

Full Length Research Paper

Duration of post-partum amenorrhoea associated with breastfeeding pattern in Bangladesh

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The association between breastfeeding and resumption of post-partum menstruation (PPA) was examined in Bangladeshi women from the Bangladesh Demographic Health Survey (2004). Life table and Cox regression model were used. Breastfeeding was found to be statistically associated with PPA ($p < 0.00$) in bivariate and multivariate analysis. Hazard analysis show that administrative division, religion, mother's education, work status, mother's age, age at marriage, parity and contraceptive use were statistically significantly associated with the probability of termination of breastfeeding. The study indicated that the duration of PPA significantly increased with increased the duration of breastfeeding practices.

Key words: Breastfeeding, menstruation, post-partum amenorrhoea.

INTRODUCTION

Post-partum amenorrhoea (PPA) is defined as the time elapsed between the termination of pregnancy and the resumption of menstruation just after delivery. It is the most important factor for females' reproductive life and their health. PPA is one of the proximate determinants, which affect the fertility behaviour (specially its effect on birth intervals, in conjunction with or without breastfeeding) or in its own right (Yadava and Jain, 1998; Aryal, 2002; Bongaarts and Potter, 1983). The duration of PPA has been found to be positively related with the nutritional status of women (Ahamed et al., 1988; Huffman et al., 1987).

There is a large body of literature have shown that the duration of PPA period is positively correlated with duration and frequency of breastfeeding (Bongaarts and Potter, 1983; Rodriguez and Diaz, 1988; Huffman et al., 1987; Zhang et al., 2002; Yadava and Jain, 1998; Pinto, 2005; Pinto et al., 1998; Aryal, 2007). In past many researchers investigated the differentials of the duration of PPA in relation to the duration of breastfeeding (Aryal, 2007, 2006; Yadava and Jain, 1998; Pinto, 2005; Pinto et al., 1998). The most consistent conclusion drawn from these studies is that longer-term breastfeeding is asso-

ciated with longer periods of PPA and reduced fertility. Some researchers also studied the relationship between hormonal factors, breastfeeding and the return of menses (McNeilly et al., 1994; McNeilly, 2001).

The importance of breast feeding in regulating individual and social fertility has been matter of general interest for many years, because it tends to increase the average birth interval and therefore to reduce women's fertility over her life span, especially in societies where the use of contraceptive methods is not widespread. Therefore, the main objective of this study is to examine the relationship between the duration of PPA and breastfeeding patterns of Bangladesh.

MATERIALS AND METHODS

Data

The primary source of data for the present study was taken from Bangladesh Demographic Health Survey (BDHS) 2003 - 2004, which collected information throughout the nation during January to May 2004. BDHS employed a two-stage probability sample design to select respondents. At the first stage the primary sampling units chosen from the integrated Multi-Purpose Master Sample (IMPS) created by Bangladesh Bureau of Statistics. It is a nationally representative sample. A total of 361 primary sampling units were used for the BDHS survey (122 units in urban areas and 239 in rural areas) (Mitra and Associates, 2005). A total of 11440 ever-married women between ages 10 - 49 years were included in this survey.

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Among the 11,440 women, 10,145 women who had given birth to one child. And 5455 women provided information about their duration of PPA and breastfeeding for their last child. The data is restricted from 1 - 30 months after delivery for PPA and finally the yielding sample size is 5,323. Although breastfeeding rarely continues more than four years, only mothers with breastfeeding 48 months were included in this study. The data obtained were analyzed using SPSS ver.15 statistical software, Statistica 5.0, and Excel.

METHODS

The duration of PPA is considered as the dependent variables. Breastfeeding and amenorrhoea period are measured in completed months. The basic methodology applied for studying the pattern of breastfeeding and post-partum amenorrhoea is a current status analysis which uses the current status of a defined descriptive variable in each interviewed individual (breastfeeding status, post-partum amenorrhoea) at the moment of the survey. Bivariate and multivariate statistical techniques have been used to study the dependent variable PPA in relation to the explanatory variables. The duration of PPA is grouped into 1 - 10, 10 - 20 and 20 - 30 months, that is, in four categories to test the significant different between dependent and explanatory variables likely breastfeeding status. The association of the duration of PPA to each variable included in the analysis was first checked by using Chi-square statistic in a two-way tabulation.

Life-table analysis

A life table can be constructed by pooling completed and censored cases of breastfeeding (Lee, 1993; Sivakami, 2003). The completed observations are those in which breastfeeding was stopped and the exact duration of breastfeeding is known. Censored observations are those in which the child was either still being breastfed at the time of survey or was breastfed until its death. First, probabilities of terminating breastfeeding are computed for each month and from these, life tables are constructed.

Where;

N = Number of live births,

N_0 = Number of children ever breastfed,

d_i = Number of children for whom breastfeeding was stopped during the i th

month since birth, for $i = 1, 2, \dots$,

c_i = Number of children who were being breastfed at the time of survey with child in the i th month at the time of survey, for $i = 1, 2, \dots$,

w_i = Number of children who were breastfed until death with child in the i th month at the time of death, for $i = 1, 2, \dots$.

Then, N_i = Number of children being breastfed at the end of the i th month since birth,

$= N_{i-1} - d_i - c_i - w_i$ for $i = 1, 2, \dots$

q_i = Probability of discontinuing breastfeeding during the i th month

$$q_i = \frac{d_i}{[N_{i-1} - 0.5(c_i + w_i)]}, \text{ for } i = 1, 2, \dots, \text{ and}$$

P_i = Proportion continuing breastfeeding at least up to the end of the i th month = $(1 - q_i) * P_{i-1}$, for $i = 1, 2, \dots$, where From the computed values of P_i , the mean length of breastfeeding can be obtained by a standard life table formula

$$\text{Mean length} = \left[\frac{1}{2}(P_{1,0} + P_{i,48}) + (P_{i,1} + P_{i,2} + \dots + P_{i,47}) \right]$$

Using the life table technique, the monthly failure probabilities at every duration at which menstruation returned have been estimated as the ratio of the number of women that have resumed menses divided by the number of women still at risk of returning to the menstruating state.

Cox proportional hazard model

The net contribution of socio-demographic variables on stopping of breastfeeding was assessed by using the Cox proportional hazard model, which combines the features of life table and regression (Cox, 1972). Application of Cox hazard model was proposed as appropriate for analysis of the duration breastfeeding and PPA (Huffman et al., 1987). This models influence of a set of variables on the hazard of termination. The hazard function at time point t (here it is stopping or termination of breastfeeding), denoted by $\lambda(t, z)$, is expressed as:

$$\lambda(t, z) = \lambda_0(t) \cdot \exp \sum X_i \beta_i$$

Where; X_i are explanatory variables, β_i are regression coefficients and $\lambda_0(t)$ is a baseline hazard.

RESULTS

Figures 1 and 2 displays the distribution of the duration of PPA and breastfeeding for mothers of the last child respectively. Following a peak at 1 month duration the PPA distribution showed heaping at durations of multiple of three months. Figure 1 indicated that about 27% of all women in the survey reported 1 month as the duration of PPA. Figure 2 clearly showed a heaping at the multiple of six months in the duration of breastfeeding. Table 1 provides the mean durations for PPA and breastfeeding by different parities of women. The mean duration of PPA in the population under study is 8.03 months and the mean duration for breastfeeding is 32 months. The duration of PPA increased from 4.87 months for mothers of parity 1 - 9.40 months for mothers of parity 6 and over. The survival curve (Figure 3) clearly showed a decline trend up to 9 months and there after it decline rapidly. In Figure 4 showed that the survival function of breastfeeding decreased substantially up to 23 months, after that point the function decreased steadily.

Table 2 showed that PPA significantly associated with the breastfeeding status and months of breastfeeding. Women who had ever breastfed shows almost double duration of PPA than who never breastfed their child. The functions for women who never breastfeeding are suddenly drop off from 1 months and this tendency continue up to 12 months; while the survival functions for women who ever breastfeeding are gradually decreasing with increasing duration of PPA (Figure 5). Table 2 also

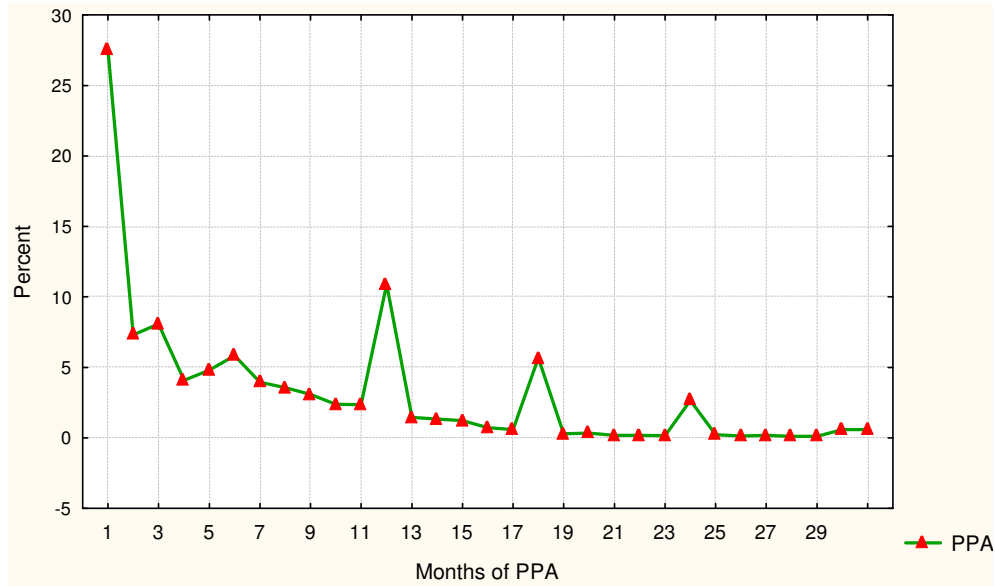


Figure 1. Percentage distribution of women by reported duration of amenorrhoea.

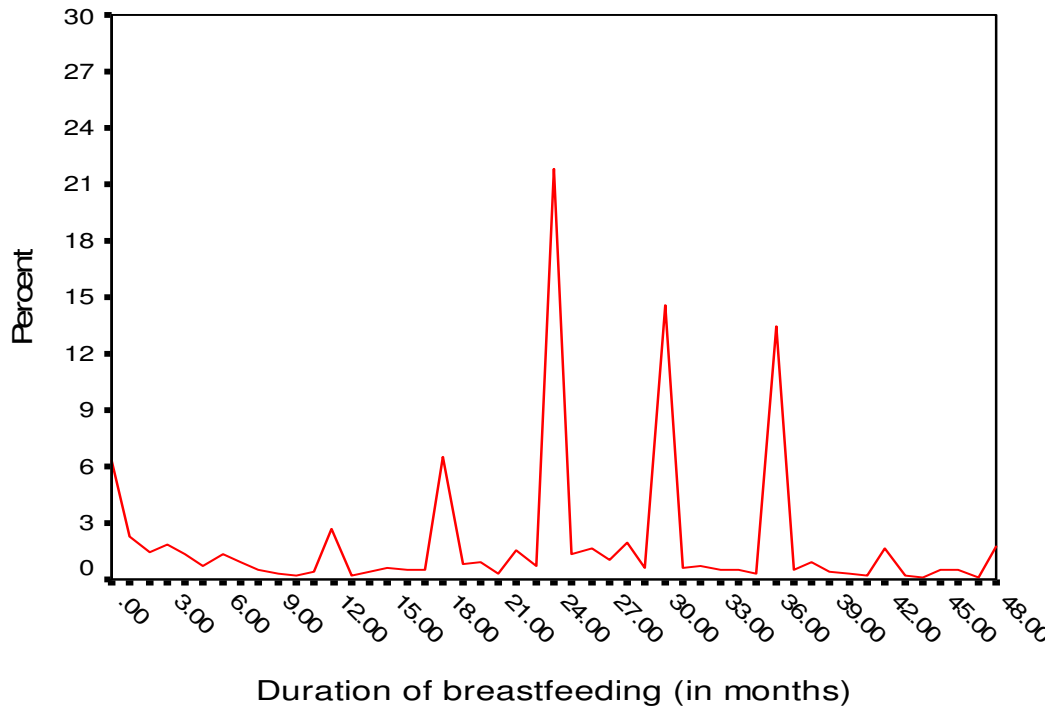


Figure 2. Percentage distribution of women by reported duration of breastfeeding.

Table 1. Life table for duration of PPA and breastfeeding by parity of women in Bangladesh, 2004.

Variables	Mean length of amenorrhoea and breastfeeding by parity						Total
	1	2	3	4	5	6+	
Post-partum amenorrhoea	4.87	7.05	7.23	9.16	9.26	9.40	8.03
Breastfeeding	32.42	32.04	32.05	32.09	32.29	31.82	31.99

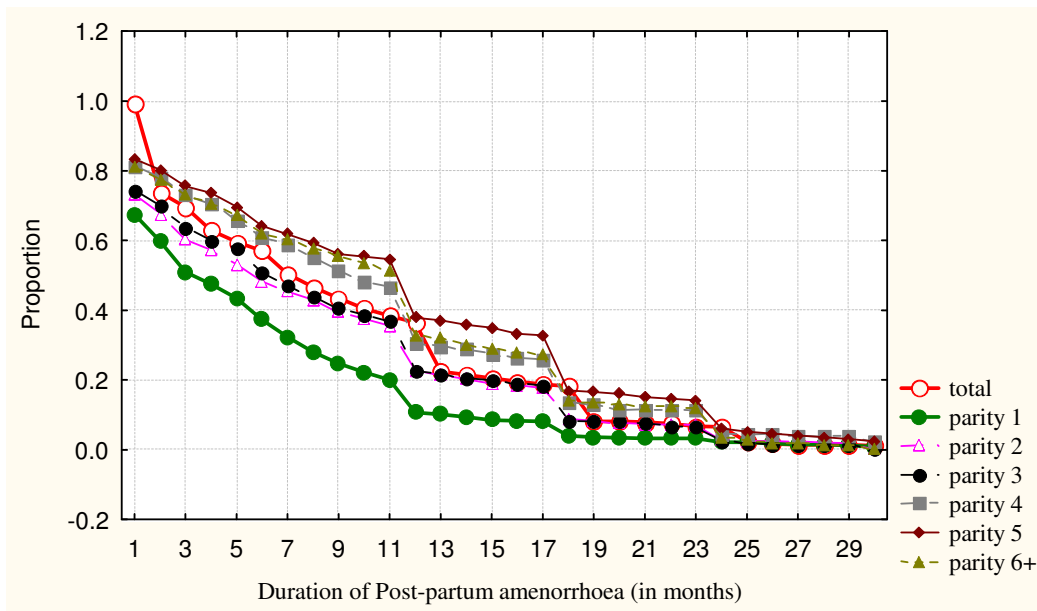


Figure 3. Survival functions for women who were continuing amenorrhoea at different months of PPA, Bangladesh.

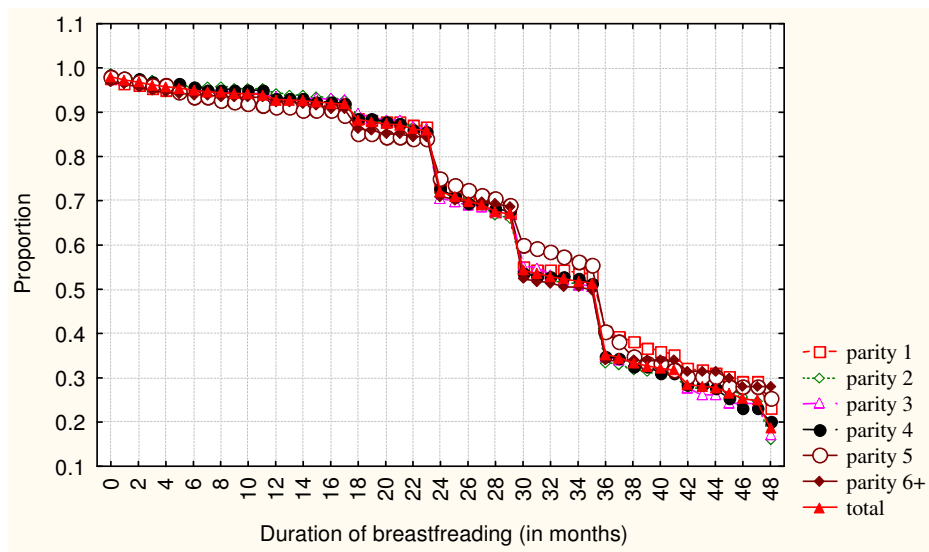


Figure 4. Survival functions for women who were continuing breastfeeding at different months of breastfeed duration, Bangladesh.

Table 2. Mean duration amenorrhoea by different demographic characteristics based on Life table technique.

Characteristics	Level	Mean	Cal. χ^2	p vale
Breastfeeding	Never breastfeed	3.84	$\chi^2 = 7.93$ d.f = 2	0.019
	Ever breastfeed	7.35		
Months of Breastfeeding	0-5	5.58	$\chi^2 = 324.61$ d.f = 4	0.000
	6-12	7.10		
	13 and more	7.62		

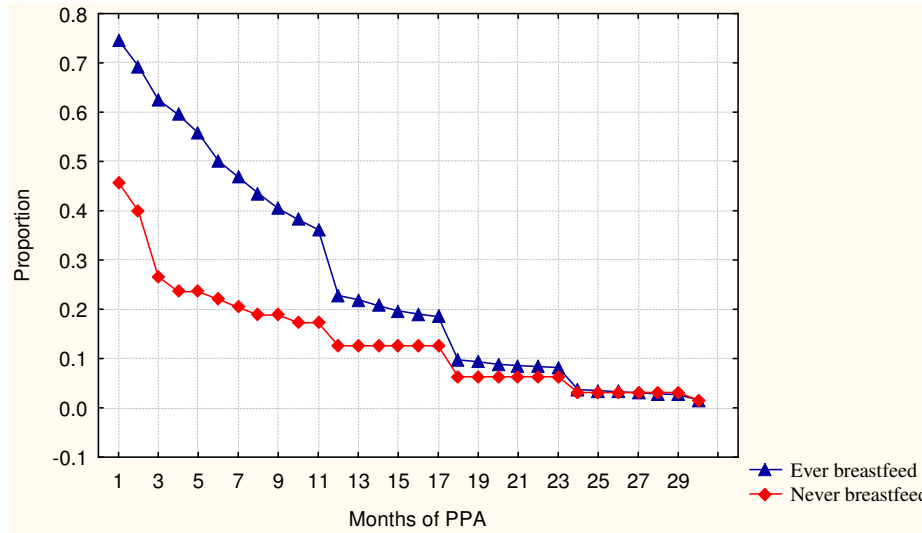


Figure 5. Survival function for those women who breastfeed ever and never status at different months of PPA.

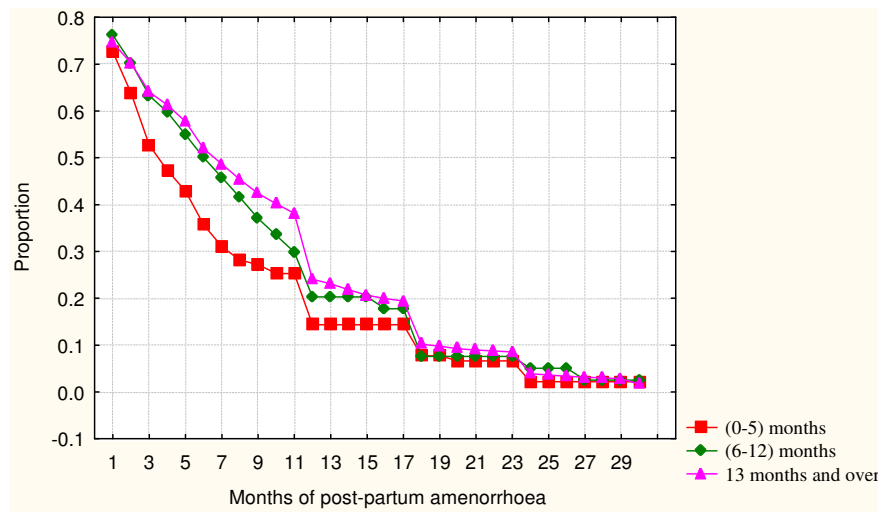


Figure 6. Survival function for those women who are breastfed for (0-5), (6-12) and 13+ months at different months of PPA.

showed that the mean duration of PPA increased from a minimum of 5.58 months in the low breastfeeding category of 0-5 months to a maximum of 7.62 months in the category of 13 months and over. According to the Figure 6, the functions also decrease rapidly over time. Women who had breastfed their children lower duration has the faster resumption of menstruation during the first six months, subsequent point survival function tends to slow down steadily.

Socio-demographic factors associated with duration of breastfeeding are presented in Table 3. The proportional hazard analysis has identified that mother's age, age at marriage, parity, contraceptive use, delivery status, administrative division, religion, mother's education and

work status were played a significant role on the risk of termination of breastfeeding while sex of child, residence, husband education were found insignificant effect. Women with younger age (≤ 24 years) had lower risk of stop breastfeeding as compared to the women with older age. Women with early age at marriage (≤ 14 years) had lower risk of stop breastfeeding than older marriage category. Mother who delivery their child in normal way is 0.767 times less likely to terminate breastfeeding than the mothers who delivery their child in caesarean type. Contraception user had the lower risk of stop breastfeeding than the non-user women. The women of Barisal, Dhaka, Khulna and Rajshahi divisions were less likely to terminate breastfeeding than Sylhet division. Muslim mother

Table 3. Cox proportional hazard model estimates of relative risk of socio-demographic characteristics on breastfeeding.

Explanatory variables	Coefficient (β)	S.E	Wal χ^2	P value	Odds ratio	95% CI
Mother's age* (in years)						
< = 24	0.748	0.068	121.73	0.000	2.114	1.851-2.414
25 - 34	0.327	0.057	32.32	0.000	1.386	1.239-1.551
(35+)	...	...	...	...	1.000	
Age at marriage* (years)						
<=14	-0.523	0.153	11.63	0.001	0.593	0.439-0.801
15 - 19	-0.455	0.151	9.04	0.003	0.634	0.471-0.853
20 - 24	-0.358	0.158	5.09	0.024	0.699	0.513-0.954
(25+)	...	...	...	...	1.000	
Sex of child						
Male	-0.030	0.028	1.103	0.294	0.971	0.919-1.026
Female	...	...	...	...	1.000	
Parity*						
1	-0.459	0.075	36.99	0.000	0.632	0.545-0.733
2	-0.370	0.069	28.87	0.000	0.691	0.603-0.790
3 - 5	-0.093	0.059	2.50	0.114	0.991	0.813-1.022
(6+)	...	...	...	...	1.000	
Contraceptives use*						
No used	0.327	0.042	59.40	0.000	1.387	1.276-1.507
(Used)	0.000	...	...	...	1.000	
Delivery status*						
Normal	-0.265	0.070	14.20	0.000	0.767	0.669-0.881
Caesarean	...	...	...	...	1.000	
Residence						
Urban	0.007	0.032	0.052	0.819	1.007	0.947-1.072
(Rural)	...	...	...	...	1.000	
Region*						
Barisal	-0.135	0.061	4.90	0.027	0.874	0.776-0.985
Chittagong	0.124	0.053	5.57	0.018	1.133	1.021-1.256
Dhaka	-0.102	0.054	3.61	0.057	0.903	0.813-1.003
Khulna	-0.074	0.060	1.51	0.219	0.929	0.825-1.045
Rajshahi	-0.150	0.056	7.17	0.007	0.861	0.771-0.961
(Sylhet)	...	...	...	...	1.000	
Religion*						
Muslim	0.254	0.050	25.81	0.000	1.289	1.169-1.422
(Non-Muslim)	...	...	...	...	1.000	
Educational level*						
Illiterate	-0.236	0.076	9.60	0.002	0.790	0.680-0.917
Primary	-0.199	0.072	7.68	0.006	0.820	0.712-0.943
Secondary	-0.116	0.067	2.10	0.083	0.891	0.782-1.015
(Higher)	...	...	...	...	1.000	
Work status*						
Not work	0.149	0.037	15.98	0.000	1.161	1.079-1.249
(Work)	...	...	...	...	1.000	

Table 3. Cont'd.

Husband education						
No education	-0.003	0.041	0.007	0.931	0.997	0.920-1.079
Primary	0.002	0.040	0.003	0.956	1.002	0.927-1.083
(Secondary & Higher)	...	...	...	...	1.000	

Log-likelihood : 77191.721; Model Chi-square: 405.96; Degrees of freedom (d.f): 24. P: 0.000 *at 1% level of significant.

Table 4. Effects of breastfeeding variables on the duration of post-partum amenorrhoea: Proportional hazard estimates.

Variables	Coefficient (β)	S.E (β)	Wal χ^2	Sig.	Relative risk exp (β)	95% CI
Duration of breastfeeding*						
0-5	0.860	0.055	247.34	0.000	2.362	2.122-2.630
6-12	0.669	0.049	183.27	0.000	1.952	1.772-2.151
(13 and above)	...	...	...	...	1.000	

Log-likelihood: 63422.521, Model Chi-square: 389.70, Degrees of freedom (d.f): 2, P: 0.000. *at 1% level of significant

has 1.289 times higher risk of weaning than their Non-Muslim counterpart. The risk of stop breastfeeding increased with increasing maternal education. Working women were breastfed for a slightly longer duration as compared with their non-working counterparts. Table 4 showed that the effect of lower duration of breastfeeding (0 - 5 months) on the risk of resumption menstruation after childbirth is 2.362 times higher than the risk of those mothers who breastfeed their child with longer duration (13 months and over). For the effect of intermediate breastfeeding group (6 - 12 months), the risk is 1.952 times higher than that of the reference group.

DISCUSSION

The duration of PPA clearly showed a heaping at the multiple of three months. There are some researchers has been found similar pattern of PPA heaping like in India (Singh, 1993; Yadava and Jain, 1998), Bangladesh (Rahman, 1992) and Ghana (Amemuvege, 1994). Therefore the reasons for this heaping are misreporting of the duration (Rahman, 1992; Singh, 1993), lack of differentiation between post-partum bleeding and resumption to menses (Ofosu, 1989). It showed a heaping pattern in the duration of breastfeeding at the multiple of six months. Some other studies in developed and developing countries found similar pattern of heaping (Amenkveghe, 1994; Srinivasan et al., 1989; Trussell et al., 1992). A clear upward duration of PPA by an increase in the parity of women is supported by other findings (Aryal, 2007; Nessa et al., 1987; Srinivasan et al., 1989). Yadava and Jain (1998) found different results, PPA decreases with increased parities.

Younger mothers (< = 24 years) are more likely to ter-

minate breastfeeding early as compared to older (35 years and over) counterparts which is consistent with others studied (Akin and others., 1981; Jain and Bongaart, 1981; Islam et al. 2006,; Giashuddin and Kabir, 2003, 2004). There is significant variation of the duration of breastfeeding among contraceptive user and non user women. The risk of terminating of breast feeding is comparatively lower among normal delivery type women as compared with caesarean women. In this study significant difference in breastfeeding was observed in administrative divisions. A similar tendency was found among the mothers in some other studies (Giashuddin and Kabir, 2003, 2004; Manan and Islam, 1995). The probabilities of weaning of Muslim mothers are 1.289 times higher than the Non-Muslim mothers. In various studies of Bangladesh found that Non-Muslim women have longer duration of breast feeding than Muslim women (Islam et al., 2006; Manan and Islam, 1995; Gias-huddin and Kabir, 2003, 2004). Women with illiterate, primary and secondary education have lower risk of terminating breastfeeding than who had higher education. A number of studies found that shorter duration of breast-feeding for higher educated mother in the developing countries (Grummer-Strawn, 1996; Giashuddin and Kabir, 2003, 2004) but Vestermark et al. (1991) found reverse results in case of industrial countries. Working women's were breastfeed for a slightly longer duration as compared with their non-working counterparts. Similar results were found by other studies (Mannan and Islam, 1995; Ahamad 1986; Sivakami, 2003). The reason for this may be that, since most working women in Bangladesh perform physical or manual labour, it is possible that they take their babies with them to their place of work. Again, it is reasonable to assume that they are mostly less educated or uneducated.

Women with the longer duration of breastfeeding, the periods of intense lactation that causes prolonged anovulatory period tend also to be longest. This study indicated that a positive and strong association is found between the duration of PPA and duration of breastfeeding, which is also showed a consistent result to the other findings elsewhere (Aryal, 2007, 2005; Yadava and Jain, 1998).

Conclusion

This study finding revealed that the mean duration was found to 8.03 months for PPA and 32 months for breastfeeding. Female's age at marriage has a negative and significant effect on the risk of termination of breast feeding. The termination of breast feeding is higher for Muslim mother than their Non-Muslim counterpart due to their religious affiliation. In addition, women with higher education, those who delivered their child in caesarean type and not work outside tend to breastfeed their children for relatively shorter periods. Strong positive association was found between the duration of PPA and breastfeeding. So, it is demonstrated that breastfeeding has tremendous consequences on PPA.

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