Factors Associated with the Timing of Female's Age at Sterilization in Bangladesh

Introduction

Many women in developing country start childbearing relatively early, continue reproduction until their desired family size is achieved and then stop childbearing to resort by choosing permanent methods such as female sterilization (Padmadas et. al., 2004; Greene and Merrick, 2005). The most developing countries in Asia like Bangladesh, the women are commonly using sterilization (tubal ligation) method and female sterilization is critically meeting the reproductive goals and family planning needs of this country (BDHS, 2007).

In Bangladesh, there is a gradual increase in the age at marriage, but the age at which they seek sterilization is stagnant from more than a decade which clearly indicates that reproductive span is narrowing. Major motivations for having sterilization appear to be economic, completed family size and dislike of other contraceptive methods (Ahmed et al., 1980; Hamson, 1979; Roy et al., 1973; Burnight et al., 1975).

For sterilization, the number and sex of children are important matters. Women with one child had a much lower risk of sterilization than women with one boy and one girl. Couples with two girls also experience lower rates of sterilization than couples with a boy and a girl. Evidence suggests that last birth interval and son preference influence women to go for abortion or to resort sterilization (Arnold et al., 2002; Dalla and Leone, 2001).

Singh et al. (2011) have used Weibull distribution to fit the female age at sterilization data for Bangladeshi women from the data BDHS (2004) and the distribution fits the data quite well. In this paper, an attempt has been made to know the effects of some selected socioeconomic and demographic covariates on female age at sterilization, by applying Weibull regression, a parametric failure time survival model. The application of parametric failure time model for the event history analysis is also identify to show the effect of heterogeneity on the timing of sterilization. For this purpose, Weibull survival models with and without Gamma heterogeneity have been used.

Data and Methodology

This study utilizes the data from the retrospective survey "Bangladesh Demographic and Health Survey 2004" which is carried out during January-May 2004 under the authority of the National Institute for Population Research and Training (NIPORT) of the Ministry of Health and Family Welfare. For this analysis, women who had at least one child at the time of survey have been considered and also the women whose open birth interval is more than five years have been selected, because it is assumed that women are likely to have completed their reproductive span during this time period. In the present analysis the women who are widowed, divorced, not living together, in-fecund and menopausal were excluded. Finally a total of 2963 women have been selected for this analysis.

Results

This study is based on 2963 women who have had at least one child, among them 574 have become sterilized before the date of survey. Table 1 provides the prevalence of age at sterilization by place of residence and region. The table shows that among currently married women who have had undergone sterilization, more than 50 percent women have chosen permanent method at younger ages, i.e. earlier than 30 years. The same patterns of cohort effect on sterilization are observed in place of residence and all divisions in Bangladesh. From the Table 2, it is clear that more than 50 percent women with 4 or more parity choose to have sterilization as a terminal method of contraception in their reproductive career. The median age at sterilization at parity 2 is 22 years, while that at parity 3 is 24.0 years and at parity 4 is 29 years.

Table 3 depicts the results of fitted Weibull survival model without heterogeneity and it also provides the results for this model with Gamma heterogeneity. The result indicates that the propensity of sterilization is 1.2 times higher among urban women as compared to rural women when the model is considered without heterogeneity and it is significant. Similarly, if the model takes into account the Gamma heterogeneity then the propensity of sterilization among urban women is 1.5 times higher as compared to rural women, but it is insignificant.

The impact of women education and husband education show negative effects on age at sterilization. As education increases, the risk of women becoming sterilization decreases. Women with primary education and women who have completed secondary education have 25 percent and 48 percent respectively less chance for going for sterilization than women with no education and the difference are highly significant. Religion seems to be an influencing variable for age at sterilization. In comparison to non-Muslim, Muslim women have a slower pace in accepting sterilization. The average failure time for sterilization is 41 percent lower among Muslim women than their non-Muslim counterparts. Similar pattern is observed after correcting for heterogeneity.

It is to be noted from Table 3 that women aged older than 29 years have 1.16 times higher average failure risks for sterilization than women aged lower than 30 years. After correcting the models for misspecification, it is observed that the average failure time for women aged greater than or equal to 30 years is 2.4 times higher than younger women aged less than 30 years and it becomes highly significant.

Age at marriage has significant effect on the timing of age at sterilization, women whose age at marriage is more than equal to 18 years are less likely to choose sterilization quickly as compared to women whose age at marriage is less than 18 years. The strength of this variable remains significant even after controlling for heterogeneity.

The last birth interval is insignificant for age at sterilization of women in the model if the heterogeneity is not considered. But, after correcting the model, it is interesting to note that the last birth interval is highly significantly effect on age at sterilization. It is found from the model where heterogeneity factor is taken into consideration that women with more than 2 children have the average age at sterilization is 70 percent lower than women with up to 2 children. The effect of heterogeneity has been found from the values of θ in model in Table 3.

The result shows that θ is significantly different from zero indicating a significant amount of heterogeneity present in population with respect to the tempo of the timing of age at sterilization. A significant value of σ in both the models indicates the change of the shape of the curve.

Table 1: Distribution of female age at sterilization by age group and region in Bangladesh

Characteristics	Mean	Age in years (%)				Number of woman
		<30	30-34	35-39	40-49	
Residence						
Urban	26.9	66.2	23.9	7.5	3.4	213
Rural	26.3	74.3	19.4	5.3	2.2	361
Division						
Barisal	26.3	76.3	20.0	3.6	-	55
Chittagong	29.3	54.6	28.0	12.0	5.3	75
Dhaka	26.6	78.7	23.6	7.0	0.6	157
Khulna	24.8	90.3	6.5	3.2	-	62
Rajshahi	25.5	75.2	19.8	3.4	1.7	177
Sylhet	28.6	60.4	27.1	10.4	2.1	48
All cases	26.6	71.3	21.1	6.1	1.6	574

Table 2: Distribution of female age at sterilization by parity and region in Bangladesh

Characteristics	Parity				Number of woman
	1	2	3	>=4	
Residence					
Urban	2.8	16.0	29.6	51.6	213
Rural	2.5	15.0	26.9	55.7	361
Division					
Barisal	3.6	12.7	27.3	56.4	55
Chittagong	2.7	5.3	16.0	76.0	75
Dhaka	1.9	15.3	33.1	49.7	157
Khulna	1.6	16.1	29.0	53.2	62
Rajshahi	4.0	21.5	28.2	46.3	177
Sylhet	-	10.4	27.1	62.5	48
All cases	2.6	15.3	27.9	54.2	574
Median	17.0	22.0	24.0	29.0	-

Table 3: Hazard ratio for Weibull regression model fitted for age at sterilization without and with unobserved heterogeneity in Bangladesh

Characteristics	Weibull regression without unobserved heterogeneity		Weibull regression with unobserved heterogeneity	
	Hazard ratio	**P-value**	**Hazard ratio**	**P-value**
Residence[1]				
Urban	1.21	0.04	1.47	0.08
Woman's education[2]				
Primary	0.73	0.00	0.44	0.00
Secondary and above	0.51	0.00	0.28	0.00
Husband education[3]				
Primary	0.75	0.00	0.57	0.03
Secondary and above	0.62	0.00	0.35	0.00
Religion[4]				
Muslim	0.59	0.00	0.34	0.00
Woman's age[5]				
>= 30 years	1.16	0.38	2.38	0.00
Age at marriage[6]				
>= 18 years	0.68	0.04	0.39	0.02
Last birth interval[7]				
< 24 months	1.19	0.13	3.74	0.00
First birth	0.56	0.11	0.42	0.15
Last child sex[8]				
Male	1.06	0.51	0.97	0.91
Experiences of child death[9]				
Yes	0.94	0.49	0.59	0.03
Parity[10]				
> 2 children	0.92	0.53	0.29	0.00
Shape parameter (ρ)	1.26	-	3.03	-
θ	-	-	1.4	0.00
-(2Log Likelihood)	**1781.98**		**1685.78**	

Reference categories: [1]Rural, [2]Woman's education (No), [3]Husband education (No), [4]Non-Muslim, [5]Woman's age (< 30 years), [6]Age at marriage (< 18 years), [7]Last birth interval (>= 24 months), [8]Female, [9]Experiences of child death (No), [10]Parity (<=2)