.02	16.75	3.00	19.36	19.25	5.00
Economic Status						
Poor	15.86	16.00	4.00	17.94	17.87	3.75
Middle	15.84	15.75	3.00	18.95	18.87	4.50
Rich	17.73	17.25	5.00	20.66	20.25	5.00
Husband's Occupation						
Agriculture and labour work	16.12	16.00	4.00	19.82	20.00	4.25
Professional	17.83	17.25	5.00	21.25	21.00	6.00
Female's Occupation						
Not working	16.58	16.25	3.00	19.89	19.75	5.00
Working	18.04	17.50	6.00	23.14	23.37	8.00
Ovulatory Cycle						
Does Not Know	16.53	16.25	3.00	19.54	19.25	5.00
Knows	17.60	17.12	4.00	21.48	21.75	5.00
Age At Marriage						
Less than 18	15.29	15.25	3.00	16.43	17.00	2.00
Above 18	21.14	20.50	4.00	22.46	22.00	4.00
Current Age Of Mother						
15-18	15.39	15.75	3.00	16.67	16.75	1.50
18-21	16.29	16.25	3.00	17.81	18.25	3.00
21-24	16.54	16.25	3.00	20.38	20.75	3.00
25 & Above	16.91	16.50	4.00	20.65	20.50	6.00

interval is higher for Rajasthan with respect to all the covariates selected under study. But the percentage of childless females is markedly varied in both the states. Since most of the variables were not normally distributed, a non-parametric test named Wilcoxon-Gehan test proposed by Gehan [9], was applied to compare the survival distribution among groups based on differences in group mean scores (Table 5). Almost all the covariates were found to be insignificant at 5% level of significance except current age of female for Rajasthan.

For additional analysis, hazard regression model and Kaplan Meier plot were applied to estimate the effect of all the covariate under study. In both the states, rural females are at higher risk of having shorter first birth interval relative to their urban counterparts and the hazard is more in Rajasthan (Table 6). Highly educated females are at the lesser risk of early motherhood in Rajasthan, while corresponding risk is more in Kerala. It indicates that female education is negatively associated with the first birth interval in Rajasthan. The female education behaves in a different fashion in both the states. The implication of this factor is considered to be the same across different populations. It is very astonishing to see that this does not work here as per that defined pattern. Religion does not appear to play any significant role at both places. However, with the increasing level of education the effect of religion seems to be dwindling in Kerala. Economic condition of females might influence the risk of bearing first child. Economically sound females have the higher risk of shorter first birth interval in Rajasthan. Prosperity ensures the lesser risk of early first birth in Kerala. Husbands occupation also has the significant role to play in both states. Professionally settled husband have lesser risk in Rajasthan, but it is more in Kerala. Working females in Kerala have the tendency of having shorter first birth interval. But in Rajasthan this hazard is as low as almost 2%. It is interesting to observe that the females, who know about their ovulatory cycle correctly, are at the lower

Table 3: Some statistical measures for first birth interval (in months) according to the background characteristics in both the states

Background characteristics	Rajasthan			Kerala		
	Mean	Tri mean	Spread	Mean	Tri mean	Spread
Over all	**29.86**	**24.50**	**25.00**	**27.48**	**22.25**	**19.00**
Female Education						
Up to Primary	29.65	24.00	26.00	28.44	24.00	28.00
Up to Secondary	31.23	25.00	22.50	27.54	22.87	19.75
Above Secondary	28.00	22.50	23.00	26.83	20.75	20.00
Residential Status						
Urban	31.61	27.37	28.00	28.45	22.75	19.00
Rural	29.00	22.75	23.00	27.00	22.00	20.00
Media exposure						
Poor	29.29	23.25	25.00	25.35	21.25	15.00
Good	30.42	24.50	26.25	29.04	23.50	21.00
Excellent	33.92	30.50	26.00	24.45	21.00	18.00
Religion						
Hindu	29.93	24.00	24.00	26.61	22.37	17.75
Non-Hindu	29.30	26.37	26.75	28.60	22.75	23.50
Economic Status						
Poor	27.44	21.50	18.50	24.50	19.62	16.25
Middle	34.61	25.87	29.75	25.97	21.50	16.50
Rich	28.95	25.25	25.00	27.88	23.12	20.75
Husband's Occupation						
Agriculture and labour work	29.75	23.87	25.00	27.43	23.50	19.25
Professional	30.10	25.00	27.00	27.59	20.75	20.00
Female's Occupation						
Not working	29.69	24.00	24.00	27.61	22.50	20.00
Working	33.13	27.62	37.00	26.65	22.87	16.00
Ovulatory Cycle						
Does Not Know	29.86	24.75	24.75	26.24	21.75	19.00
Knows	29.89	24.00	25.75	29.33	23.12	18.75
Age At Marriage						
≤ 18	30.28	24.12	24.25	27.12	22.75	21.00
> 18	28.46	24.62	25.50	27.69	22.50	18.00
Current Age Of Mother						
15-18	32.06	25.50	23.00	23.83	14.50	22.75
18-21	28.11	23.00	22.00	24.69	18.75	18.00
21-24	31.23	26.50	30.75	28.59	23.62	23.00
25 & Above	29.59	24.00	24.00	27.68	23.00	18.50

risk of early first birth in both populations. This hazard is as low as 18% and 3% in Kerala and Rajasthan respectively. With the increasing age of females the risk of first birth increases exponentially in both the states and relatively more in Kerala. Females, who got married before achieving the legal age at marriage, have higher risk of smaller first birth interval at both places. Exposure to mass media plays a very crucial role in determining the first birth interval and the effect is prominent in both the states. Its effect seems to be more effective in Rajasthan in favour of longer first birth interval, while in Kerala it works in favour of shorter birth interval.

3 Discussion and conclusion

In Indian context, traditionally, entry into motherhood goes only through marriage. From the above analysis, we observe that early entry into marital union leads to the longer first birth interval. The possible reason attributed to this fact might be that females who got early into marital union are less educated, socially and economically backward and reside in a rural settlements. In such kind of atmosphere, females have to observe a lot of customs and taboos prevailed in that society, resulting in a very low coital frequency for early few months of marriage. Thus, the probability of conceiving becomes low and the first birth interval gets larger. While the females who marry late show some catch up effect by trying to cover the lost time in attaining education and finding job through the rapid first birth (Hong [13]). Higher age at marriage could produce the higher age at child bearing, prolongs the interval between generations and hence reduce the

Table 4: Median first birth interval from Life table analysis (in months)

Background characteristics	Rajasthan			Kerala		
	Median first birth interval	% who had not had first birth after 97 months	N	Median first birth interval	% who had not had first birth after 97 months	N
Over all	**13.50**	**5.0**	**468**	**13.45**	**2.0**	**328**
Residential status						
Urban	15.08	3.0	155	14.54	4.0	111
Rural	12.21	6.0	313	13.00	1.0	217
Female education						
Up to Primary	12.76	5.0	338	13.50	0.0	25
Secondary	16.09	5.0	97	13.91	3.0	244
Higher	13.77	8.0	33	11.48	0.0	59
Religion						
Hindu	13.00	5.0	412	13.21	1.0	184
Non-Hindu	15.74	0.0	56	14.00	3.0	144
Economic status						
Poor	10.38	5.0	153	9.80	0.0	16
Middle	14.67	10.0	116	11.67	0.0	40
Rich	14.82	2.0	199	14.19	3.0	272
Husband occupation						
Labour and agriculture	13.45	5.0	323	14.09	2.0	214
Professional	13.79	4.0	145	12.28	2.0	114
Female occupation						
Not working	13.24	0.05	445	13.71	2.0	285
Working	13.55	0.0	23	13.19	0.0	43
Ovulatory cycle						
Wrongly knows	13.00	5.0	413	13.00	0.0	196
Correctly knows	15.78	2.0	55	14.36	7.0	132
Current age of female						
15- 18	8.67	36.0	36	14.00	0.0	6
18-21	16.89	18.0	62	18.00	0.0	26
21-24	17.37	5.0	78	12.54	0.0	39
Above 24	11.04	3.0	292	12.17	2.0	257
Age at marriage						
≤ 18	12.76	5.0	360	12.50	1.0	117
> 18	15.50	5.0	108	14.09	3.0	211
Media exposure						
Poor	12.00	2.0	309	12.07	0.0	57
Good	14.96	2.0	134	14.67	3.0	196
Excellent	11.16	6.0	25	11.75	0.0	74

Table 5: Wilcoxen-Gehan test statistics for testing the median in both states

Background characteristics	Rajasthan			Kerala		
	χ^2-statistics	D.f.	p-value	χ^2-statistics	D.f.	p-value
Residential status	3.445	1	0.063	0.540	1	0.463
Female education	1.732	2	0.421	1.342	2	0.511
Religion	1.414	1	0.234	0.000	1	0.989
Economic status	2.583	2	0.275	0.451	2	0.798
Husband occupation	0.079	1	0.778	0.623	1	0.430
Female occupation	0.013	1	0.911	0.104	1	0.748
Ovulatory cycle	0.249	1	0.618	0.509	1	0.476
Current age of female	15.922	3	0.001	5.597	3	0.133
Age at marriage	1.242	1	0.265	1.032	1	0.310
Media exposure	3.979	2	0.137	2.223	2	0.329

Table 6: Likelihood of the background characteristics using Proportional hazard ratio analysis

Background characteristics	Rajasthan				Kerala			
	p-value	hazard ratio	95% C.I.		p-value	hazard ratio	95% C.I.	
			Lower	Upper			Lower	Upper
Residential status (Ref.: Urban)								
Rural	.222	1.204	.894	1.622	.496	1.095	.844	1.421
Female education (Ref.: Up to primary)								
Secondary	.675	0.931	.667	1.300	.768	1.090	.616	1.927
Higher	.772	0.917	.510	1.648	.518	1.279	.607	2.696
Religion (Ref.: Hindu)								
Non-Hindu	.844	1.034	.742	1.442	.982	0.997	.770	1.292
Economic status (Ref.: Poor)								
Middle	.053	0.756	.570	1.004	.901	0.954	.455	2.003
Rich	.564	1.101	.794	1.528	.319	0.682	.322	1.447
Husband occupation (Ref.: Labour and agriculture)								
Professional	.515	0.915	.701	1.195	.675	1.066	.792	1.435
Female occupation (Ref.: Not working)								
Working	.945	0.984	.612	1.581	.876	1.032	.691	1.541
Ovulatory cycle (Ref.: Wrongly knows)								
Correctly knows	.887	0.976	.694	1.372	.142	0.819	.627	1.069
Current age of mother (Ref.: 15-18)								
18-21	.007	2.532	1.284	4.991	.197	3.852	.496	29.891
21-24	.001	2.883	1.502	5.534	.189	3.883	.512	29.444
Above 24	.000	3.835	2.075	7.086	.091	5.539	.759	40.427
Age at marriage (Ref.: <18)								
≥18	.273	0.851	.638	1.136	.092	0.783	.590	1.041
Media exposure (Ref.: Poor)								
Good	.780	0.958	.709	1.295	.402	0.858	.601	1.227
Excellent	.313	0.762	.449	1.292	.573	1.130	.739	1.727
-2 log likelihood	**4048.18**				**2643.63**			

population growth (Soung and William [29]). Our findings are similar to that of Marini [18], Gibson and Mace [10], Nath et al. [21] and Singh et al. [28]. It is well known fact that early age at first birth leads to higher fertility. Early entry into childbearing prolongs the fertility span, resulting in a high fertility. Ahbab Mohammed [24] has shown that the females who start early childbearing are more fecund than females who conceive later. Gyimah [11] has also observed the negative association between early motherhood and fertility. Choe et al. [5] in their study on Nepalese women found a significant association between early marriage and womens autonomy. The another explanation of early age at marriage might be given that India is still predominantly a conventional society, particularly rural areas, where marriage is considered to be the union of two families rather than two individuals. It has been observed that where marital decision are made by the parents then age at marriage seems to be lower as compared when the decision are taken by only concerned individuals (Caldwell and Caldwell [4], Dehal et al. [7]). Another important covariate is the attainment of female education. It is clearly indicated by table 2 and 3 that low educated females enter marital union early and have longer birth interval than their other counterparts in both the states. The delay in first birth might be attributed by the fact that highly educated females have different priority about their life and career. They first want to settle professionally and economically by getting a secure and well paid job and after that they start thinking about family formation (Marini and Hodson [18]). Education suppresses the desire for large family and gets the female more aware, which in turn leads to the fewer and well brought up children (Okezie et al. [22]). However, all these factors do not seem to work in Kerala, as far as first birth interval is concerned. This might be explained by the fact, since, the majority of females in Kerala get married after achieving the legal age at marriage. By this time they become well educated, mature enough and aware about the pros

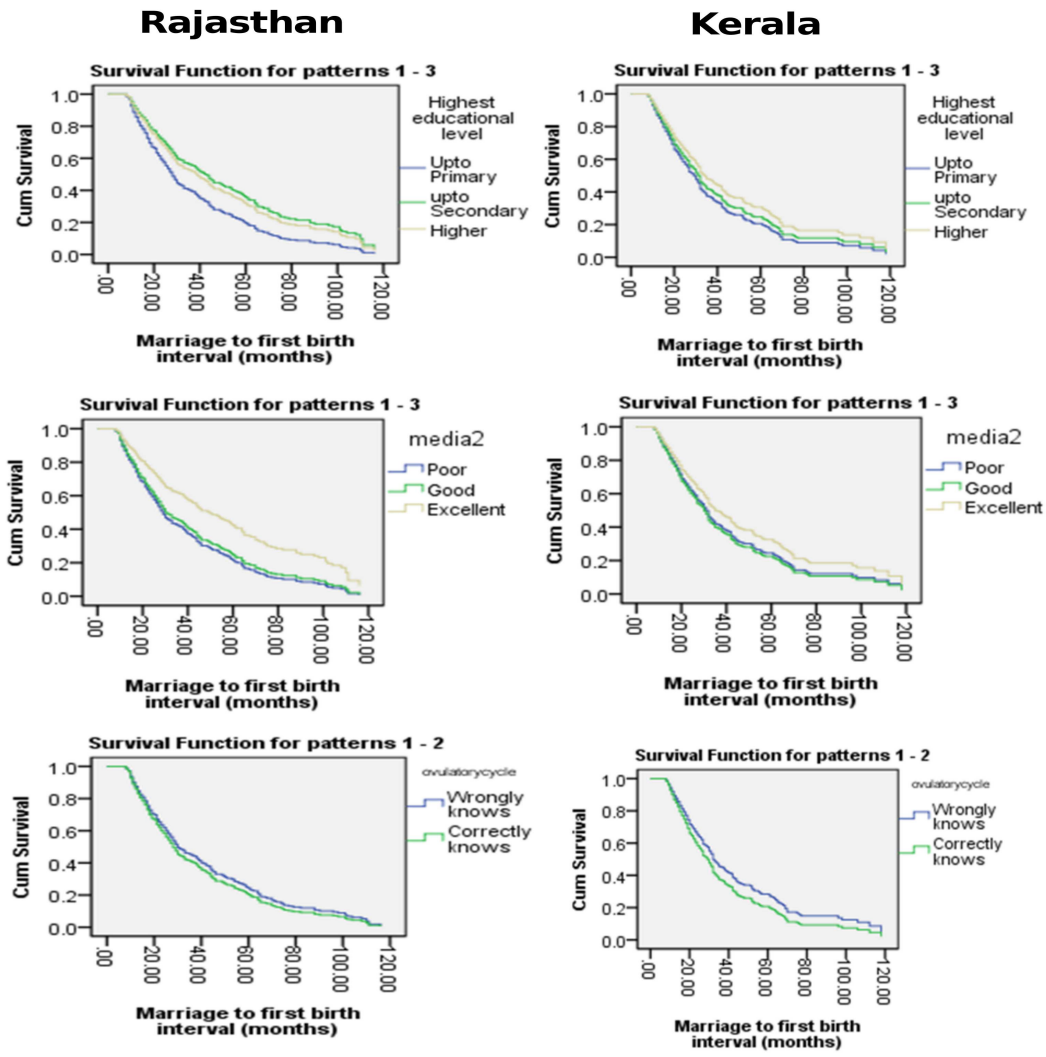

Fig. 2: Kaplan-Meier survival curve

and cons of starting a family, consequently, they tend to start the early child bearing after marriage, and thus, the risk of early birth becomes higher in Kerala. Kim [15] and Yadava et al. [31] also got the same result. He concluded that more educated females have shorter first birth interval than those who are less educated. Knowledge of ovulatory cycle is another very important factor in determining the birth interval. Biologically, it is not only menstruation, but ovulation is the key to conception. It is surprising to see that an overwhelming majority of females in both the states do not know the ovulatory cycle correctly. It is apparent from the above analysis that birth interval is higher for those females, who know their ovulatory cycle correctly (table 3 and 4). The role of this factor becomes more important in a country like; India, where availability and awareness about modern contraceptives is not satisfactory and still many females rely on the traditional method of birth control. Lack of knowledge about this factor might lead to early and unplanned pregnancies, which might affect the overall fertility level. The role of female education and her exposure to mass media might be helpful in this regard. Apart from the above discussed variables, other covariates like, economic status, female occupation husbands occupation, residential status and exposure to media are other prominent determinants of first birth interval. The net effect of all these factors goes only through education. Like females belonging to the low economic group tend to start their family early relative to other females, because they are less educated, ill-informed and do not have access to health and family planning facilities. In a nutshell, education of females is the key to determine the first birth interval. All other factors decide their role only through this.

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