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Determinants of Marriage to First Birth Interval in Pakistan

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Abstract

Marriage to first birth interval is important incidence in the life of women with increasing responsibilities. First birth interval not only affects the length of rest of birth intervals but also has effect on reproductive pattern of women. Cox Proportional Hazard model is used for identification of significant factors contributing towards marriage to first birth interval in Pakistan. Covariates used for analysis of first birth interval are: age of women at the birth of first child, age at marriage, ideal number of children (fertility intention), ideal number of boys (son preference), region (Punjab, Sindh, KPK, Baluchistan), education of both spouses, wealth index and occupation of both spouses. Women's age at the birth of first child, women's age at marriage, education (illiterate) and wealth index (poorer) contribute significantly to first birth interval. Age of women at marriage and age of women at the birth of first child has played vital role in its determination. Modernization factors have not affected negatively the length of first birth interval. Due to family pressures couples start planning the child soon after marriage irrespective of their education, work status and wealth index. There is need of effective family planning policies to increase the length of first birth interval along with delayed marriages to get a significant control over rapid population growth.

Keywords

First birth interval, Cox Proportional Hazard model, Kapaln Meier survival estimate, Fecundability

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1. Introduction

Pakistan is facing the problem of rapid population growth along with the scarcity of resources. Government is trying to control this rapid population growth. But more emphasis was put on the discontinuing behavior of fertility. Control over spacing behavior was neglected. Two child policies along with delayed marriages and at least four year birth interval can give better results in lowering the fertility (Bongaarts, 1985 as cited in Hoa et al., 1996). Total fertility rate can be lessened by increasing the age at marriage (Auon, 2005 as cited in Islam, 2009). But age at marriage is difficult to increase due to effect of strong social customs on it. The other option is to increase the length of first birth interval. If population control policies are formulated in a way that first birth interval is controlled, then higher order birth interval will be also controlled (Akhter et al., 1996 as cited in Islam, 2009). For the formulation of effective policy to motivate people for longer first birth interval, it is necessary to study the effect of various socio-economic and demographic factors which effect first birth interval length. So, there is need to study the background forces which pushed couple for shorter first birth interval. Birth interval analysis exposed the length of interval between subsequent births which is helpful in understanding the reproductive behavior. Increase in the length of birth spacing can cause decline in population growth provided that number of children remains same. Moreover, long birth spacing has positive effect on child health. Study of determinants of birth spacing is vital for policy makers for both population growth and health issues of children (Kim, 2003).

2. Literature Review

Changes in the behavioral trends under the new societal system affected the length of first birth interval. First birth interval is becoming short now-a-days because couples take less time to become near (Shrestha, 1998). Researchers are interested in finding the reasons for short first birth interval in developed countries. First birth interval is associated with couple's personal characteristics like age at marriage, education, occupation, and place of residence but with the influence of social norms. Age of women at first birth is important determinant and it effects the growth of population. Early child bearing increases the women's reproductive span as compared to those similarly fecund women who bear child later. It also reduces age gap between the two generations (Kumar and Danabalan, 2006). Important reason for the analysis of marriage to first birth interval is to find the impact of delayed marriages on it (Woldemicael, 2008). Khan and Raeside (1998) and Rindfuss and John (1983) have also documented the

importance of first birth interval analysis. They consider it important incidence in the life of women with increasing responsibilities. First birth interval not only affects the length of rest of birth intervals but also affect reproductive pattern of women (Millman and Hendershott, 1980; Trussel and Menken, 1978; Yamaguchi and Ferguson, 1995). Rao and Balakrishnan (1989) found that early birth interval increases the chances of second, third intervals etc.

Zheng (2000) found the reason of delay in first live birth for women who married in between 1980-92 for China. Urban women deliberately control the fertility by limiting the birth interval. Education, residence Urban/Rural, age at first marriage, marriage cohort played a significant role in the determination of marriage to first birth interval. Marriage to first birth interval for Chinese women is usually two years.

Education of both spouses had not shown any substantial effect on the first birth interval in Taiwan. The college educated Taiwanese women had two months long birth interval than women who had completed only school education. Women with fifteen years marital duration had long birth interval than those who had less marital duration. Reduction in fecundability with increasing age was the obvious reason. Urban residents had wider interval than Rural. The difference of interval between Urban and Rural women was four months. Family planning program had not attained the desired results and prevalence rate in Rural areas was low than Urban. Contraceptive use had shown insignificant relationship with birth spacing (Stokes and Hsieh, 1983).

Marriage to first birth interval was significantly different for age of women at marriage, region, education of women, and marriage cohort in Ethiopia. Difference among the spouse's age and occupation had not affected the marriage to first birth interval (Gurmu and Etana, 2005). Islam (2009) had also investigated the determinants of first birth interval in Rural Bangladesh. Respondent's age, age of women at marriage, family income and quality of care at clinic were found as significant determinants. Kumar and Danabalan (2006) had found significant difference in birth spacing for women belonging to different residential characteristics, types of family, religion, age difference between couples or education.

Nath et al. (1999) had studied the effect of status of women on first birth interval in Indian Urban society. Education of women, work status, participation in family

decisions and age at marriage were taken as status variable along with socio-economic variables (family income, family status and caste system). Effect of age of women, education, family income and decision making power on first birth interval was significant. Education had played vital role in determination of marriage to first birth interval. Caste system had played insignificant contribution in the determination of first birth interval in India.

3. Data and Methodology

Pakistan Demographic and Health Survey conducted in 2006-07 is the source of data. Two stage stratified sample design was used for selection of sample. Total of 1000 sample points were chosen but data was actually collected from 972 due to political problem in some areas. Distribution of 1000 sample points was given as: Punjab (440), Sindh (260), KPK (180), Baluchistan (100), and Federally Administered Tribal Areas (20). In Urban areas, sample point is enumeration block while in Rural area it is Moza/Deh. Sample comprised of 102,060 households (Munir and Mehmood, 2008).

The data about reproduction was collected from 10023 ever married women aged 15-49 through women related questionnaire (Figure 20). It is the recent most National level survey related to the reproductive history of women. Cox Regression model is used to study the effect of socio-economic and demographic factors on marriage to first birth interval length. The analysis is carried out using survey option in SPSS 17.0. The description of model is given in the following subsection.

3.1 Kaplan Meier Product Limit Survivorship Function: The Product Limit estimate of the Survival Function (Kaplan and Meier, 1958) is defined as

$$S(t_i) = \prod_{j=1} (1 - \frac{d_j}{n_j})$$

where

d_j = number of women having births at time t_j
n_j = number of women just prior to t_j exposed to the risk of having birth
t_j=time since the previous birth of a child to that woman

3.2 Hazard Function: It is also called Conditional Hazard Rate. It is the probability of failure during short interval provided that individual has survived at the beginning of interval. It can also be defined mathematically in terms of survival function as

$$h(t) = \frac{f(t)}{S(t)}.$$

3.3 Cox Proportional Regression Model: In demographical studies, life table technique was very popular to analyze birth intervals. Rodriguez and Hobcraft (1980) had used this technique. Trussell et al. (1985) documented criticism on life table technique. Hazard model analysis is an alternative method for analyzing birth intervals. It is also advantageous to prefer this model when exact survival time distribution is unknown. Cox Proportional Hazard model, which was first proposed by Cox (1972), is a Semi-parametric Regression model. Demographical perspective of model was illustrated by Trussell and Hammerslough (1983). The Cox Proportional Hazard model assumes that ratio of the Hazard Function is constant (proportional) for two subjects.

4. Statistical Analysis of Marriage to First Birth Interval

Covariates used for analysis of first birth interval are age of women at the birth of first child, age of women at marriage, ideal number of children, ideal number of boys, region (Punjab, Sindh, KPK, Baluchistan), education of both spouses, wealth index and occupation of both spouses. The pattern of distribution shows uni-modality with positive Skewness (Figure 21). Marriage to first birth interval of majority of the respondents is two years. The decline becomes sharper after three years. Maximum number of birth occurs within three years after marriage. The average value of marriage to first birth interval is approximately 31 months or 2.7 years. Average birth interval has declined as compared to Gangadharan and Maitra (2001) but mode remains same. They found that average duration of first birth interval was 3.21 years with mode of two years on the basis of Pakistan Integrated Household Surveys, 1991. In Ethiopian society, first birth interval was found long (3 years) in spite of low contraceptive prevalence rate (Gurmu and Etana, 2005). Marriage to first birth interval in Nepal was found long due to late start of sexual relation after marriage. The length of interval was found to be 3.9 years because Nepalese women are shy by nature (Suwal, 2001). Average birth interval for Taiwanese women was short i.e. approximately 15 months (Stokes and Hsieh, 1983). Youssef (2005) had also found short birth interval (18 months) for Jordan.

4.1 Kaplan Meier Estimates for Marriage to First Birth Interval: Survival functions are plotted from Figures 1-11 for all background characteristics. The

most notable difference in birth interval length is found between different categories of age of women at first birth and age at marriage of women. Older cohort has longest while younger has shortest birth interval. Women who married before eighteen year of age have shown sharper decline than other categories of age at marriage. All other age groups had similar pattern. It is revealed from Figure that chances of not having birth decline slowly if age at marriage is less than 18 years while more steep for other age groups. As age at marriage increases, woman prefers to have her first child early. For rest of factors little difference in the length of birth interval is observed among various categories of these factors. Chances of not having first birth declined in almost similar pattern with the increase in time across the provinces. Sindh and Baluchistan have close birth interval length and Punjab and KPK have almost same trend. There is little difference in survival curves among Urban and Rural women. Urban is more steep than Rural meaning Urban women want child earlier than Rural. Education of spouses, wealth index and marriage to first birth depicts negative relationship. Women belonging to professional occupation and women who do not work want to have a child early as compared to women belonging to other occupational categories. Woman whose husband belongs to professional occupation category has more chances of early birth.

Kaplan Meier estimates of Mean and Percentiles by socio-economic and demographic characteristics are given in Table 1.

4.2 Multivariate Analysis (Marriage to First Birth Interval): Prior to fitting of any Regression model, assumptions (diagnostics) should be verified. Diagnostics for Cox Proportional Regression model are verified as follows.

a) Assessing Adequacy of Proportionality Assumption

Verification of the proportionality assumption is vital for Cox Proportional Hazard model. The Cox Proportional Hazard model is based on the assumption that Hazard Ratio for two subjects is independent of time. It necessitates that variables should be independent of time. If a single variable is time dependent, then assumption of proportionality is violated. All covariates of marriage to first birth are treated as fixed covariates with fixed effect (Baschieri and Hinde, 2007; Hemochandra et al., 2010; Singh et al., 2007; Suwal, 2001; Trussell et al., 1985). For covariates which are time independent there is no need to check assumption of proportionality (Lee and Wang, 2003). Though factors and covariates are fixed as induced from literature, the overall test to check condition of proportionality, available in SPSS 17.0 is used for confirmation. The result is given in Table 4.1.

Table 4.1: Overall Test of Proportionality for Marriage to First Birth Interval

d.f. 1	d.f. 2	Wald F	Sig.
24.000	464.000	1.577	.041

The p-value shows that proportionality assumption is not rejected at 1% level of significance.

b) Linearity of Covariates

Cox Hazard model also assumes that there should be linear relationship between covariates and log of Hazard Function. Linearity in Cox Regression model is checked by plotting Martingale residual against the covariates. If the Lowees smoothing line is roughly flat and horizontal then assumption of linearity is satisfied. It is observed from Figures 12 to 15 that all covariates are log linear.

c) Outliers Detection

Birth interval for which, $|Dfbeta| > \frac{2}{\sqrt{n}}$, needs to be checked for outliers (Belsley et al., 1980 as cited in Freund et al., 2006). The cutoff value of Dfbeta for marriage to first birth interval is computed as

$$\frac{2}{\sqrt{n}} = \frac{2}{\sqrt{7014}} = 0.024$$

For convenience, Dfbeta for each covariate is plotted against case ID for each interval respectively and influential observation which exceeds cutoff criterion is investigated. Figures 16 to 19 show that no outlier is found.

d) Multicollinearity

Multicollinearity is also checked for marriage to first birth interval model. None of VIF exceeds 10 in Table 4.2, so no severe case of Multicollinearity is found among Regressors.

Table 4.2: Multicollinearity diagnostics for marriage to first birth interval

Parameters	VIF
Age_w at first birth	3.222
age_m	3.398
Region	1.142
Residence	1.470
edu _w	1.683
edu _h	1.541
wealth index	2.128
occ_h	1.098
occ_w	1.119
Ideal_child	3.026
Ideal_boys	2.999

e) Problem of Censoring

Marriage to first birth interval data is censored for those women who have no birth (1225) till the date of survey (Suwal, 2001).

f) Model Fit Statistic

The value of AIC (Table 4.3) has decreased substantially after inclusion of covariates in the model as compared to null model (without covariates). Hence, it is concluded that model with covariates is appropriate.

Table 4.3: Model fit statistic marriage to first birth interval

Criterion	Without Covariates	With Covariates
AIC	126334.5	93996.4

Table 2 shows results of marriage to first birth interval with all factors and covariates. Model with significant predictors which can also be used for purpose of prediction for marriage to first birth interval is fitted and named as a final model. Age of women at the birth of first child, age of women at marriage, education (illiterate) and wealth index (poorer) are significant factors of prediction model (final model) for first birth. Interpretations of Regression Coefficients for all factors are given below along with the comparison of outcome of relevant studies.

Present study has confirmed the decline in fertility due to increase in the age of women at first birth. The reason is of course biological i.e. decline in fecundity for older women as compared to younger. Sathar (1988) had also computed short birth interval for young Pakistani women while long for those women whose age was more than 35. According to Gangadharan and Maitra (2001) increase in age of women at first birth is one of the indicators of demographic transition. Regression Coefficient for age of women at first birth, exhibits that increase in age at first birth has more relative risk of long first birth interval. Effect of risk is also significant. Same result was also reported by Suwal (2001) for first birth interval in Nepal. Some contradictory results were also observed such as in India older women had shorter first birth interval as compared to younger women (Dommaraju, 2008).

Increase in age at marriage has resulted in significantly short first birth interval. Age at marriage is important predictor of fertility in Pakistan, like other countries where there is no concept of pre-marital sex (Hinde and Mturi, 2000 as cited in Woldemicael, 2008). Age at marriage plays important role in first birth as compared to higher parities. It is actually an onset of fertility (Woldemicael, 2008). Yang (1990 as cited in Woldemicael, 2008) also found that women whose marriage was delayed had shown short birth interval for first birth in China as compared to those who married early. Gurmu and Etana (2010) had found significant effect of age at marriage on first birth interval in Ethiopia. Late marriages can result in lower fertility but only in those populations where deliberate fertility control methods are widespread (Coale, 1992 as cited in Dommaraju, 2008). Dommaraju (2008) had presented two ideas for negative effect of age at marriage on birth spacing. The reason for long first birth interval in early marriages is lack of choice for mate and joint family system. Mean birth interval length is more in nuclear family than extended family (Kumar and Danabalan, 2006). Subfecundity due to immature age of women at marriage is another cause of long first birth interval.

To observe the difference in the length of birth interval due to cultural and environmental factors, demographers had frequently used region as a factor in birth interval analysis (Gurmu and Etana, 2005; Suwal, 2001). In the current analysis, Punjab, Sindh and KPK have shown risk of shorter birth interval as compared to Baluchistan. Sathar (1988) had found short interval for KPK and almost similar result holds for Punjab and Sindh.

It is found from Multivariate Analysis that Urban residents have longer first birth interval than Rural if rests of factors are controlled. Rajpoot (1996) concluded that Rural women had 4 months shorter interval than Urban women in Pakistan. Rural inhabitants have usually no access for maternal health and family planning programs as compared to Urban residents (Woldemicael, 2008) which may result in short interval for Rural women as compared to Urban.

For marriage to first birth interval uneducated, primary and secondary educated women have risk of long interval as compared to women with higher education. It confirms the findings that education of both partners had not declined fertility in Pakistan (Rajpoot, 1996). Gangadharan and Maitra (2001) had also found similar type of relationship between education of women but inverse for education of husband on first birth interval in Pakistan on the basis of Pakistan Integrated Household Surveys, 1991. Reason for short birth interval among educated women is their less participation in labour market (Gangadharan and Maitra, 2001). In Pakistan all educated women are not participating in economic activity. Educated women are 35% while working women are 25%. All of these working women are not educated so percentage of educated working women is less than 25%. Some studies had also reported the same trend for education of women on first birth interval (Khan and Raeside, 1998; Suwal, 2001). The rationale behind the short birth interval for highly educated women is delayed marriages. They want child early because they have less reproductive span left as compared to less educated women (NSEO and ORC Macro Inc. 2003 as cited in Woldemicael, 2008). The difference in interval for college educated women is only two months more than women who had completed only school education (Stokes and Hsieh, 1983).

Multivariate analysis has also shown positive impact of husband's education on fertility though insignificant. It is plus point for demographic transition because education has resulted in demographic transition of developed countries. Hemochandra et al. (2010) and Suwal (2001) also concluded the same for India and Nepal respectively. Education had also shown positive effect on first birth interval in India and Eritrea (Dommaraju, 2008; Woldemicael, 2008). Education of both spouses had no effect on the first birth interval in Taiwan (Stokes and Hsieh, 1983).

Wealth index for all categories (Poorest, Poorer, Middle, and Richer) has shown more risk of long birth interval as compared to richest. But its effect is insignificant. Suwal (2001) concluded short first birth interval for those women who had less cash earning than those who had more. Poorest, Poorer, Middle, and Richer women had also shown long first birth interval as compared to richest

women in India (Dommaraju, 2008). Lack of health facilities and nutritional value for the women in lower economic group may result in more prenatal and postnatal deaths, miscarriages and abortions than higher wealth index. These losses widen the birth interval for live children.

If husband did not work, engaged in agriculture or professional sector, then marriage to first birth interval is short for these women as compared to woman whose husband is manual worker. Association between first birth interval and occupation is insignificant for the woman whose husband is professional or engaged in agriculture sector. But significantly short first birth interval is found for women whose husbands are not working.

According to theory of opportunity cost, negative association between women's occupation and fertility is expected. But in developing countries, nature of relationship might be different. Impact of women's occupation depends on the sector (traditional/ modern) in which she works. Positive association exists between women working in agriculture sector and fertility. Saxena and Aoun (1997) had defined two roles of working woman i.e. her role as a mother and her role as a worker. Lack of compatibility between two roles may causes decline in fertility. Work status of woman has strong negative effect if her work clashes with her role of mother. These clashes or lack of compatibility occurs due to paid jobs, long working hours, less leisure time, no helper in household chores, awareness about contraceptive use etc. This incompatibility is reduced if there is any one to care a child at home or due to the facility of day care center. Women with white collar job had less number of children than women with blue collar job in Bombay (Bhargava and Saxena, 1986 as cited in Saxena and Aoun, 1997). On the other hand, if job does not clash with work then it reduces the significance of negative impact of work status on fertility. Sometimes even in paid jobs, lack of financial independence and individualism can produce results which go against the theory of opportunity cost. In agriculture sector and self-employed jobs due to less restriction of working hours, negative effect of work on fertility declines. In developing countries no significant association was found between the birth interval length and women work status. Women work has also different influence in Urban and Rural areas. Studies conducted in Turkey, China, Peru, India and Mexico had shown no relationship between the both (Stoycos and Weller, 1967; Weller, 1968).

For marriage to first birth interval model, woman who did not work or worked in agriculture or professional sector has long interval as compared to manual but it is insignificant. Sequence-wise length of fist birth interval for occupation of women is manual, no work, professional and agriculture. The reason of slightly longest birth interval in agriculture sector is joint family system. Women living in joint family system due to lack of privacy for couple has long interval (Stokes and Hsieh, 1983). Women employment had no strong association with first birth interval in Taiwan (Stokes and Hsieh, 1983). Sequence-wise length of interval in Taiwan was found as follows. It was longest for women engaged in agriculture sector, than longer for professional women and shortest for women who never worked. Women whose occupation was farming also had resulted in long birth interval in Yunnan province of China than non-farming job (Lofstedt et al., 2005). Women engaged in managerial/ professional/service jobs had shown short birth intervals in Indonesia in 1970's (Kim, 2003). Working women had short first birth interval both in Urban and Rural areas of Bangladesh (Khan and Raeside, 1998). For those couples who desired to have more number of sons have long first birth interval means son preference had not decreased the length of their first interval. First birth interval is not influenced by the reproductive goals of a couple because woman has family pressure to prove her fecundability. This factor may affect inversely on birth interval of higher order (Hemochandra et al., 2010). Hemochandra et al. (2010) had found long birth interval for those women whose husband's desirable numbers of sons were more than her counterparts (those whose husband desire less number of boys). Women who prefer to have more number of children have short birth interval. Hemochandra et al. (2010) had also concluded short interval for those women who desire to have more number of both daughters and sons.

A Covariate Survival Curve is the percentage of survivals with a given covariate. It shows chances of not having a child after taking into account all factors and covariates. Steep nature of curve in Figure 22 shows low survival rate or short survival time. Decline is sharp after one year and there is thorough decline till it become constant at third year. Chances of not having a birth of child decrease with increase in birth interval. After three years it has reached at bottom line.

5. Conclusion

Age at first birth, age at marriage, education (illiterate) and wealth index (poorer) are significant factors of prediction model for first birth. It can be concluded after observing prediction model that in marriage to first birth interval, age at marriage and age at first birth have played vital role in its determination. First birth interval

is inconsistent and irregular due to cultural norms and bans of society (Singh et al., 1993 as cited in Nath et al., 2000). Marriage to first birth interval is not governed by Urbanization and modernization factors but depends on social norms and taboos. For example, even presence of mother-in-law at home and joint family system effect length of birth interval (Khan and Raeside, 1998; Nath et al., 2000). Same is the case of marriage to first birth interval for current data. In Pakistan there is no evidence of contraceptive use at the start of marriage to delay the first birth (PSLM, 2005-06). So couples intentionally do not control fertility soon after marriage. Moreover, a woman has to prove her fecundabilty, so couples start planning the child soon after marriage irrespective of their education, work status and wealth index status. First birth interval is even shorter for educated women or women engaged in white collar job or those who belong to higher category of wealth index. Uneducated women belonging to lower economic class may conceive child earlier but due to lack of health facilities and nutritional intake it is not necessary that first birth will be alive and thus their first birth is prolonged (Kumar and Danabalan, 2006). Significant negative effect of delayed marriages on spacing behavior of fertility is observed in Pakistan. There is need to increase marriage to first birth interval along with delayed marriages to control the fertility through spacing behavior.

6. Recommendations and Policy Implication

These are the suggestions for future researchers and policy makers.

- Educate both spouses through media campaigns to change their reproductive behavior so that they delay their first child. Delay in marriages cannot be effective until and unless it follows delay in marriage to first birth interval. There is need to familiarize couple the concept of use of family planning methods to increase length of first birth interval.
- Probe into the unexpected effects of modernization factors such as education, wealth index and occupation of both spouses on first birth interval length by collecting relevant data on different aspects of these factors. Delay in first birth interval should be recommended keeping in view the impact of socio-economic and demographic characteristics. There is need to change the trend of people towards birth spacing irrespective of their education and status.

Figures 1-11: Graphs of Survival Functions for women background characteristics and marriage to first birth interval

Figure 1: Survival Function for age of women at first birth

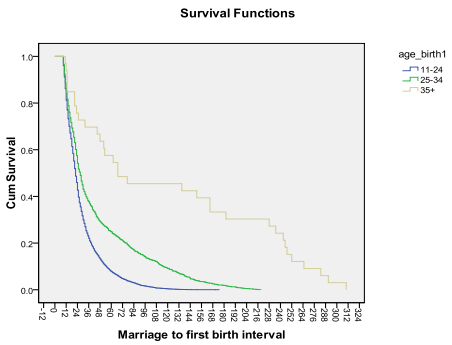


Figure 2: Survival Function for age of women at marriage

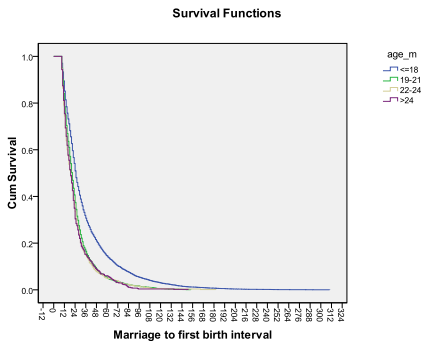


Figure 3: Survival Function for region

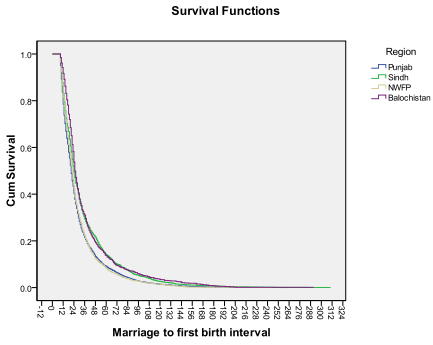


Figure 4: Survival Function for place of residence

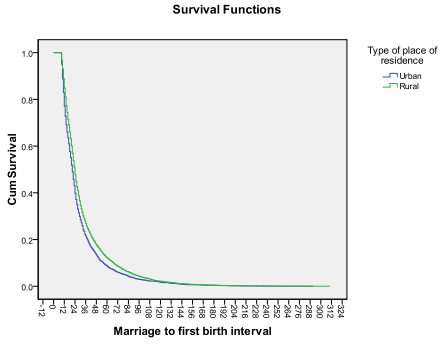


Figure 5: Survival Function for education of women

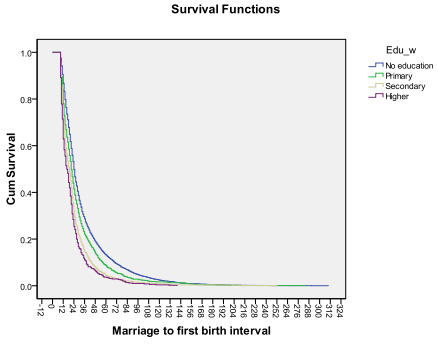


Figure 6: Survival Function for education of husband

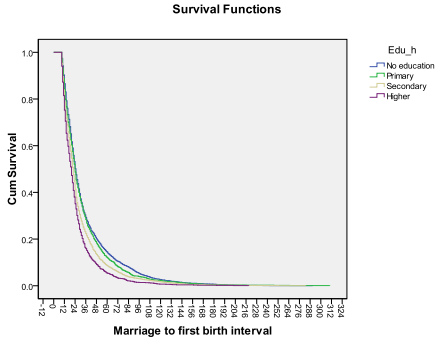


Figure 7: Survival Function for occupation of women

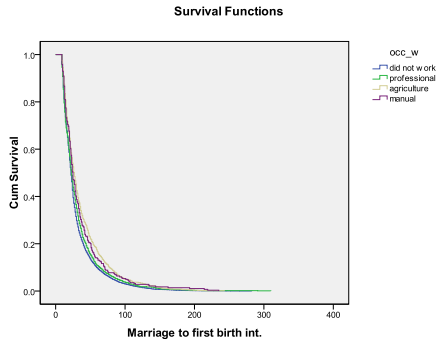


Figure 8: Survival Function for occupation of husband

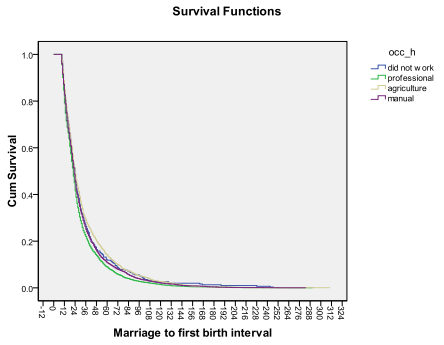


Figure 8: Survival Function for ideal number of children

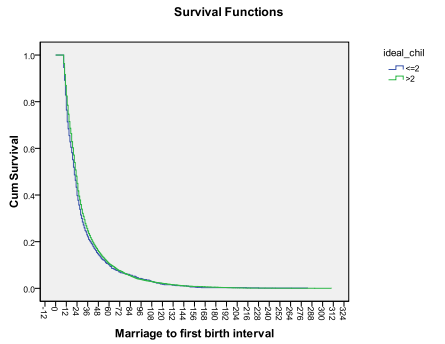


Figure 10: Survival Function for ideal number of boys

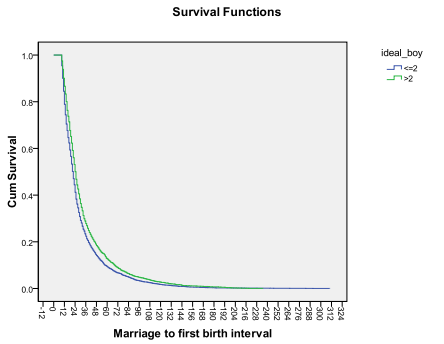
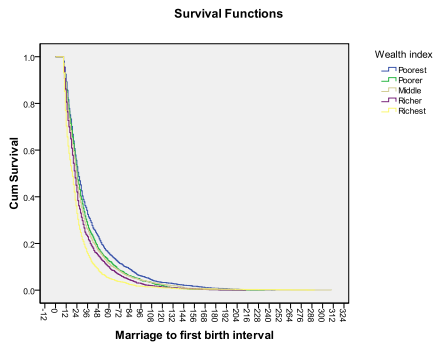


Figure 11: Survival Function for wealth index



Figures 12-15: Smoothed Residual Plots for Linearity (marriage to first birth interval)

Figure 12: Smoothed Residual Plot for age of women at first birth

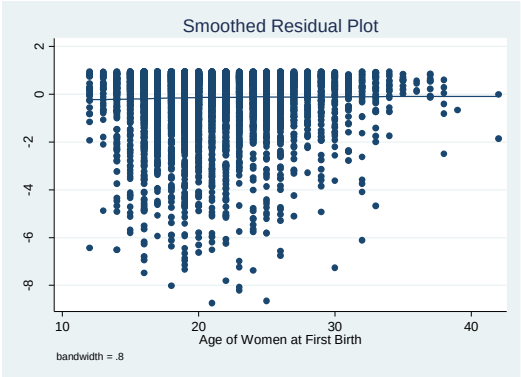


Figure 13: Smoothed Residual Plot for age of women at marriage

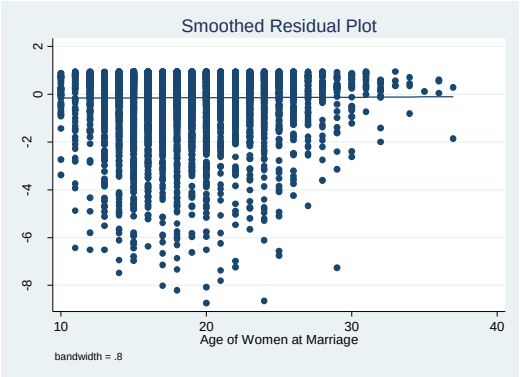


Figure 14: Smoothed Residual Plot for ideal number of children

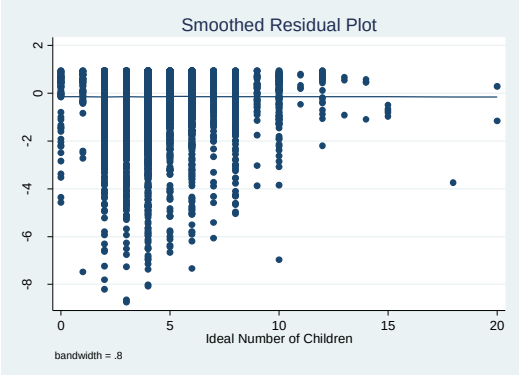
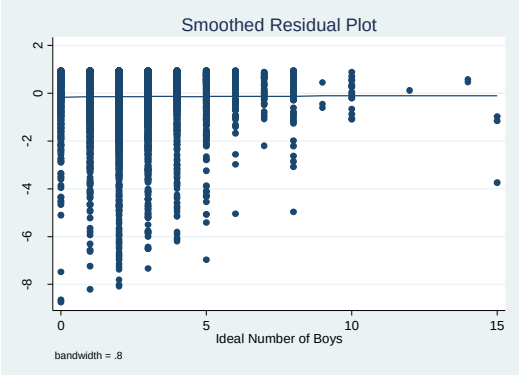


Figure 15: Smoothed Residual Plot for ideal number of boys



Figures 16-19: Dfbeta Plots for detection of Outliers (marriage to first birth interval)

Figure 16: Dfbeta for age of women at first birth vs case ID

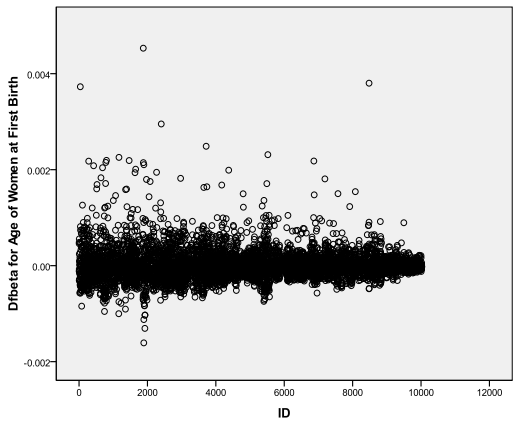


Figure 17: Dfbeta for age of women at marriage vs case ID

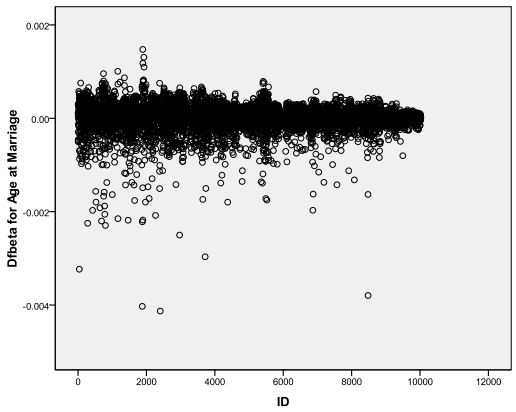


Figure 18: Dfbeta for ideal number of children vs case ID

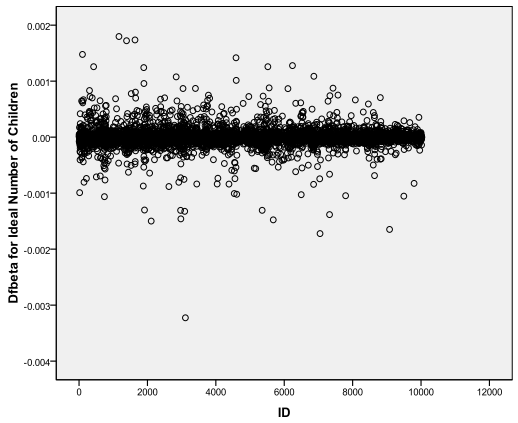


Figure 19: Dfbeta for ideal number of boys vs case ID

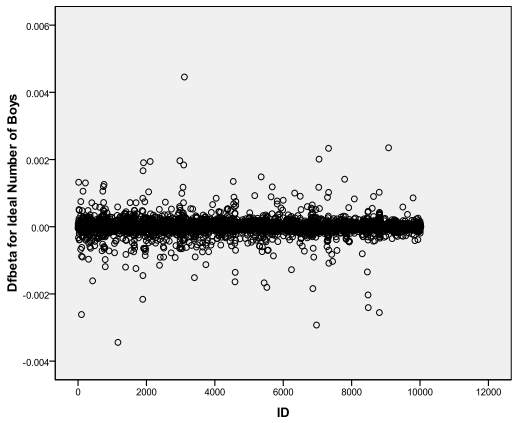


Figure 20: Sample Design (PDHS, 2006-07 cited in Munir and Mehmood, 2008)

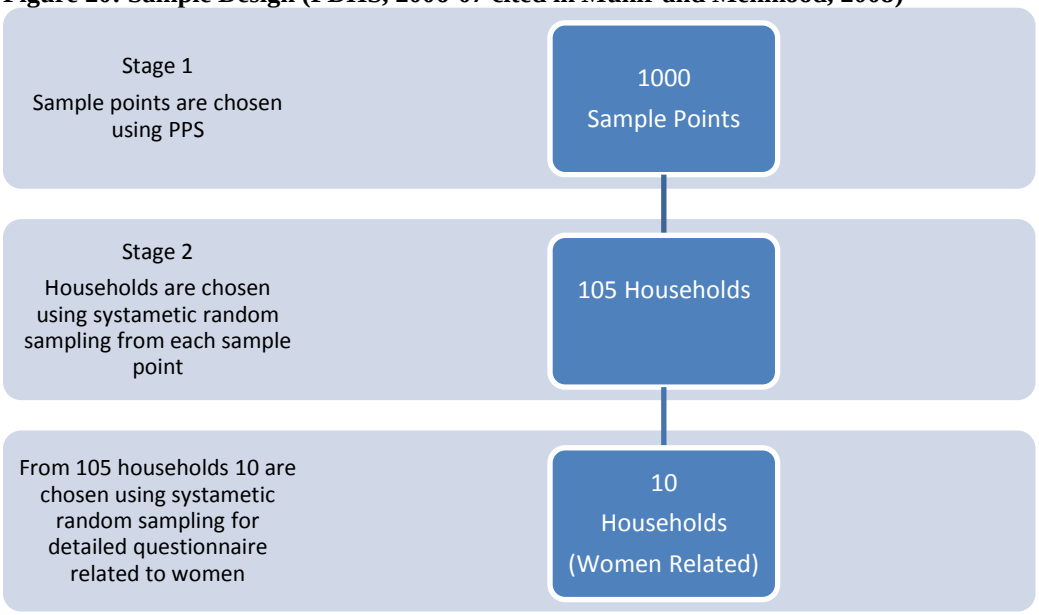


Figure 21: Histogram for length of marriage to first birth interval

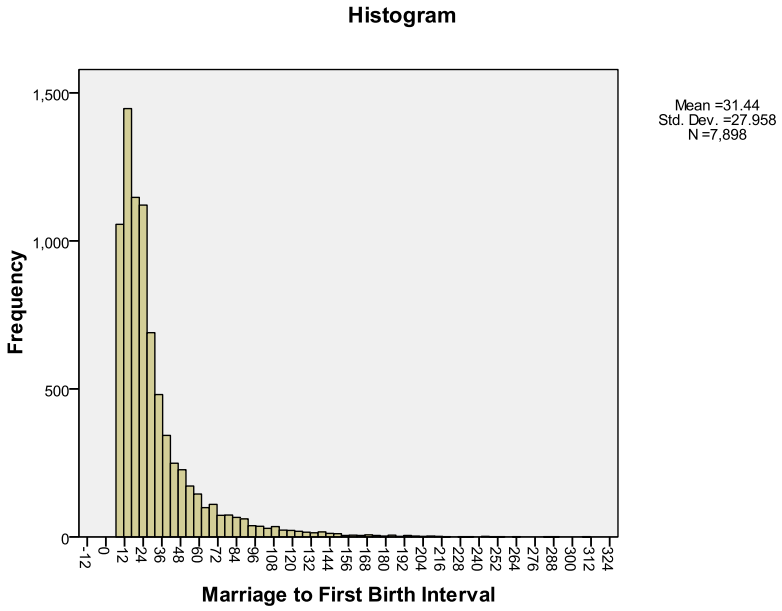


Figure 22: Survival Curve (marriage to first birth interval)

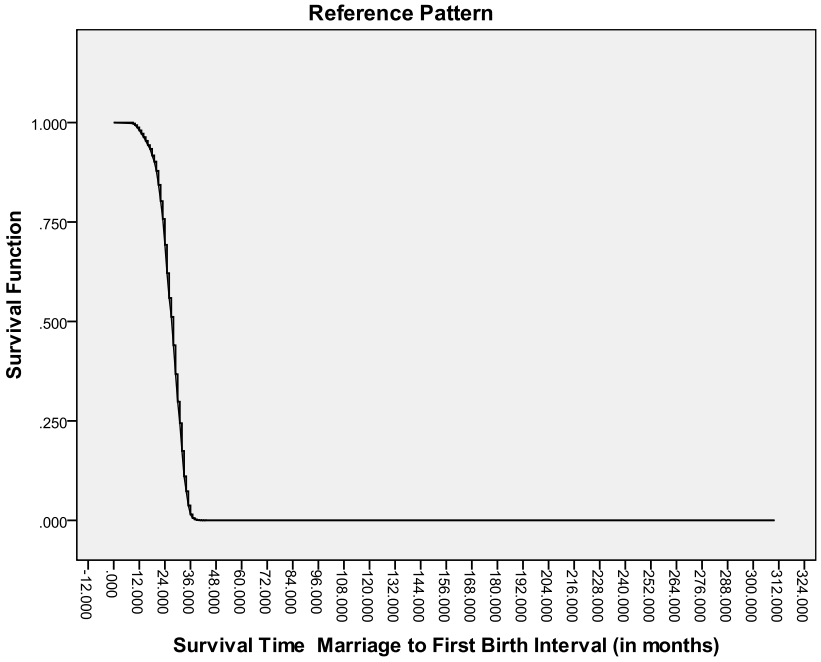


Table 1: Kaplan Meier Estimates of Mean and Percentiles by socio-economic and demographic characteristics for marriage to first birth interval

Factors/ Covariates	Levels	Mean Survival Time for Birth Interval		Percentiles					
				25%		50%		75%	
		Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
Age at First Birth	<=24	28.194	.252	34.000	.419	22.000	.198	14.000	.156
	25-34	45.854	1.230	60.000	3.508	27.000	.670	16.000	.498
	35+	122.788	18.085	235.000	38.77	67.000	47.084	25.000	9.722
Overall		31.445	.315	36.000	.476	23.000	.184	14.000	.145
age-m	<=18	35.694	.462	42.000	.794	25.000	.292	16.000	.242
	19-21	25.588	.452	30.000	.565	21.000	.350	13.000	.241
	22-24	24.366	.669	28.000	.805	19.000	.574	12.000	.261
	25+	24.147	.762	28.000	1.083	19.000	.658	13.000	.336
Overall		31.445	.315	36.000	.476	23.000	.184	14.000	.145
Region	Punjab	28.920	.432	33.000	.615	21.000	.283	13.000	.177
	Sindh	35.024	.696	42.000	1.342	24.000	.410	15.000	.337
	KPK	29.118	.626	34.000	.901	22.000	.408	14.000	.342
	Baluchistan	36.621	1.073	41.000	1.414	25.000	.491	18.000	.485
		31.445	.315	36.000	.476	23.000	.184	14.000	.145
Residence	Urban	28.922	.476	33.000	.665	21.000	.301	13.000	.173
	Rural	33.049	.415	38.000	.701	24.000	.237	15.000	.211
Overall		31.445	.315	36.000	.476	23.000	.184	14.000	.145
edu_w	No	34.315	.411	40.000	.695	24.000	.242	16.000	.198
	Primary	29.189	.806	34.000	1.220	21.000	.521	13.000	.272
	Secondary	24.234	.648	28.000	.789	19.000	.546	12.000	.211
	Higher	21.553	.751	25.000	.866	16.000	.783	11.000	.228
Overall		31.445	.315	36.000	.476	23.000	.184	14.000	.145
edu_h	No	35.171	.575	41.000	1.043	25.000	.384	16.000	.276
	Primary	33.304	.839	39.000	1.307	24.000	.512	15.000	.392
	Secondary	29.260	.521	34.000	.803	22.000	.315	13.000	.234
	Higher	25.238	.576	29.000	.737	20.000	.443	13.000	.236
Overall		31.407	.314	36.000	.476	23.000	.184	14.000	.146
Wealth Index	Poorest	33.379	.684	45.000	1.392	26.000	.594	17.000	.387
	Poorer	32.633	.740	39.000	1.201	25.000	.480	16.000	.398
	Middle	29.597	.616	38.000	1.170	24.000	.399	15.000	.371
	Richer	24.968	.583	33.000	.951	22.000	.385	14.000	.313
	Richest	31.445	.315	28.000	.692	19.000	.443	12.000	.172
Overall		31.408	.856	36.000	.476	23.000	.184	14.000	.145
occ_w	no work	30.153	.352	34.000	.522	22.000	.210	14.000	.173
	Professional	32.122	.864	38.000	1.191	23.000	.551	14.000	.322
	Agriculture	37.650	1.126	47.000	1.974	27.000	.877	16.000	.509
	Manual	35.806	1.995	42.000	3.173	25.000	1.174	15.000	1.166
Overall		31.442	.315	36.000	.476	23.000	.184	14.000	.145

Factors/ Covariates	Levels	Mean Survival Time for Birth Interval		Percentiles					
				25%		50%		75%	
		Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
occ_h	no work	33.875	1.938	38.000	2.078	24.000	.886	15.000	.737
	Professional	29.162	.457	33.000	.697	22.000	.287	13.000	.199
	Agriculture	34.604	.770	42.000	1.414	24.000	.503	15.000	.359
	Manual	31.813	.517	37.000	.754	23.000	.297	14.000	.224
Overall		31.426	.314	36.000	.476	23.000	.184	14.000	.145
ideal_child	<=2	29.778	.867	33.000	1.283	21.000	.527	13.000	.291
ren	>2	31.464	.361	36.000	.536	23.000	.212	14.000	.162
Overall		31.217	.333	36.000	.493	23.000	.195	14.000	.152
ideal-boys	<=2	29.697	.395	34.000	.574	22.000	.242	13.000	.152
	>2	34.167	.607	39.000	1.000	25.000	.348	16.000	.289
Overall		31.232	.334	36.000	.507	23.000	.196	14.000	.152

Table 2: Cox Regression model for marriage to first birth interval

	Full Model			Final Model		
Parameters	**B**	**Sig.**	**Hazard Ratio**	**B**	**Sig.**	**Hazard Ratio**
age_w at First Birth	-2.363	.000	.094	-2.369	.000	.094
age_m	2.359	.000	10.577	2.366	.000	10.651
region=Punjab	.078	.092	1.082	-	-	-
region=Sindh	.015	.759	1.015	-	-	-
region=KPK	.014	.805	1.014	-	-	-
region=Baluchistan	.000[a]	.	1.000	-	-	-
residence=Urban	-.004	.915	.996	-	-	-
residence=Rural	.000[a]	.	1.000	-	-	-
edu _w=no	-.276	.001	.759	-.280	.001	.756
edu _w=Primary	-.139	.148	.870	-.139	.137	.871
edu _w=Secondary	-.159	.048	.853	-.119	.137	.887
edu _w=Higher	.000[a]	.	1.000	.000[a]	.	1.000
edu _h=no	.034	.485	1.035	-	-	-
edu _h=Primary	.031	.602	1.031	-	-	-
edu _h=Secondary	.056	.241	1.058	-	-	-
edu _h=Higher	.000[a]	.	1.000	-	-	-
wealth index=Poorest	-.072	.273	.930	-.089	.118	.915
wealth index=Poorer	-.143	.015	.867	-.155	.003	.856
wealth index=Middle	-.071	.203	.932	-.059	.243	.943
wealth index=Richer	-.030	.528	.970	-.039	.400	.962
wealth index=Richest	.000[a]	.	1.000	.000[a]	.	1.000
occ_h=no work	.206	.005	1.228	-	-	-
occ_h=Profession	.029	.415	1.030	-	-	-

	Full Model			Final Model		
Parameters	**B**	**Sig.**	**Hazard Ratio**	**B**	**Sig.**	**Hazard Ratio**
occ_h=Agriculture	.030	.499	1.031	-	-	-
occ_h=manual	.000[a]	.	1.000	-	-	-
occ_w=no work	-.077	.400	.925	-	-	-
occ_w=Professional	-.089	.354	.915	-	-	-
occ_w=agri	-.143	.150	.866	-	-	-
occ_w=manual	.000[a]	.	1.000	-	-	-
Ideal_child	.005	.677	1.005	-	-	-
Ideal_boys	-.013	.421	.987	-	-	-

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