Women's autonomy, education and birth intervals: visiting the less familiar

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Abstract

Using data from the third National Family Health Survey (NFHS-3-2005-2006) on currently married fecund women with at least one child and Cox-proportional hazard models, this study attempts to address the less familiar association between women's autonomy and birth-to-conception intervals (BI) in India. It also examines whether women's autonomy can explain much of the relationship between education and birth interval. It even examines whether education has any influence in the relationship between autonomy and birth intervals. Most research in this area has considered the association between women's autonomy and contraceptive use and lower fertility. In addition, while some researcher (e.g., (S. J. Jejeebhoy, 1995)) have suggested that women's autonomy may be a key pathway through which education influences fertility, others (e.g. (Basu, 1996)) have convincingly argued that there is still little quantitative evidence in support of the importance of women's autonomy as a mediating factor between education and fertility.

Our results indicate that after adjusting for demographic, socioeconomic factors and use of contraceptive for spacing purpose, women's autonomy remained a significant predictor of birth-to-conception intervals with higher autonomy positively associated with larger birth-to-conception intervals. We also found significant interaction between women's autonomy and education of women implying that empowered women may have higher or shorter BI depending upon the education of the women.

1. Introduction

Birth interval is one of the major determinants of the infant and child mortality, maternal health, the overall timing of birth of children and period fertility (Alam, 1995; Cleland & Sathar, 1984; Curtis, Diamond, & McDonald, 1993; King, 2003; Koenig, Phillips, Campbell, & D'Souza, 1990; Rajaretnam, 1990; Rousso et al., 2002). Maternal characteristics, such as age, education and socioeconomic status, have been associated with longer birth intervals. Another important predictor of birth interval is women's autonomy (Upadhyay & Hindin, 2005). However, the literature is limited on the role of women's autonomy and its association with the length of birth interval. Most research in this area has considered the association between women's autonomy with reproductive outcomes and contraceptive use (Deborah Balk, 1994; Caldwell, 1986; Dixon-Mueller, 1993; Faour, 1989; Gage, 1995; Ghuman, 2003; Hogan, Berhanu, & Hailemariam, 1999; Hollos, 1991; Kirk, 1965; Morgan & Niraula, 1995; Nagi, 1984; Schuler & Hashemi, 1994; Youssef, 1978). These studies document lower levels of women's autonomy to be related to a higher family size (D. Balk, 1994), low use of contraceptives (Saleem & Bobak, 2005), low use of prenatal, natal and postnatal services (D. Balk, 1994; Bloom, Wypij, & Das Gupta, 2001; Mistry, Galal, & Lu, 2009). Several studies have also shown specific dimensions of women's autonomy to be associated with child growth and survival (Begin, Frongillo, Jr Delisle, & Habicht, 1999; Doan & Bisharat, 1990; Kishore, 1998), and child stunting (M. Shroff, Griffiths, Adair, Suchindran, & Bentley, 2009) and infant feeding practices (M. R. Shroff et al., 2011).

We found only one study that examined whether women's autonomy affect birth-to-conception intervals (BI) in Philippines (Upadhyay & Hindin, 2005). Upadhaya and Hindin's study (2005) found that women's autonomy was a significant predictor of larger birth-to-conception intervals. In addition, while some researchers (e.g., (S. J. Jejeebhoy, 1995)) have suggested that women's autonomy may be a key pathway through which education influences fertility, others (e.g. Basu,

1996) have convincingly argued that there is still little quantitative evidence in support of the importance of women's autonomy as a mediating factor between education and fertility. The current study, therefore, aims to examine the association of women's autonomy with BI in India. Following Jejeebhoy (1995) and Basu (1996), it also provides quantitative evidence about whether women's autonomy can explain much of the relationship between education and birth interval.

1.1 Women autonomy

Autonomy is a multidimensional concept and therefore has been defined in several ways. For example, Dyson and Moore emphasises decision-making power regarding a women's life and those close to her (1983) defined it as "*the ability ‒ technical, social, and psychological ‒ to obtain information and to use it as the basis for making decisions about one's private concerns and those of one's intimates*" (p. 45)(Dyson & Moore, 1983), whereas other have used proxy or indirect measures to operationalize women's autonomy such as education, occupation, and demographic characteristics like age at marriage and age differences between spouses (Abadian, 1996; Mason, 1986). More recently, autonomy has been defined as women's enacted ability to influence decisions, to access and control over economic resources, and move freely (Bloom et al., 2001; S. Jejeebhoy, 2002).

We conceptualise women's autonomy as consisting of three dimensions in which women make decisions and control resources within the family: freedom of movement (mobility autonomy), household decision making autonomy, and access to finances (financial mobility). As various measures of autonomy or various dimensions of autonomy are context dependent (Agarwala & Lynch, 2006), we chose these dimensions as they are highly relevant in Indian context where women are restrained in their movements in and out of the house, have limited access to economic resources and lack decision making power (Dharmalingam & Morgan, 1996; Visaria, Jejeebhoy, & Merrick, 1999; Vlassoff, 1992). All these three dimensions of autonomy are important in order to influence the BI. Women, who have freedom of movement, control over economic resources or decision making, would be able to travel to health facility, if needed, gain knowledge about methods of birth spacing, spend money to pay for the travel and other health acre utilisation and make decisions if and when they need the next child.

2. Data and Methodology

Data

The data for this paper come from the third National Family and Health Survey (NFHS-3), undertaken in 2005-2006. The NFHS-3 is a nationally representative survey, which was conducted in 29 Indian States using a format very similar to that of the Demographic and Health Surveys (DHS), modified to meet Indian conditions and the needs of policy makers and programme planners. The survey covered representative sample of 124,385 women of age group 15-49 from 109,041 households.

Data collection was carried out in NFHS-3 using systematic stratified random sampling and by adopting a three stage design in urban areas (selection of towns in first stage, followed by selecting urban blocks, and then households) and two stage design in rural areas (villages were

first selected using Probability Proportional to Size (PPS) sampling and is followed by selection of households). Further details of methodology of collecting data in NFHS-3 can be found elsewhere (MacroInternational, 2007). The analyses for this paper are based on data from a sub sample of 14,868 fecund women who are still married at the time of NFHS 3 and who had given at least one birth during 2001-2002. The NFHS-3 provides high-quality, up-to-date information on all of the key variables required for the analysis. It has collected self-reported information on maternity history, socio-economic characteristics, health, contraceptive usage, and autonomy. Compared with previously available data, the survey permits substantial expansion of the examination of the issue of women's autonomy.

Outcome variable

The main outcome variable used in this study was the birth-to-conception interval, defined as the period between index birth (birth - or first birth in case there are more than one birth - that occurred to the considered woman during 2001-2002 is referred from here onwards as the index birth) and the next known conception. This measure of birth spacing allowed the inclusion of conceptions that resulted in still births and of current pregnancies at the time of interview. However, this method did not allow us to include conceptions that resulted in miscarriages as the information was not provided when the miscarriage happen. Unlike birth to birth interval, this measure increased the sample size by few thousand, resulting in better measurement precision.

Measuring women autonomy

Women autonomy, the main exposure variable in this study, was measured by constructing an autonomy index based on detailed information collected on the freedom enjoyed by women in aspects related to 1) movement, 2) household decisions and 3) finance. Autonomy related to movement was captured from the information on whether a woman is allowed to go to: market, health facility and places outside own community/village. Autonomy related to household decisions was captured from the information on five aspects namely whether a woman has any say: on her own health care, on large household purchases, purchase for daily needs, what to do with money husband earns, and visits to family or friends. Autonomy related to finance was assessed based on response to question regarding whether she has money for her own use or not. For all the questions related to movement of autonomy the possible responses of woman are "alone", "with someone else" and "not at all". We gave a score of 2 if the response of woman is "alone", 1 if her response is "with someone else", and 0 if her response is "not at all". For questions related to household decisions, the possible responses of woman are "respondent alone", "respondent and husband/partner", "husband/partner alone", "someone else" and "other". We gave a score of 2 if the response of woman is "respondent alone", 1 if her response is "respondent and husband/partner", and 0 otherwise. The possible responses for question on "whether woman has money for her own use" are "yes", and "no". We gave a score of 2 if the response of woman is "yes", 0 otherwise.

Cronbach's standardised alpha coefficient for the considered components is 0.76. This means that the used instruments had a great internal consistency and can perform well in measuring the underlying construct (latent autonomy). Earlier researchers using very detailed data and by using confirmatory factor analysis found that there is a single construct behind various dimensions of woman autonomy (Agarwala and Lynch 2006). Since we do not have very detailed data on various dimensions of autonomy, we rather directly constructed a single index of autonomy using exploratory factor analysis. The constructed index (factor) has very good loadings for all the nine

components mentioned above. Factor loadings for various components vary between 0.08 and 0.21. Most components have a factor loading around 0.2 (see Table A1 in the Appendix).

The constructed Autonomy Index (AI) score vary between 0 and 3.3. The AI takes a value of zero for women who have nil autonomy and it takes the value 3.3 for women who have full autonomy with respect to the considered aspects. For the purpose of understanding the association between women autonomy and birth intervals, all women were classified into three groups based on their autonomy score. Women with an autonomy score less than or equal to 1.22 (first quartile of overall autonomy scores) were considered as women with low level of autonomy. Women with an autonomy score of above 1.22 but less than or equal to 2.17 (third quartile of autonomy scores) were considered as women with medium level of autonomy and women with an autonomy score of more than 2.17 were considered as women with high level of autonomy.

Covariates

Other covariates included in our analysis were demographic (age of respondent, sex of last child, total number of surviving children, use of contraceptive methods for spacing purpose, region) and socioeconomic characteristics of the women (education, women's work status, caste, religion, exposure to media, place of residence), along with the household standard of living. Age of the respondent means age of the respondent at the index birth. Based on age of respondent at index birth, all the respondents were categorized into the following age groups: <=19, 20-29 and 30+. Total number of surviving children means total number of surviving children at the time index birth. For convenience, total number of surviving children were categorised into the four groups namely 0, 1, 2-3 and 4+. This study adopts the same regional classification of India as is done in NFHS-3 (International Institute for Population Sciences, 2007). Various regions in India and their constituent states are given in the form of Table A2 in the Appendix.

Based on their caste all respondents were divided in three groups namely: (1) Schedules caste (SC) or Scheduled Tribe (ST), (2) Other Backward Castes (OBC) and (3) others. Religion was categorised into Hindu, Muslim, Christian and others. Education of the women was categorised as illiterate, primary, secondary and higher. Mother's current work status was categorised as not working, agriculture and non-agriculture worker. Media exposure level of respondents was assessed by constructing media exposure index, based on the information collected from each respondent on issues such as how frequently she listens to radio, reads new paper and watches television. This index varies between 0 to 6, with 0 indicating absolutely no media exposure and a value of 6 indicating highest level of media exposure. However, for analytical convenience (to allow possible nonlinear relationship with the study variable), media exposure was categorized into three groups namely low (with media index value in the range [0,2)), medium (with media index in [2,4)) and high (with media index in [4,6]). A composite index called Standard of Living Index (SLI), which is considered as an indicator of household economic condition has been constructed by using data on basic household amenities (see IIPS, 2000). This index ranges from 0 to 67. If this index score for a household is between 0 and 14 then the household economic status is considered as low. If the score is between 15 and 24 then the economic status is considered as medium; otherwise, the economic status is said to be high (IIPS, 2000).

Methods

We used descriptive, Kaplan-Meier (K-M) survival analysis and cox-proportional hazard regression models to investigate the association between birth interval and women's autonomy, as well as a number of other socioeconomic variables. Kaplan-Meier (K-M) survival analysis was

used to estimate proportion of women who conceived in a length of time '*t*', following index birth. Log-rank test was used to examine whether pattern of conceiving varies by level of autonomy of women. Multivariate Cox-proportional hazard models were used step by step to examine the association between women autonomy and their BIs after controlling the effects of other demographic and socioeconomic variables. We also tested interaction between women's autonomy, education and birth interval. All the analysis was carried out using Statistical Analysis System (SAS) package version 9.3.

Results

3.1 Descriptive

Table 1 presents percentages or mean distributions of the sample. On the whole, the majority of women (63%) were 20-29 years of age. Male and female children were equally represented in the index birth. More than half of all women (57%) had some education and were not working (62%). About 34% belonged to scheduled caste/scheduled tribe and about 68% belong to Hindu religion (68%). The majority of women (62%) were located in rural areas and approximately 39% of the women reported to be living in a household categorised to have poor standard of living. About 65% had low media access and a similar percentage were not using contraceptive for spacing purposes (66.09)%.

(Table 1 about here)

Table 2 presents precent distribution of the responses to the autonomy related questions. It is clear from this table that level of autonomy of women varies from one aspect to another. For instance, while 96% women are allowed to go to health facility either by themselves or with someone else only 56.6% of women are involved (either alone or with partner) in decisions regarding large household purchases. Similarly, only 41.4% of women had money that they can use without asking anyone. While generally autonomy related to movement is high, their economic and decision-making autonomy is not high.

(Table 2 about here)

Table 3 shows important statistics related to the duration between the index birth and the subsequent pregnancy. It can be seen from this Table 3 out of the total of 14,868 women who had given birth during 2001-2002, 19.2% women subsequently became pregnant within a year, and 26% between 13-24 months (all together 45% became pregnant within the next two and a quarter year), following the index birth. The median duration to next pregnancy is 27 months.

(Table 3 about here)

Table 4 provides further insight into the risk of incidence of next pregnancy, following index birth, among the women of various autonomy levels, and Figure1 shows probability of no subsequent conception by various durations of time, following the index birth, among the women of various autonomy levels. This figure also shows 95% confidence limits to the above mentioned probabilities. It can be seen from this Figure 1 that at any level of duration, the scope of subsequent conception is relatively less for women with high level of autonomy than the women with low level of autonomy. Log-rank test (Table A3 in appendix) also confirmed that

statistically risk (hazard) of subsequent pregnancy varies considerably from women of one autonomy level to another. These results imply that statistically BI are significantly larger for the women of high autonomy level than the women of low autonomy level.

(Table 4 about here)

(Figure 1 here)

3.2 Cox-regression results to determine role of autonomy on birth-to-conception interval

Results shown in earlier section are unadjusted for age and other covariates. In order to control for confounding, we ran cox-proportional hazards models step by step with and without simultaneously controlling for demographic and socioeconomic factors, as shown in Table 5. In Model 1, women autonomy is the only explanatory variable. In model 2, in addition to women autonomy, demographic characteristics of women are also included. In Model 3, in addition to the variables in model 2, socio-economic characteristics of women are added. In Model 4, current use of contraceptive method was additionally added to the explanatory variables in Model 3.

Results showed that risk of subsequent pregnancy, following index birth is relatively less among women with high autonomy level (hazard ratio is 0.65) and the women with medium autonomy level (hazard ratio is 0.84) than the women with low level of autonomy. This means birth intervals are large for women with high autonomy level and the medium autonomy level than the women with low autonomy level. Results also indicate that after adjusting for demographic, and socioeconomic factors women's autonomy remained a significant predictor of birth-to-conception intervals with higher autonomy positively associated with larger birth-to-conception intervals (Table 5, Model 3). Additionally controlling for use of contraceptive for spacing purpose, did not bring any changes to the effect of autonomy on birth-to-conception intervals. This indicates that contraceptive usage is not a mediator in the relationship between autonomy and birth-to-conception interval. We also found that women with secondary and higher education were less likely to have a conception than women with no education.

3.4 To determine whether autonomy mediates the relationship between education and birth-to-conception interval

In order to test whether women autonomy mediates the relationship between education and birth-to-conception interval we proceeded step by step again with cox-regression, as shown in table 6. In first step education is only included in the regression model. In the second step, demographic and socio-economic variables were included in the model. In the third and final step women autonomy was controlled (actually this Model is exactly the same as Model 4 in Table 5). If education lost its significance in the presence of autonomy it means that women autonomy mediates the relationship between education and birth-to-conception interval.

Decrease in the risk of birth with increase in the level of education of women can be seen from Table 6 (Model 1). In particular, the relative risks of getting pregnant among women with primary education, secondary education and higher education are 0.9, 0.75 and 0.36 respectively. After adjusting for demographic and socio-economic factors, these magnitudes slightly altered. However, including the usage of spacing method variable in the regression model (Model 3) considerably increased the magnitudes of risk of conception among women of various education levels. This indicates the partial mediating role of contraceptive use in the relation between

education and birth-to-conception interval. But, further addition of women autonomy variable to the regression model (Model 4) did not alter the results at all. This suggests that women autonomy is not acting as mediator in the relationship between education and birth-to-conception interval.

Study also found significant interaction between women's autonomy and education of women (Model 5) implying that empowered women may have higher or shorter BI depending upon the education of the women (Table 6). After adding the interaction terms to the model already controlling for the demographic and socioeconomic factors (Table 6, Model 5), the main effect of autonomy variable almost lost its significance while the main effect of education remained significant. It was only secondary educated women with high empowerment and higher educated women with medium and high empowerment were less likely to have risk of conception as compared to uneducated and low empowered women. This clearly suggests that autonomy acts as a moderator in the relationship between education and birth-to-conception interval.

Conclusion

Globally, very little evidence exists on the relationship between woman autonomy and their births intervals. In case of India, where the position of woman is low, such knowledge is completely absent. In this study, using data from the third National Family Health Survey that was conducted in India during 2005-2006, we have investigated the relationship between women autonomy and their birth intervals. Results indicate that even after controlling for other influencing factors women autonomy has significant influence on birth intervals. In particular, women with higher autonomy levels have large birth intervals than the women with lower levels of autonomy. Present study does not provide any support to the general perception that woman autonomy may be one of the pathways through which education acts on reproductive and health outcomes. Present study also found that the influence of contraceptive usage on birth-to-conception interval is more in the relationship between education and birth-to-conception interval and almost nil in the relationship between autonomy and birth-to-conception interval. This indicates that autonomy acts on birth-to-conception interval through other mechanisms which are needs to be explored. Present study also found significant interaction between women's autonomy and education of women in influencing birth-to-conception interval, implying that educated women may have higher or shorter BI depending upon the level of autonomy of women. This essentially means that autonomy is the moderator in the relationship between education and birth interval.

Table 1: Characteristics of study respondents

Characteristics (and categories)	Total	Per cent
Age group		
<20	223	1.5
20-29	9363	63.0
30+	5282	35.5
Sex of last child		
Female	7460	50.2
Male	7408	49.8
Total number of surviving children		
0	6083	40.91
1	3904	26.26
2	3406	22.91
3 and above	1475	9.92
Region		
North	2425	16.3
South	3500	23.5
East	1686	11.3
West	2970	20.0
Central	2718	18.3
North-east	1569	10.6
Level of education		
No education	6348	42.7
Primary	2171	14.6
Secondary	5251	35.3
Higher	1098	7.4
Work status		
Not working	9216	62.0
Agriculture worker	3382	22.7
Non-agriculture worker	2270	15.3
Caste		
Scheduled caste or scheduled tribe	5059	34.0
OBC	4698	31.6
Other caste	4518	30.4
Caste not reported/ missing	593	4.0
Religion		
Hindu	10157	68.3
Muslim	2534	17.0
Christian	1477	9.9
Others	700	4.7
Place of residence		
Rural	9146	61.5
Urban	5722	38.5
Standard of living		
Low	5752	38.7
Medium	4932	33.2
High	3821	25.7
Unknown/ missing	363	2.4
Exposure to media		
Low	9618	64.7
Medium	4018	27.0
High	1232	8.3
Using any spacing method		
No	9826	66.09
Yes	5042	33.91
Total	14868	100

Table 2: Level of autonomy among respondents

Autonomy issue	N	Per cent
Autonomy related to movement		
Allowed to go to market either alone or with someone else	13,470	*90.6*
Allowed to go to health facility either alone or with someone else	14,362	*96.6*
Allowed to go to outside village/community either alone or with someone else	13,827	*93*
Autonomy related to household decisions		
Either alone or together with spouse take final decisions on own health care	9,857	*66.3*
Either alone or together with spouse take final decisions on making large household purchases	8,415	*56.6*
Either alone or together with spouse take final decisions on making household purchases for daily needs	9,426	*63.4*
Either alone or together with spouse take final decisions on visits to family or relatives	9,545	*64.2*
Either alone or together with spouse take final decision on what to do with money husband earns	10,512	*70.7*
Economic autonomy		
Had some money that can be used without asking any anybody	6,155	*41.4*
level of autonomy		
Low	3,717	*25.0*
Medium	7,434	*50.0*
High	3,717	*25.0*
Mean level of autonomy		*1.71*
Total sample size	**14,868**	*100*

Table 3: Some important characteristics related to incidence and duration to next pregnancy (conception)

Issue	N	Per cent
censored or not become pregnant during study period	4776	32.12
Become pregnant within in a year (i.e. on or before 12 months)	2855	19.2
Become pregnant in the second year (i.e. during 13 to 24 months)	3866	26.0
Median duration to next pregnancy (in months)		*27*
Total sample size	14868	100

Table 4: Incidence and duration to next pregnancy (conception) by level of autonomy of women

Level of autonomy	censored or not become pregnant during study period		become pregnant on or before 12 months		become pregnant during 13 to 24 months		Median duration to next pregnancy (in months)	Total
	N	Per cent	N	Per cent	N	Per cent		
Low	895	24.1	799	21.5	1119	30.1	23	3717
Medium	2360	31.7	1428	19.2	1927	25.9	27	7434
High	1521	40.9	628	16.9	820	22.1	34	3717

Table 5: Multivariate hazard models predicting risk of next conception by socio-demographic and women's autonomy

| Factor	Categories (if any)	Model 1		Model 2		Model 3		Model 4	
		Hazard Ratio	Confidence interval	Hazard Ratio	Confidence interval	Hazard Ratio	Confidence interval	Hazard Ratio	Confidence interval
Level of autonomy	High	0.65**	(0.61,0.69)	0.76**	(0.72,0.80)	0.86**	(0.81,0.91)	0.86**	(0.81,0.91)
	Medium	0.84**	(0.80,0.87)	0.90**	(0.86,0.94)	0.94**	(0.90,0.98)	0.95*	(0.91,1.00)
	Low ®								
Age group	<=19			1.18**	(1.04,1.33)	1.01	(0.89,1.14)	1.03	(0.91,1.16)
	20-29 ®								
	30+			0.54**	(0.51,0.57)	0.59**	(0.56,0.63)	0.60**	(0.57,0.64)
Sex of last child	Female ®								
	Male			0.86**	(0.83,0.90)	0.87**	(0.84,0.90)	0.89**	(0.86,0.93)
Number of surviving children	0 ®								
	1			0.78**	(0.74,0.82)	0.72**	(0.69,0.76)	0.76**	(0.72,0.80)
	2-3			0.96	(0.91,1.01)	0.78**	(0.74,0.82)	0.83**	(0.78,0.88)
	4+			0.95	(0.87,1.03)	0.68**	(0.62,0.74)	0.73**	(0.67,0.80)
Region	North			1.01	(0.94,1.09)	1.01	(0.93,1.09)	1.10*	(1.02,1.19)
	South ®								
	East			0.91**	(0.85,0.97)	0.79**	(0.73,0.84)	0.90**	(0.84,0.97)
	West			0.97	(0.90,1.05)	1.06	(0.98,1.15)	1.14**	(1.05,1.23)
	Central			1.17**	(1.10,1.25)	1.04	(0.97,1.11)	1.16**	(1.08,1.24)
	Northeast			0.71**	(0.63,0.80)	0.62**	(0.55,0.70)	0.77**	(0.68,0.88)
Level of education	No education ®								
	Primary					0.88**	(0.83,0.94)	0.93*	(0.88,0.99)
	Secondary					0.76**	(0.72,0.81)	0.83**	(0.78,0.89)
	Higher					0.49**	(0.43,0.57)	0.59**	(0.51,0.68)
Work status	Not working ®								
	Agriculture					0.88**	(0.84,0.93)	0.88**	(0.84,0.93)
	Non-Agriculture					0.82**	(0.77,0.88)	0.83**	(0.78,0.88)
Caste	SC or ST					1.20**	(1.13,1.27)	1.14**	(1.08,1.21)
	OBC					1.13**	(1.07,1.19)	1.08**	(1.02,1.13)
	Others ®								
Religion	Hindu ®								
	Muslim					1.16**	(1.10,1.23)	1.15**	(1.09,1.22)
	Christian					1.39**	(1.19,1.61)	1.31**	(1.12,1.52)
	Others					1.05	(0.93,1.19)	1.09	(0.96,1.23)
Place of residence	Rural ®								
	Urban					0.90**	(0.85,0.95)	0.93*	(0.88,0.99)
Standard of living	low ®								
	Medium					0.96	(0.91,1.01)	0.98	(0.93,1.03)
	High					0.81**	(0.76,0.87)	0.86**	(0.81,0.92)
Education gap between couple						0.99**	(0.99,1.00)	1.00	(0.99,1.00)
Media exposure	Low ®								
	Medium					0.88**	(0.83,0.93)	0.92**	(0.86,0.97)
	High					0.80**	(0.72,0.90)	0.84**	(0.75,0.94)
Contraceptive use	Not using ®								
	Using							0.54**	(0.51,0.57)

Note: * significant at 5% level of significance, ** significant at 1% level of significance. [a] Prim indicates primary education, seco indicates secondary education, aut_m indicate medium autonomy, aut_h indicate high level of autonomy.

Table 6: Role of autonomy in the relationship between education and birth-to-conception interval

Characteristic	Categories (if any)	Model 1 Hazard ratio	Model 1 Confidence interval	Model 2 Hazard ratio	Model 2 Confidence interval	Model 3 Hazard ratio	Model 3 Confidence interval	Model 4 Hazard ratio	Model 4 Confidence interval	Model 5 Hazard ratio	Model 5 Confidence interval
Level of education	No education										
	Primary	0.90**	(0.85,0.95)	0.88**	(0.83,0.94)	0.93*	(0.88,0.99)	0.93*	(0.88,0.99)	0.97	(0.88,1.06)
	Secondary	0.75**	(0.72,0.79)	0.76**	(0.72,0.81)	0.83**	(0.78,0.89)	0.83**	(0.78,0.89)	0.89**	(0.81,0.97)
	Higher	0.36**	(0.32,0.40)	0.49**	(0.42,0.56)	0.59**	(0.51,0.67)	0.59**	(0.51,0.68)	0.85	(0.65,1.11)
Age group	<20										
	20-29			1.03	(0.91,1.16)	1.04	(0.92,1.18)	1.03	(0.91,1.16)	1.03	(0.91,1.16)
	30+			0.58**	(0.55,0.62)	0.59**	(0.56,0.63)	0.60**	(0.57,0.64)	0.60**	(0.57,0.64)
Sex of last child	Female (R)										
	Male			0.87**	(0.84,0.90)	0.89**	(0.86,0.93)	0.89**	(0.86,0.93)	0.89**	(0.86,0.93)
Total number of surviving children	0 (R)										
	1			0.72**	(0.68,0.76)	0.76**	(0.72,0.80)	0.76**	(0.72,0.80)	0.76**	(0.72,0.80)
	2			0.77**	(0.73,0.81)	0.82**	(0.77,0.87)	0.83**	(0.78,0.88)	0.82**	(0.78,0.87)
	3			0.67**	(0.61,0.73)	0.72**	(0.66,0.79)	0.73**	(0.67,0.80)	0.73**	(0.67,0.79)
Region	North			1.01	(0.94,1.10)	1.11**	(1.03,1.21)	1.10*	(1.02,1.19)	1.11**	(1.02,1.20)
	South (R)										
	East			0.79**	(0.74,0.85)	0.90**	(0.84,0.97)	0.90**	(0.84,0.97)	0.90**	(0.84,0.97)
	West			1.06	(0.98,1.14)	1.13**	(1.05,1.23)	1.14**	(1.05,1.23)	1.14**	(1.06,1.24)
	Central			1.04	(0.98,1.12)	1.17**	(1.09,1.25)	1.16**	(1.08,1.24)	1.16**	(1.08,1.24)
	Northeast			0.61**	(0.54,0.70)	0.76**	(0.67,0.87)	0.77**	(0.68,0.88)	0.77**	(0.68,0.88)
Work status	Not working (R)										
	Agriculture			0.88**	(0.84,0.93)	0.88**	(0.84,0.92)	0.88**	(0.84,0.93)	0.88**	(0.84,0.93)
	Non Agriculture			0.81**	(0.76,0.87)	0.82**	(0.77,0.87)	0.83**	(0.78,0.88)	0.83**	(0.78,0.89)
Caste	SC & ST			1.20**	(1.13,1.27)	1.14**	(1.07,1.21)	1.14**	(1.08,1.21)	1.14**	(1.08,1.21)
	OBC			1.13**	(1.07,1.19)	1.07**	(1.02,1.13)	1.08**	(1.02,1.13)	1.08**	(1.02,1.14)
	Others (R)										
Religion	Hindu (R)										
	Muslim			1.16**	(1.10,1.23)	1.15**	(1.09,1.22)	1.15**	(1.09,1.22)	1.15**	(1.09,1.22)
	Christian			1.37**	(1.18,1.59)	1.29**	(1.11,1.51)	1.31**	(1.12,1.52)	1.32**	(1.13,1.53)
	Others			1.04	(0.92,1.18)	1.08	(0.95,1.22)	1.09	(0.96,1.23)	1.08	(0.95,1.22)
Place of residence	Urban			0.88**	(0.84,0.93)	0.92**	(0.87,0.97)	0.93*	(0.88,0.99)	0.94*	(0.89,0.99)
	Rural (R)										
Standard of living	Low (R)										
	Medium			0.96	(0.91,1.01)	0.98	(0.93,1.04)	0.98	(0.93,1.03)	0.98	(0.92,1.03)
	High			0.81**	(0.76,0.87)	0.87**	(0.81,0.93)	0.86**	(0.81,0.92)	0.86**	(0.81,0.92)
Education gap with spouse				0.99*	(0.99,1.00)	1.00	(0.99,1.00)	1.00	(0.99,1.00)	1.00	(0.99,1.00)
Exposure to media	Low (R)										
	Medium			0.87**	(0.82,0.92)	0.91**	(0.86,0.96)	0.92**	(0.86,0.97)	0.92**	(0.86,0.97)
	High			0.79**	(0.70,0.88)	0.83**	(0.74,0.93)	0.84**	(0.75,0.94)	0.86**	(0.76,0.96)
Using spacing methods	No (R)										
	Yes					0.54**	(0.51,0.57)	0.54**	(0.51,0.57)	0.54**	(0.52,0.57)
Level of autonomy	Low (R)										
	High							0.86**	(0.81,0.91)	0.91*	(0.85,0.99)
	Medium							0.95*	(0.91,1.00)	0.99	(0.93,1.04)
Education and autonomy interaction terms	Prim*aut_m									0.94	(0.83,1.07)
	Prim*aut_h									0.95	(0.81,1.12)
	Seco*aut_m									0.92	(0.83,1.02)
	Seco*aut_h									0.87*	(0.76,0.98)
	High*aut_m									0.67**	(0.49,0.92)
	High*aut_h									0.57**	(0.41,0.80)

Note: * significant at 5% level of significance, ** significant at 1% level of significance. ª Prim indicates primary education, seco indicates secondary education, aut_m indicate medium autonomy, aut_h indicate high level of autonomy.

Figure 1: *Probability no subsequent pregnancy, following index birth during 2001-2002, with the duration of time among the currently married fecund women by their level of autonomy*

Product-Limit K-M Estimates
With 95% Confidence Limits
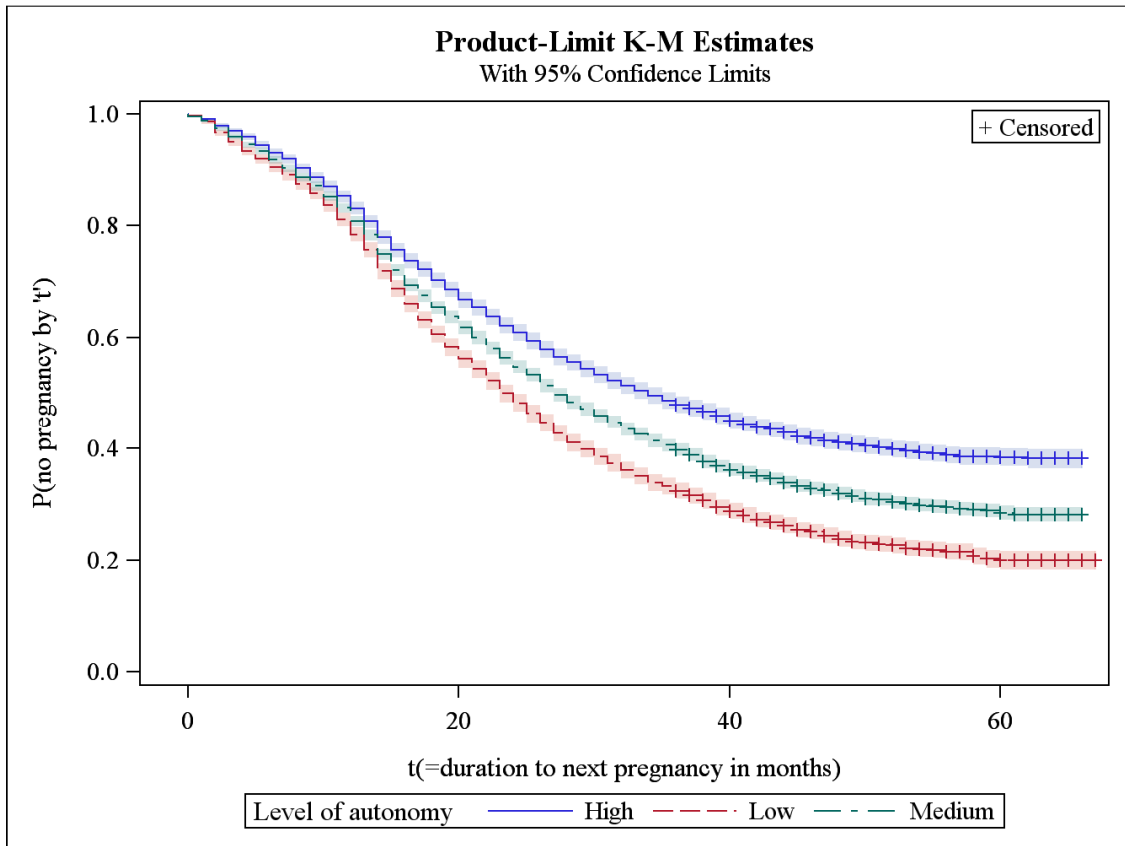
Appendix

Table A1: Factor loading for variables

Variable	Loading
Allowed to go to market	0.21193
Allowed to go to health facility	0.21074
Allowed to go to outside village/community	0.18612
Final say on own health care	0.16615
Final say on making large household purchases	0.20731
Final say on making household purchases for daily needs	0.20640
Final say on visits to family or relatives	0.20115
Final say on what to do with money husband earns	0.17338
Final say on money for own use	0.08405

Table A3: Log-rank test results

Test of Equality over Strata			
Test	Chi-Square	DF	Pr > Chi-Square
Log-Rank	263.2161	2	<.0001

Table A2: *Different regions of India and their constituent states*

Region	Constituent States
North India	Jammu & Kashmir, Himachal Pradesh, Haryana, Punjab, Delhi, Uttaranchal and Rajasthan
South India	Andhra Pradesh, Kerala, Tamil Nadu and Karnataka
East India	Bihar, Jharkhand, Orissa and West Bengal
West India	Goa, Maharashtra and Gujarat
Central India	Madhya Pradesh, Chhattisgarh and Uttar Pradesh
North-east India	Sikkim, Meghalaya, Assam, Arunachal Pradesh, Mizoram, Manipur, Nagaland and Tripura

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