International Journal of Statistical Sciences Vol. 7, 2008, pp 73-88 © 2008 Dept. of Statistics, Univ. of Rajshahi, Bangladesh

Breastfeeding and Its Impact on Fertility: Perspective of Rural-Urban Differentials in Rajshahi District

Md. Mostafizur Rahman

Department of Population Science and Human Resource Development University of Rajshahi Rajshahi-6205, Bangladesh

Md. Ismail Tareque

Department of Population Science and Human Resource Development University of Rajshahi Rajshahi-6205, Bangladesh E-mail: tareque_pshd@yahoo.com

Samad Abedin

Department of Statistics University of Rajshahi Rajshahi-6205, Bangladesh

[Received April 10, 2006; Revised February 17, 2008; Accepted March 30, 2008]

Abstract

This paper seeks to examine the duration of breastfeeding and its impact on fertility among rural and urban women. The data were collected from a survey of 2250 women in urban areas and 2250 women in rural areas of Rajshahi district. Life-table analysis shows that the mean length of breastfeeding is longer by about 4 months among rural women (24.6 months) than urban women (20.6 months). The study reveals that patterns of socioeconomic and demographic differentials in breastfeeding practices have been almost consistent. The analysis of Cox's Proportional Hazard Model also reveals that only age of the mother has a significant negative effect on stopping of breastfeeding in urban area.

Keywords and Phrases: Breastfeeding, fertility, life-table and Cox's Proportional Hazard analysis.

AMS Classification: 62P10.

ISSN 1683-5603

1 Introduction

Breastfeeding is the focus of rapidly growing interest in developing countries because of its important implications not only for the health of children, who are breastfed, but also on fertility levels. Recent research has documented the benefits of breastfeeding as an inexpensive and appropriate source of nutrients and to stimulate strong emotional relationship between mother and child. Breast-milk provides immunological protection against common childhood illness such as diarrhoea and respiratory disease and so, it has a significant impact in reducing infant and child mortality. In developing countries, breastfed infants experience substantially lower morbidity and mortality risks than infants who are not breastfed, particularly in the first year of life (Knodel and Kinter, 1977; Palloni and Millman, 1986; Pebley and Stupp, 1987; Retherford and others, 1989; Shah and Khanna, 1990). The advantage of breastfeeding in terms of savings on expenditures on alternative food is also important in poor families. There are advantages for the mother too. Not only does breastfeeding help to establish a closer relationship between the mother and infant, but it also helps to delay the resumption of ovulation and thus promotes spacing of births (Van Esterik and Greiner, 1981). Aside from these major roles, breastfeeding is equally important in controlling fertility in developing countries. The suckling infant stimulates the flow of natural contraceptives hormones within the mother and thus affects a delay in the return of ovulation. Additional months of breastfeeding may, therefore, extend the period of non-exposure to the risk of conception and lengthen the interval between births. Bongaarts and Potter (1983) have pointed out that in populations without access to modern forms of contraception, birth intervals are determined primarily by duration of breastfeeding.

The relationship between socioeconomic and demographic variables and fertility is complex and vary from country to country, depending on the level of development. In the long-run, economic development plays a decisive role in fertility reduction, but in the short run it is individual behaviour like age at marriage, practice of breastfeeding, and contraceptive use, which directly affects fertility (Bulatao, 1979). Since breastfeeding is one of the important proximate determinants of fertility, especially in traditional societies which depend on lactation for infants nourishment. Breastfeeding is assumed to suppress fertility by delaying the return of ovulation following a birth, thus regarded as the primary determinant of amenorrhea (Jain and Bongaarts, 1980; Bongaarts and Menken, 1983). Therefore, it is needed to investigate how long mothers in various areas of residence breastfeed their babies & its impact on fertility and also to determine socio-economic factors for risk of discontinuing breastfeeding. The specific objectives of this study are:

- to examine the differentials in the prevalence of breastfeeding aspects and their patterns by selected background characteristics;
- to isolate the socio-economic factors that are more responsible for discontinuation of breastfeeding.

2 Data and Methods

The data of this study were collected under the project of UNFPA entitled "Strengthening the Department of Population Science and Human Resource Development". Under the project, data were collected in three sections namely fertility, mortality and migration along with socio-economic characteristics of the respondents. The study is based on the total of 4500 ever married women of ages 12 to 49 years of which 2250 women in rural areas and the remaining in urban areas of Rajshahi district. The data were collected during the period 20th June, 2004 to 1st July, 2004.

Determination of the mean duration of breastfeeding directly from reported duration very often is affected by truncation (both selectivity and censored) error as well as heaping error (reported as multiple of 6 or 12 months). Life table analysis of the duration of breastfeeding takes care of such error. Therefore, recourse of life table technique is made following Lee (1993) to obtain the estimate of the expected duration of breastfeeding of the women under study. Finally, in order to determine the socioeconomic variables that are more responsible for risk of discontinuing breastfeeding, a multivariate technique named as Cox's Proportional Hazard model is used.

3 Development of the Life -Table

A life table can be constructed by pooling completed and censored cases of breastfeeding (for methodology, see Lee, 1993). The completed observations are those in which 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 completed for each month and from these, life tables are constructed.

Let

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

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 breast feeding during the *i*th month

$$= \frac{d_i}{[N_{i-1} - 0.5(c_i + w_i)]}$$

 P_i = Proportion continuing breastfeeding at least up to the end of the *i*th month

$$= (1 - q_i) \times P_{i-1}$$
, for $i = 1, 2, \dots,$ where

 $P_0 =$ Proportion ever breastfed $= \frac{N_0}{N}$.

A small adjustment is required if it is reported that a few babies died immediately after birth before breastfeeding could be initiated. If the number of such deaths is n, then P_0 will be given by $\frac{N_0}{(N-n)}$ instead of $\frac{N_0}{N}$.

From the computed values of P_i , the mean length of breastfeeding can be obtained. Since the proportion breastfeeding after 33 months is not large, the mean is computed here by treating the maximum duration of breastfeeding as 33 months (truncated at 33 months) and is given by

$$\left[0.5P_0 - \sum_{i=1}^{22} P_i + 0.5P_{33}\right]$$

4 Development of Cox's Hazard Regression Model

A hazard function is defined as the failure rate during a very short interval $(t, t + \Delta t)$ conditional upon the individual surviving to the beginning of the interval. For instance, for interval $(t, t + \Delta t)$ the hazard function can be expressed as

$$h\left(t\right) = \lim_{\Delta t \to 0} \frac{\Pr\left(an \, individual \, fails \, to \, continue \, to \, using \, the \, interval \, \left(t, t + \Delta t\right)\right)}{\Delta t}$$

The proportional hazards model is non-parametric in the sense that it involves and unspecified function in the form of an arbitrary base line hazard function. This model is comparatively more flexible and appropriate for the analysis of survival data with or without censoring and with or without tide failure time. This model assumes that the hazard of the study group is proportional that of the underlying survival distribution. The Cox's proportional hazards model specifies that.

$$h\left(t,z\right) = h_0(t)e^{z\beta}$$

Where Z is row vector of P measured co-varieties, (β) is a common vector of P regression parameters, $h_0(t)$ is an unspecified base line hazard function and T is the associated failure time.

The survivor function and density function of T are also given by $S(t;z) = \exp[-\int h_0(u)e^{z\beta}du]$ and f(t;z) = h(t;z)S(t;z) respectively.

5 Duration of Breastfeeding: A Life-Table Approach

In Bangladesh, women especially in rural areas generally breastfeed their babies up to 30 months. From our data we have noticed that very small percentage children were breastfed at least 33 months in urban than in rural areas. Based on the previous study for computation of life-table analysis of breastfeeding we considered duration time up to 33 months. In this section, we discuss the life table analysis of breastfeeding for rural and urban areas and examine it if there is any difference between the rural and urban pattern of breastfeeding.

The results of life- table analysis are given separately of rural and urban areas in table 1. With regard to the duration of breastfeeding it is evident that urban mothers wean their children at earlier ages than rural mothers by about four months. From the mean length of breastfeeding in months we observed that women wanted to discontinue breastfeeding after 25 months and after 21 months in rural and in urban areas respectively.

The estimated proportions being breastfed at specific durations from table 1 show that almost 99.7 percent children in rural areas and 99 percent in urban areas were ever breastfed. It is evident that almost 98 percent and 96 percent mothers breastfed for at least three months, 95 percent and 94 percent child were still being breastfed after 9 months and 88 percent and 81 percent were breastfed for at least a year in rural and in urban areas respectively. It can be seen that there are steep falls after the ninth months, twenty-first months and twenty-seventh months. This is because of heaping errors in reported length of breastfeeding that is commonly done in units of one year or half a year. In many studies, duration of breastfeeding shows heaping at multipliers of six months (Lesthaeghe and Page, 1980, Abedin, 1983, Diamond and others, 1986). However, it is also possible that mothers deliberately decided to discontinue breastfeeding at those points owing to local customs and prior planning about an age appropriate for weaning.

From the table it is also observed that after 21 months the proportion reduced to 41 percent and 15 percent from 83 percent and 72 percent in rural and in urban areas respectively. So, the overall finding is that rural mothers are more likely to initiate breastfeeding and continue breastfeeding their children for longer durations than urban mothers.

Figure 1 is presented to observe the proportion of children being breastfed at specific duration by the duration of breastfeeding

6 Differential in Breastfeeding Duration

Table 2 presents the mean duration of breastfeeding by selected socio-economic and demographic variables. The salient features of the table are:

(1) For all these selected variables, there is a considerable difference between rural and urban areas in the duration of breastfeeding. As previously pointed out that women in rural areas are more likely to initiate breastfeeding and breastfeed for longer duration than those in urban areas. The reasons why urbanization is associated with low prevalence of breastfeeding using the life-styles in modern cities those are somehow incompatible with breastfeeding. In addition, the decline in breastfeeding reflects a subconscious attempt to move from the traditional to modern culture and the shifts to bottle-feeding which may be a feature of modernization and acquisition of Western material culture (Huffman, 1984).

- (2) The duration of breastfeeding is closely associated with the age of mother, where on average, mothers under age 30 were breastfeeding for somewhat shorter period than mothers aged 30 and over. Generally, as age of mothers increases breastfeeding duration also increase, but the extent of such trend is fluctuating through different age groups. Younger mothers are more likely than their older counterparts to be more educated and working away from home while older mothers, although they tend to fecund than younger women so that they may breastfeed for longer periods (Akin et. al., 1986, Chen et. al., 1974, Jain et. al., 1970).
- (3) A negative association between education and the duration of breastfeeding, i.e. durations of breastfeeding tend to decline with the increase in the educational level of mothers is evident. It is because educated women are more likely to work away from home which may compete with childbearing. These variations are more pronounced in urban than rural areas. Similar pattern in breastfeeding practice can be seen according to the mothers work status. Like education, work status may reflect the value of time and the household socio-economic status.
- (4) In contraceptive use, continued breastfeeding (ultimate child) is higher among rural women than urban women.
- (5) Concerning the influence of parity on breastfeeding, earlier studies showed that if breastfeeding is used deliberately to limit the family size, its duration should be affected by the number of children already born (Chen et. al., 1974). The length of breastfeeding seems to be positively associated with the number of CEB. This is to be expected since women of higher parity are also those who are likely to be older, and younger women are expected to be more educated and more likely to break with traditions than older and less educated counterparts.

Different Characteristics	Mean Len	gth of Breastfeeding
Different Characteristics	Rural	Urban
Age of the Respondent		
Under 25	24.80	21.34
25-29	28.87	23.69
30-34	29.06	24.92
35+	29.72	25.05
Educational Level of Respondent		
No Formal Education	28.89	24.26
Primary	27.37	23.96
Secondary	27.14	23.71
Higher	24.68	23.98
Work Status		
No	27.65	23.98
Yes	29.26 *	23.31
Contraceptive Use		
No	27.93	23.59
Yes	27.69	24.00
Number of CEB		
1-2	27.49	23.69
3-4	28.12	24.60
5-6	28.57	22.70
7+	30.00	25.13

Table 2: Mean Length of Breastfeeding by Different Characteristics

* Number of cases is less than 103 out of 2250 cases, CEB: Children Ever Born

7 Effects of Socio-economic, Demographic and Proximate Factors on Mean Number of CEB

In any situation where a multivariate problem is encountered, the method of analysis should proceed from simple to complex in an orderly manner (Srinivassan, 1979). As to the above statement we start with simple cross-tabular analysis, which is based on the imposition of simplifying pattern or structure relating cumulative fertility to the selected variables. This section highlights an exploratory inquiry into the relationship among duration of breastfeeding, number of children ever born (CEB) and the selected socioeconomic & demographic variables using simple cross tabular analysis.

Contraceptive Use, Length of Breastfeeding and Fertility: The relationship between contraceptive use, length of breastfeeding and cumulative fertility is examined using for rural- urban comparison (see table 3). The overall mean number of CEB of non-user of contraception who breastfeed their children with the duration of 1-18 months is 2.12 in rural area and 2.75 in urban area while the overall mean number of CEB of user of contraception who breastfeed their children with the same duration is 1.19 in rural area and 2.38 in urban area. Also it is observed that the overall mean number of CEB of non-user of contraception who breastfeed their children with the duration of 19-60 months is 2.22 in rural area and 2.86 in urban area and overall mean number of CEB of user of contraception who breastfeed their children with the duration of 19-60 months is 2.22 in rural area and 2.86 in urban area and overall mean number of CEB of user of contraception who breastfeed their children with the same duration of 19-60 months is 2.27 in rural area and 2.55 in urban area. The relationship seems to be inconsistent with the hypothesis that breastfeeding and contraception using provide protection against pregnancy and reduce fertility in rural areas while it is consistent for urban area. The inconsistency in rural area could be due to reporting errors of CEB. But except for the non-user women aged under 25 and 30-34 in urban area and user women aged 35+ in rural area, the mean parity decreases with the increase of the duration of breastfeeding for all age groups, which seems to be consistent.

Level of Education, Length of Breastfeeding and Fertility: Urban-rural differences in demographic trends exist in almost all countries. Some of the important determinants of such differences are on account of higher literacy and educational achievements; easier and effective mass communications, higher density and housing problems, industrial occupations, rational thinking, role segmentation and increased social and territorial mobility. Table 4 presents the mean number of CEB to all ever-married women by age, childhood place of residence, level of education of the respondents and length of breastfeeding. The overall mean number of CEB of women who had no formal education with duration of child breastfeeding 1-18 months is 2.39 in rural area and 3.59 in urban area while the overall mean number of CEB of women with no formal education with duration of child breastfeeding 19-60 months is 2.74 in rural and 3.55 in urban area. So, there is an inconsistency that the higher duration of breastfeeding should lengthen the birth interval and reduce fertility. But it was not happened in overall mean number of CEB for all women (women with no formal, primary, secondary and higher education) in both the areas. These inconsistencies may be due to incorrect reporting of CEB. From the table we also observe that the overall mean number of CEB was less in rural area than in urban area. This could be happened due to the small number of cases especially for the rural categories than urban categories. But except these overall mean numbers of CEB, we observed that the mean number of CEB decreases with the increase of the level of education of the respondent in both rural and urban areas.

Work Status of Women, Length of Breastfeeding and Fertility: During the past decade or two, there was an enormous amount of research regarding the impact of women participation in the labour force on reproductive behavior. Several studies suggest that working women have lower fertility than their non-working counterparts (UN, 1973). The inverse relationship is well established in developed countries (Sweet, 1973; Fong, 1976) because of higher opportunity cost resulting from higher incompat-

ibility between child bearing and work of mother. Data in table 5 provide that the work status of the respondent and length of breastfeeding-fertility relationship. From the table, it is found that the overall mean number of CEB of non-working women of those who breastfeed 1-18 months is 2.00 in rural area and 2.48 in urban area while overall mean of CEB of the working women of those who breastfeed with duration of 1-18 months is 1.89 in rural area and 2.19 in urban area. And the overall mean number of CEB of non-working women of those who breastfeed with duration of 19-60 months is 2.27 in rural area and 2.64 in urban area while overall mean of CEB of the working women of those who breastfeed with the duration of 19-60 months is 2.15 in rural area and 2.10 in urban area. This inconsistent with the hypothesis that higher duration of breastfeeding provides protection against pregnancy and reduces fertility than the smaller duration of breastfeeding is observed for all overall groups, except the working women in urban area. But it is also observed that the overall mean number of CEB of working women is less than the non-working women. But except for non-working women aged 30-34 in urban area, 35+ in rural and for working women aged 25-29 in urban and 30-34 in rural, the mean parity decreases with the increase of duration of breastfeeding for all age groups, which is consistent.

	Contraceptive Use									
		N	lo		Yes					
Age Group	Rural		Urban		Rural		Urban			
	Breastfeeding		Breastfeeding		Breastfeeding		Breastfeeding			
	1-18M	19-60M	1-18M	19-60M	1-18M	19-60M	1-18M	19-60M		
Under 25	1.28	1.11	1.22	1.36	1.48	1.38	1.62	1.43		
25-29	2.00	1.45	1.67	1.55	2.42	2.04	2.09	2.08		
30-34	3.40	2.12	1.76	2.06	2.77	2.48	2.55	2.54		
35+	3.67	3.37	4.45	3.80	2.90	3.11	3.60	3.29		
Overall	2.12	2.22	2.75	2.86	1.99	2.27	2.38	2.55		

Table 3: Mean number of CEB by Age, Contraceptive Use, Place of Residence and Length of Breastfeeding

	Level of Education									
]	No formal	Educatio	on	Primary					
Age Group	Rural		Urban		Rural		Urban			
	Breastfeeding		Breastfeeding		Breastfeeding		Breastfeeding			
	1-18M	19-60M	1-18M	19-60M	1-18M	19-60M	1-18M	19-60M		
Under 25	1.77	1.54	1.86	1.94	1.49	1.37	1.81	1.62		
25-29	2.33	2.31	2.14	2.62	2.92	2.04	2.63	2.38		
30-34	3.15	2.56	3.08	3.13	3.00	2.50	3.18	2.84		
35+	2.82	3.35	4.74	4.29	3.12	2.93	4.33	3.75		
Overall	2.39	2.74	3.59	3.55	2.06	2.17	2.65	2.99		

Table 4: Mean number of CEB by Age, Level of Education of Respondent,Place of Residence and Length of Breastfeeding

Table 4 Contd....

	Level of Education									
		Secor	ndary		Higher					
Age Group	Rural		Urban		Rural		Urban			
	Breastfeeding		Breastfeeding		Breastfeeding		Breastfeeding			
	1-18M	19-60M	1-18M	19-60M	1-18M	19-60M	1-18M	19-60M		
Under 25	1.33	1.26	1.47	1.28	1.17	1.08	1.19	1.28		
25-29	2.09	1.69	2.19	1.92	1.00	1.33	1.60	1.49		
30-34	2.55	2.19	2.32	2.42	1.50	2.10	1.79	1.71		
35+	3.80	3.04	2.92	3.10	2.33	2.45	3.35	2.43		
Overall	1.69	1.81	2.03	2.26	1.46	1.67	2.06	1.93		

Table 5: Mean number of CEB by Age, Work Status of Women, Place ofResidence and Length of Breastfeeding

	Work Status of Women									
		N	0		Yes					
Age Group	Rural		Urban		Rural		Urban			
	Breast	Breastfeeding		Breastfeeding		Breastfeeding		Breastfeeding		
	1-18M	19-60M	1-18M	19-60M	1-18M	19-60M	1-18M	19-60M		
Under 25	1.47	1.35	1.56	1.43	1.33	1.33	1.50	1.25		
25-29	2.40	2.01	2.12	2.03	2.00	1.75	1.00	1.30		
30-34	2.87	2.46	2.45	2.53	2.00	2.54	1.91	1.65		
35+	3.05	3.18	3.97	3.45	2.33	2.61	2.94	2.68		
Overall	2.00	2.27	2.48	2.64	1.89	2.15	2.19	2.10		

Notes: For table 3, 4, and 5, M indicates months

8 Results and Discussion of the Cox's Proportional Hazards Analysis

The effect of explanatory variables an stopping of breastfeeding was examined in this section. Table 6 presents the regression coefficient from Cox's proportional hazards model for the risk of discontinuing breastfeeding. This analysis carried out separately for urban, rural and total Rajshahi district.

Exp. (beta) gives the risk of discontinuation of breastfeeding (relative to the risk for the reference category). The analysis for total Rajshahi district provides that education of the mother has a significant positive effect on stopping of breastfeeding. That means the risk of stopping of breastfeeding is significantly higher among women who had above primary education than women having education primary and less. It is also observed that monthly household income has also positive effect on stopping of breastfeeding. That means, risk of discontinuing of breastfeeding significantly increases with the increase of income. Age of the mother has a significant negative effect and multiple births have positive significant effect on discontinuation of breastfeeding in total Rajshahi district. That means, as age of the mother decreases the risk of stopping of breastfeeding increases and as order of birth increases the risk of discontinuing breastfeeding increases in total Rajshahi district. The results of Cox regression analysis also show that in urban only one factor and in rural two factors have significant effects on duration of breastfeeding. In urban areas, only age of the mother has a significant negative effect on stopping of breastfeeding. That means, the risk of stopping of breastfeeding significantly increases as age decreases.

But in rural areas, there are two factors, which are affecting significantly the duration of breastfeeding. One is age of the mother, which has significant negative effect on stopping of breastfeeding. That means, the risk of stopping of breastfeeding is significantly increases as age of the mother decreases. The other factor is type of birth, which has significant positive effect on stopping of breastfeeding. That means the risk of discontinuation of breastfeeding is higher among women who had multiple birth than among women who had single birth.
 Table 6: Estimated Regression Coefficients from Cox's Proportional Hazards Model for the Risk of Discontinuing Breastfeeding

E Variables	R	ural	U	rban	T	Total	
Explanatory variables	Beta	Exp.(Beta)	Beta	Exp.(Beta)	Beta	Exp.(Beta)	
Work status of the mother							
Non-working (Ref.)	0.0	1.0	0.0	1.0	0.0	1.0	
Working	-0.066	0.936	0.129	1.137	0.058	1.059	
	(0.545)		(0.137)		(0.394)		
Education of the mother							
Primary and less (Ref.)	0.0	1.0	0.0	1.0	0.0	1.0	
Above primary	0.049	1.050	0.013	1.013	0.115^{***}	1.122	
	(0.372)		(0.814)		(0.002)		
Monthly household income	-0.071	0.932	0.001	1.001	0.104*	1.109	
(\log)	(0.477)		(0.992)		(0.103)		
Age of the mother	-0.024***	0.976	-0.015***	0.985	-0.016***	0.984	
(in completed years)	(0.000)		(0.000)		(0.000)		
Sex of the child							
Male (Ref.)	0.0	1.0	0.0	1.0	0.0	1.0	
Female	0.022	1.022	-0.031	0.969	0.010	1.010	
	(0.624)		(0.476)		(0.748)		
Type of Birth	· · · ·		· · · ·		· · · ·		
Single (Ref.)	0.0	1.0	0.0	1.0	0.0	1.0	
Multiple	0.123**	1.130	0.064	1.067	0.114^{***}	1.121	
	(0.035)		(0.287)		(0.006)		
Chi-square value	45	.739	22.544		61.627		
-2 Log likelihood	2803	30.838	291	56.379	62764.598		
Number of live births	4	498	5	392	9890		

Notes: Figures in the parentheses are 'p' values.

Coefficients significant at at least the 10 percent level are shown in **bold** type.

Level of significance: $* * * p < 0.01; \, * * < 0.05; \, * p < 0.10.$

9 Summary and Conclusions

In this paper an attempt has made to shed some light on the association between breastfeeding practices and fertility in rural and urban areas of Rajshahi district. The main findings of the study can be summarized as follows:

- (i) Breastfeeding is nearly universal in rural and urban areas of Rajshahi district; more than 98 percent of mothers whose last live birth occurred within 33 months prior the breastfeeding their babies. The mean duration of breastfeeding is estimated to 24 and 20 months in rural and urban areas respectively.
- (ii) Patterns of socio-economic and demographic differentials in breastfeeding practices were found to be almost consistent. The mean duration of breastfeeding generally decreases with modernization factors.
- (iii) By the cross-tabular analysis the relationship between breastfeeding and contraceptive using provide protection against pregnancy and reduce fertility are observed in urban areas but this situation is not clear in rural areas. The mean number of CEB decreases with the increase of the level of education of the re-

spondent in both rural and urban areas. Also, the overall mean number of CEB of working women is less than that of non-working women.

(iv) By Cox's Proportional Hazard analysis, we observed that two factors, one is age of mother and the other factor is type of birth, are affecting significantly the duration of breastfeeding in rural area.

From the foregoing discussion we concluded that the changes in the duration and pattern of breastfeeding, which may occur as urbanization and development continue in future, will contribute to higher fertility level unless compensated for by higher level of effective contraceptive practice. It is important, therefore, to recognize the need for programs that will encourage the initiation and continuation of the breastfeeding practice, while simultaneously promoting the use of appropriate contraceptive method.

References

- Abedin, S. (1983). "Fertility levels and Birth Interval Dynamics in a Rural Community of Bangladesh". Unpublished M. Phil Thesis, Cairo Demographic Centre, Egypt.
- [2] Akin et. al. (1986). "Breastfeeding patterns and determinants in Jordan". Population Bulletin of ESCWA, No. 28, pp. 5-41
- [3] Bongaarts, J. and R.G. Potter (1983). "Fertility, Biology and Behaviour: An Analysis of the Proximate Determinants".New York, Academic Press.
- [4] Bongaarts. J and J. Menken (1983) "The Supply of Children: A Critical Essay" in R.A. Bulatao and R.D. Lee eds., Determinants of fertility in Developing Countries: A summary of Knowledge, Vol. 1, National Academy Press, Washington, D.C.
- [5] Bulatao, R.A. (1979). "Current Studies on the Value of Children Further Evidence of the Transition in the Value of Children". Papers of the East-West Population Institute, no. 6-B. Honolulu: East West Centre.
- [6] Chen et. al. (1974). "A prospective study of birth interval dynamics in Rural Bangladesh" in: Nutrition and Human Reproduction (Mosley, W.H., ed.) Plenum Press, New York.
- [7] Diamond, I. D., J.W. McDonald and I. T. H. Shah (1986). "Proportional hazard models for current status data: Application to the study of differentials in age at weaning in Pakistan.". Demography, vol. 23, No.4, pp. 607-620
- [8] Fong, M. S. (1976). "Female Labour Force and Fertility: Some Methodological and Theoretical Consideration". Social Biology 23: 45-54

Rahman, Tareque and Abedin: Breastfeeding and Its Impact on Fertility 87

- [9] Halffman, S. L. (1984). "Determinants of breastfeeding in developing countries: overview and policy implications". Studies in Family Planning, vol. 15, No. 4, pp. 170-183.
- [10] Jain, A. K and J. Bongaarts (1980) "Socio-biological factors in exposure to childbearing: Breastfeeding and its fertility effects". Paper presented at the World Fertility Survey Conference, London, July 7-11.
- [11] Jain et. al. (1970). "Demographic aspects of lactation and postpartum amenorrhea". Demography 7: 155-271
- [12] Kenodel, J. and H. Kinter (1977). "The impact of breastfeeding patterns on the biometric analysis of infant mortality". Demography, vol. 14, No. 4, pp. 391-409.
- [13] Lee, Elisa T. (1993). "Functions of survival time". in D.J. Boque and others, eds., Readings in Population Research Methodology, vol. 6, No. 21 (Chicago, Illinois, United Nations Population Fund, Social Development Center).
- [14] Lesthaeghe, R. and H. J. Page (1980). "The post-partum non-susceptible period: development and application of model schedules". Population Studies, vol. 34, No. 1, pp. 143-169.
- [15] Palloni, A. and S. Millman (1986). "Effects of inter-birth intervals and breast-feeding on infant and early childhood mortality". Population Studies, vol. 40, No. 2, pp. 215-236.
- [16] Pebley, A. R. and P. W. Stupp (1987). "Reproductive patterns and child mortality in Guatemala". Demography, vol. 24, No. 1, pp. 1-14.
- [17] Retherford, R. D. and others (1989). "To what extent does breastfeeding explain birth-interval effects on early childhood mortality?". Demography, vol. 26, No.3, pp. 439-450.
- [18] Shah, I. H. and J. Khanna (1990). "Breastfeeding, infant health and child survival in Asia-Pacific context". Asia- Pacific Population Journal, vol. 5, No.1, pp. 25-44.
- [19] Srinivassan, K. (1979). "An overview of multivariate techniques in regional wokshop as techniques of analysis of World Fertility Survey data". Asian Population Studies Series, No. 44, Thailand.
- [20] Sweet, J. A. (1973). "Women in the labour force". New York, Academic Press.
- [21] U.N. (1973). "The determinants and consequences of population trends: New summary of findings on interaction of demographic, economic and social factors". vol. 1, New York.

International Journal of Statistical Sciences, Vol. 7, 2008

- [22] Van Esterik P. and I. Grenier (1981). "Breastfeeding and women's work: constraints and opportunities", Studies in Family Planning, vol. 12, No. 4, pp. 184-197.
- 88