

The Impact of Maternal Work Participation on Duration of Breastfeeding among Poor Women in South India

As a consequence of rising women's participation in gainful activity, certain changes are called for in attitudes vis-à-vis the traditional role of women and the way in which domestic responsibilities are shared.

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Breastfeeding is important because of its relationship to child health and birth spacing. It has been well documented that mother's milk is the best food for the newborn child and that it has a significant impact on reducing infant mortality. In developing countries, breastfed infants experience substantially lower

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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). 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.

Availability of artificial products has considerably reduced the dependency of infants on breast milk. However, in poor hygienic environments, bacteria, parasites and viruses can easily be transmitted to infants through the process of feeding from bottles. In contrast, breast milk transmits the mother's antibodies, which help to resist infection. Khan (1990) has argued that in India, although breastfeeding is still almost universal, particularly in rural areas, there are indications that in certain segments of the population, such as the educated and urban elite, the duration of breastfeeding is declining. Unfortunately, this trend is also slowly trickling down to some disadvantaged urban segments of the population such as slum dwellers. However, it has also been observed that in India, particularly in rural areas, women continue to breastfeed their children exclusively for up to 8 months and in some cases even 12 months.

Breastfeeding may be terminated or the frequency of breastfeeding may be reduced for a number of reasons. In addition to factors such as the death of a child, modernization and cultural practices, work outside the house is increasingly affecting breastfeeding. The International Council of Infant Food Industries (ICIFI) identifies working mothers as one group using infant formula (ICIFI, 1977). Those mothers "must often choose between breastfeeding and work and the decision must be made in the best interest of the whole family". Huffman (1984) has argued that the type of work a woman does in developing countries could influence breastfeeding by affecting the mother's access to the infant and the time available with the infant. She states that breastfeeding is more likely to be compatible with part-time work or flexible working schedules. Women who work within their households are more likely to breastfeed their infants. She also suggests that location of work setting, transportation to the work place, alternative childcare availability and type of work are important factors which determine the incidence and duration of breastfeeding in developing countries. However, working women may not be able to spend as much time breastfeeding the child as non-working women. Moreover, the introduction of supplementary food happens early if a mother prefers to take up a job outside the home.

Demographers as well as experts in health research have extensively studied the effects of maternal work participation on duration of breastfeeding, yet the evidence does not show consistent results. Akin and others (1981), analysing World Fertility Survey data for Sri Lanka, have argued that maternal work status per se does not reduce the duration of breastfeeding, but work away from home has

a negatively significant impact on breastfeeding. A few others have also suggested that women's employment status have little effect on breastfeeding prevalence (Jain and Bongaarts, 1980; Van Esterik and Greiner, 1981). Most of those studies found that less than 10 per cent of women stop breastfeeding because of the demands of employment. Leslie (1987), based on the findings of various studies, has tried to give an overall picture about the relationship between women's work and infant feeding in developing countries. The review generally suggests that female employment is not a key determinant of breastfeeding practices. However, Popkin (1980) and Butz and others (1981) concluded, using data from Malaysia and the Philippines, that female employment is incompatible with breastfeeding. A study conducted at three metropolitan hospitals in Washington, D. C., among black and white women found breastfeeding rates to be significantly lower among white women who planned to return to work in the first two months post-partum than among those planning a later return (Kurini and others, 1989).

Research in India also suggests an unclear picture between maternal work participation and duration of breastfeeding. Zachariah and others (1994) found that in Kerala, children of working women have a higher risk of mortality than children of non-working women. The explanation offered is that duration of breastfeeding among working women was shorter. A study conducted in rural Tamil Nadu, India, showed that length of breastfeeding is higher among non-working women than working women (Sivakami, 1997). A few other studies have also found that the frequency of breastfeeding is less for working women than for non-working women (Usha and others, 1991; Sundaram and others, 1984). However, most of those studies have not controlled for other socio-economic factors. Srinivasan and others (1989), using data from Orissa found that maternal work status did not show any significant effect on stopping breastfeeding even after controlling for other socio-economic and demographic factors. Rama Rao and Pandey (1993-1994) found that in Goa, India, duration of breastfeeding was negatively associated with the employment status of the woman, but the effect became insignificant when other variables were controlled. Overall, analyses on the relationship between work status and breastfeeding gives an unclear picture. Some studies have shown that female labour-force participation reduces the duration of breastfeeding, but many have found no such effect. In spite of the complexity of the issue, it is surprising that the belief that maternal employment is a major reason for the decline in breastfeeding worldwide has become an established "truth" in the health as well as the demographic literature.

This article attempts to identify the magnitude of the effect of maternal work participation on duration of breastfeeding with data from poor women in Tamil Nadu, a southern state of India, where female labour-force participation is considerably higher (29.9 per cent according to the 1991 census) than in most other states in India.

This paper also explores further an aspect of the link between maternal work participation and duration of breastfeeding that has not been touched on so far owing to non-availability of data. If one looks at the available literature, the work status variable pertains to activity during a reference period, often a one-year

period prior to a survey. In fact, many large-scale surveys including the Demographic Health Survey (DHS), World Fertility Survey (WFS), Census and the recent National Family Health Survey (NFHS) normally collect information on current economic activity, i.e., usual activity during a reference period prior to the survey. But it has been noted that work status changes over life. Some of the women working during the last year may not have been working for time periods in the past. In particular, many women stop working during late pregnancy and resume work only after a few months or even a year after delivery. In an analysis of breastfeeding, work status at that time is more relevant than work status at or just before the time of the survey. The risk of terminating breastfeeding would possibly be influenced by whether the woman was working at the time rather than working during a reference period prior to the survey. Hence, this paper also examines the effect of work status at the time of breastfeeding on the risk of terminating breastfeeding among poor women.

Female work participation in India

Information on the nature and extent of women's work in India, as in many other parts of the developing world, is sketchy. The level of female work participation is reported to be low in India. According to the 2001 census, only 25.7 per cent of women are economically active in India (Office of the Registrar General and Census Commissioner, 2001). However, the actual level of participation may be higher than that reported in the Census. Pointing out methodological difficulties in measuring women's work in India, Bose (1979) observed that data on women workers do not give a correct picture of women's work. That is because the great majority of women in India, especially in rural areas, are engaged in agricultural and household activities that are mostly unpaid and frequently uncounted (Sen, 1982; Sen and Sen, 1985). Although agricultural and dairy production for own or family consumption is considered gainful economic activity by most standards, census enumerators and indeed women themselves frequently consider those activities simply as an extension of domestic work and do not report it as economic activity (Desai and Jain, 1994). That is so because censuses or surveys are not designed specifically to gather information on women's economic activity. As in many developing countries, in India large proportions of economically active women are seasonal, occasional or unpaid family workers. Many women who are participating in the labour force as unpaid family workers would not be classified as employed. The literature has increasingly begun to stress (Krishnaraj, 1990) that the female labour force participation rates, especially in developing countries, are much higher than those estimated in the conventional censuses and surveys and that the greatest undercounting occurs in those activities in which women are disproportionately represented. Despite those data limitations, the available estimates give an idea of spatial variations in female labour force participation. First, the participation rates are much higher in rural areas (27 per cent in 1991) than in urban areas (9 per cent) and there are large interstate variations. The level of participation is higher in the southern and central region than in the northern region and there are notable

rural-urban differences in the nature of activities. Working women in villages are engaged mostly in agricultural and related activities. But urban working women are engaged in different types of activities such as construction and domestic services.

Apart from the Census, the recent large-scale NFHS conducted in India during 1992-1993 and 1998-1999 provides information in greater detail about the nature of work and the extent of women's work. According to NFHS II, 39 per cent of ever-married women in the age group 15-49 were employed during the 12 months preceding the survey (International Institute for Population Sciences and ORC Macro, 2000). Forty-four per cent of rural women and 26 per cent of urban women worked during the year preceding the survey. A large majority of the urban women (89 per cent) and more than half of the rural women (62 per cent) who worked during the year before the survey earned money for their work. Agricultural workers including farmers, farm workers and women in other agricultural occupations accounted for more than three quarters (76 per cent) of women who work in rural areas. In urban areas, there was greater occupational diversity. Twenty-seven per cent of urban women who worked were production workers, 17 per cent were professional, 15 per cent were agricultural workers and 13 per cent were in sales and service occupations.

A significant feature of women's work participation in India is their substantial contribution to family earnings. Nearly one in five (17 to 18 per cent) urban as well as rural women who worked for money at any time in the 12 months preceding the survey reported that the family is entirely dependent on their earnings. Another 30 per cent in urban areas and 24 per cent in rural areas reported that they contribute half or more (but not all) of the total family earnings.

Materials and methods

Tamil Nadu, situated on the south-eastern side of the Indian peninsula, extends between 8°5' and 13°35' north latitude and 76°15' and 80°20' east longitude. According to the 2001 Census of India, Tamil Nadu has the sixth largest population among the states in India (Office of the Registrar General and Census Commissioner, 2001) and has an area of 130,058 sq km. Tamil Nadu is one of the economically and industrially more developed states. Although it continues to be predominantly an agricultural state, the Tamil Nadu economy has been changing rapidly into an industrial economy. According to the 2001 Census, Tamil Nadu has a population of 62.1 million, accounting for 6 per cent of the total population of India (Office of the Registrar General and Census Commissioner, 2001). Except for Kerala, Tamil Nadu recorded the lowest population growth rate from 1991 to 2001 among all the states in India. The population density in Tamil Nadu (478) is much higher than the density for the country as a whole (324).

According to the 2001 census, Tamil Nadu has become one of the most urbanized and educationally most advanced states in the country. The literacy level for population aged 7 years and above in 2001 is 73 per cent, which is above the national average of 65 per cent. Male literacy is 82 per cent, whereas female

literacy is 65 per cent as opposed to 76 per cent for males and 54 per cent for females at the all-India level. The crude birth rate of 19.0 per 1,000 population in Tamil Nadu is substantially lower than the all-India crude birth rate of 25.4, as estimated by the Sample Registration System (SRS) in 2001. The infant mortality rate is also lower in Tamil Nadu than in the country as a whole. For the year 2001, the infant mortality rate estimated by SRS was 49 per 1,000 live births as compared with 66 for all India. The population sex ratio (number of females per 1,000 males) of 986 in 2001 is much higher than the figure of 933 for all India. For 1996-2001, life expectancy in Tamil Nadu was projected to be 65.2 years for males and 67.6 years for females (Ministry of Health and Family Welfare, 1999). Overall, the performance of maternal and child health services in the state appears to have been above the all-India level.

The data for this study are taken from a survey of poor women in Tamil Nadu, a state that shows a higher than average participation of women in the labour force. It must be noted at the outset that this survey was not primarily designed to see the relationship between maternal work participation and breastfeeding. Instead, it sought to examine the effect of mother's work participation on child health. Breastfeeding was conceived as an important intermediate factor and hence detailed data on breastfeeding were also collected. In many developing countries, large proportions of working women live in localities with poor hygienic conditions. Also, the nature of work may differ in rural and urban areas. For that purpose, slums in urban areas and Scheduled Caste¹ (SC) populations in rural areas were chosen. The study is restricted to Coimbatore city and rural areas in the district of Coimbatore.

In Coimbatore city, out of 59 municipal wards, two wards with high female work participation and low literacy were identified. In the absence of ward-level data on incomes, wards with low literacy were presumed to have a large proportion of poor population. From each ward, one slum, with the highest level of female participation in the labour force was selected. For the rural sample, one *taluk*² (Palladam) from Coimbatore district with a female literacy rate, SC population and a female labour force participation rate close to the district rural population average was chosen. In Palladam *taluk*, three villages, which had female work participation rates and female literacy rates close to the district average and an SC population of at least 500 persons, were first chosen. The SC settlements in those villages were covered. The survey was carried out during August 1998 to January 1999 (for more details of sampling, see Sivakami, 2001).

A preliminary listing of households in the slums as well as in the village was undertaken. Currently married women in the age group 15-49 who had at least one live birth were systematically selected in the survey. Women who were normally engaged in economic activity during the previous year were identified as working women. There were 529 women, 285 in the urban slums and 244 in the rural settlements. Information on breastfeeding was obtained for the last three live births; there were 1,163 such births to women in the study, 627 births in urban areas and 536 in rural areas. The survey elicited information on whether a child was ever breastfed, reasons for not breastfeeding and duration of breastfeeding. The time of

the mother's resumption of work after a birth was also obtained, something that is not normally obtained in large-scale surveys. At the time of survey, a few of the children were still being breastfed. A few other children were breastfed until death. For those children, the observation is censored. Hence, the life-table approach is used to compute the proportions being breastfed at various durations.

Life-table analysis

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 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.

- 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 $i = 1, 2, \dots$,
 - 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
 $= \frac{d_i}{[N_{i-1} - 0.5(c_i + w_i)]}$, for $i = 1, 2, \dots$, 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
 - P_0 = Proportion ever breastfed = 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 $N_0 / (N - n)$ instead of N_0 / N .

From the computed values of P_i , the mean length of breastfeeding can be obtained. Since the proportion breastfeeding after 36 months is not large, the mean is computed here by treating the maximum duration of breastfeeding as 36 months (truncated at 36 months) and is given by

$$[0.5 P_0 + \sum_{i=1}^{35} P_i + 0.5 P_{36}].$$

Cox proportional hazard analysis

The net contribution of maternal work participation 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 the Cox hazard model was proposed as appropriate for analysis of the duration of breastfeeding (Huffman and others, 1987; MacDonald, 1981). The benefit of using such a multivariate life-table model is that censoring of nursing by either the survey or the deaths of children are taken care of. The technique of the proportional hazard model is similar to regression analysis but also useful to analyse the process of survival, in which termination may occur at any time (in that case stopping of breastfeeding or termination of breastfeeding). It also models the influence of a set of variables on the hazard of termination. The hazard function at time point t (here it is stopping of breastfeeding or termination of breastfeeding), denoted by $\lambda(t, z)$, is expressed as

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

where X_i are explanatory variables, β_i are regression coefficients and $\lambda_0(t)$ is a baseline hazard. It is assumed that the explanatory variables influence the hazard by the same degree at each time point (hence the term “proportional hazards”). This method is useful to assess the net effect of an explanatory factor on the hazard of termination (stopping of breastfeeding) of a process controlled for the effects of other factors.

As mentioned earlier, work status changes over life and the risk of terminating breastfeeding would possibly be influenced by whether the woman was working at that time. Hence, work status should be used as a time-dependent variable. In the survey, data were obtained on the time of resumption of work, in months, after each delivery. These data enable one to ascertain work status (working or non-working) for each month after delivery and thus can be used as a time-dependent variable. If a woman resumed work at x months after delivery, her work status is treated as non-working for months 1, 2, 3, ..., $x-1$, and as working thereafter. That information has been used to examine whether work status at a given point of time has an effect on stopping of breastfeeding. The time-dependent covariate version of the Cox proportional hazard model is used for that purpose.

In the following analysis, the primary aim is to estimate the net effect of maternal work participation on stopping of breastfeeding. Here, the work status of the woman is a dichotomous variable with working and non-working as two categories and non-working as the reference category. The other variables used as controls are: education of the mother (dichotomous: illiterate [ref.], literate), annual household income (log), age of the mother (age in completed years), sex of the child (dichotomous: male [ref.], female) and type of birth (dichotomous: single [ref.], multiple). The analysis was carried out separately for urban and rural areas. It should be reiterated that this study has not been designed to investigate the effects of those factors on breastfeeding; the focus is on the effect of work participation on duration of breastfeeding. However, earlier studies have recognized the role of those factors, and hence it is necessary to control their effects in order to ascertain the net influence of work participation.

Nature of work by women in the present study

In the urban slums, the main economic activity for women is construction. Sizeable proportions were also engaged as domestic servants. The work is outside the slums, but mostly at a nearby place in the city. In rural areas, the main economic activity for women is agriculture and related activities. The work is often seasonal and is outside the home though mostly in the same village or in a neighbouring village. In both rural and urban areas, the working hours are generally from six to seven in the morning to about two to three in the afternoon with a break for breakfast. The proportion of women working the full day (normal working day) is higher in rural areas than urban areas. About 80 per cent worked throughout the year; i.e., for all 12 months, and that percentage does not differ between urban and rural areas (not shown in the table). However, in a month, the urban women worked an average of 20.5 days, and the rural women an average of 16.5 days. Thus, although both urban and rural working women work year round, the number of days is less for rural women on average. That is because agricultural labour, the predominant occupation of rural working women, may not be available on many days. In both rural and urban areas almost all women work away from home. The wages are Rs 30-40 per day (US\$ 1= Rs 45.84).

In the urban slums, women as well as their husbands are usually engaged in construction work in the same place but not necessarily all the time. In rural areas, whereas women accomplish tasks such as sowing seeds, harvesting, weeding and transplanting, men do the ploughing and digging. Since their work is casual and seasonal, women in rural areas often stay at home, especially during the off-season period. Working women, of course, also take care of their household activities such as cooking, childcare, fetching water, etc. Most of the working women in both rural and urban areas leave their children at home to be cared for by neighbours or elder siblings. However, when a child is ill, many women forgo work to attend to the child.

Findings

Profile of the sample

Of the 529 currently married women in the sample, 267 (141 from urban areas and 126 from rural areas) were working women and 262 (144 from urban areas and 118 from rural areas) were non-working. A comparative view of the demographic and socio-economic characteristics of the two areas is presented in table 1. It can be seen that the non-working women are younger than the working women on average in both rural and urban areas. The mean age at marriage of non-working women as well as that of their husbands is slightly higher than that of working women and their husbands. The mean number of pregnancies, mean working women. In both rural and urban areas, the level of literacy is higher among non-working women than working women; overall, it is quite low in rural areas as compared with urban areas. Working women have higher household incomes than

Table 1. Demographic and socio-economic characteristics of the sample population

Characteristics	Urban		Rural	
	Working	Non-working	Working	Non-working
Age of women	(Percentage distribution)			
Under 25	9.2	23.6	13.5	56.8
25-29	29.1	38.9	33.3	30.5
30-34	31.2	13.2	20.6	5.9
35+	30.5	24.3	32.5	6.8
Total	100.0	100.0	100.0	100.0
Mean age of the respondent	31.5	29.2	30.7	24.8
Mean age of the husband	37.4	35.3	36.1	29.8
Mean age at marriage of the respondent	17.7	18.6	16.1	17.2
Mean age at marriage of the husband	23.6	24.7	21.5	22.1
Mean number of pregnancies	3.1	2.5	3.0	2.4
Mean number of live births	2.6	2.2	2.7	2.2
Mean number of living children	2.3	2.0	2.4	1.9
Percentage of respondents literate	55.3	75.0	15.9	34.7
Percentage of husbands literate	70.2	84.0	30.2	53.4
Mean annual household income	26,898	24,227	26,898	21,122
Percentage residing in <i>pucca</i> houses	41.8	50.7	40.5	40.7
Percentage having separate kitchens	16.3	28.5	32.5	30.5
Number of women	141	144	126	118

non-working women in both the areas, but the gap is wider in villages (among working women, the annual household income includes their own income also). In urban areas, a greater proportion of non-working women than working women reside in *pucca*³ houses; no such difference is seen in rural areas. Overall, working women are slightly older, have more children and higher incomes, but are less literate than non-working women. Working women in urban areas alone have poorer living conditions, than non-working women.

Results of the life-table analysis

It is observed from table 2 that breastfeeding of children is almost universal in the study areas as in other parts of India and in other developing countries. In a few cases, the baby died immediately after birth before breastfeeding could be initiated. Among the babies that survived for even a short period after birth, almost all were breastfed. Volitional non-breastfeeding during early infancy is extremely rare.

Table 2. Breastfeeding by work status of mother

	Urban				Rural			
	Working		Non-working		Working		Non-working	
	Number	%	Number	%	Number	%	Number	%
Number of live births^a	329		298		306		230	
Baby died soon after birth (before breastfeeding could be initiated)	3		7		4		8	
Number of babies who survived	326	100.0	291	100.0	302	100.0	222	100.0
Ever breastfed	320	98.2	288	99.0	296	98.0	222	100.0
Never breastfed	6	1.8	3	1.0	6	2.0	0	0.0

^a The data on breastfeeding have been obtained for the last three live births of women.

As mentioned earlier, information on breastfeeding was obtained for the last three live births. Results of the life-table analysis are given separately for working and non-working women in rural and urban areas (table 3 and figures I and II). It can be seen that there are steep falls after the twelfth month, eighteenth month, twenty-fourth month and thirtieth month. That is because of heaping in mother's reporting of 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; 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. It is to be noted that the difference in the life table is seen from the beginning in urban areas. By contrast, in the rural areas, the difference in the life table is seen only in later years (after 2 years). The number of children with such long duration is not large enough in the sample to detect differences. The Wilcoxon (Gehan) test is used to test the significance of the difference between the two life tables. It shows that non-working women have a significantly longer duration of breastfeeding than working women in urban areas. But in rural areas, there is no significant difference between the breastfeeding patterns of working and non-working women. Thus, labour-force participation is incompatible with breastfeeding in urban areas but not in rural areas.

Table 3. Life-table analysis of duration of breastfeeding by work status of mother

Duration of breastfeeding	Urban		Rural	
	Working	Non-working	Working	Non-working
	Proportion of children being breastfed at specific durations			
0	0.9816	0.9893	0.9795	1.0000
3	0.9340	0.9862	0.9664	0.9862
6	0.8634	0.9467	0.9526	0.9767
9	0.8050	0.8795	0.9112	0.9357
12	0.7887	0.8369	0.9009	0.8002
15	0.6170	0.6590	0.7660	0.8002
18	0.6137	0.6428	0.7591	0.7761
21	0.4119	0.4639	0.5491	0.5350
24	0.4119	0.4639	0.5456	0.5279
27	0.2330	0.3158	0.3259	0.2277
30	0.2330	0.3158	0.3223	0.2108
33	0.1713	0.2461	0.2607	0.1230
36	0.0445	0.0743	0.2607	0.1230
Mean length of breastfeeding in months^a	19.3	21.6	23.0	21.6
Median length of breastfeeding in months	18.6	18.8	24.2	24.1
Number of live births	329	298	306	230

^a Mean is computed by treating breastfeeding as truncated at 36 months.

Figure I. Duration of breastfeeding: urban constructed life table

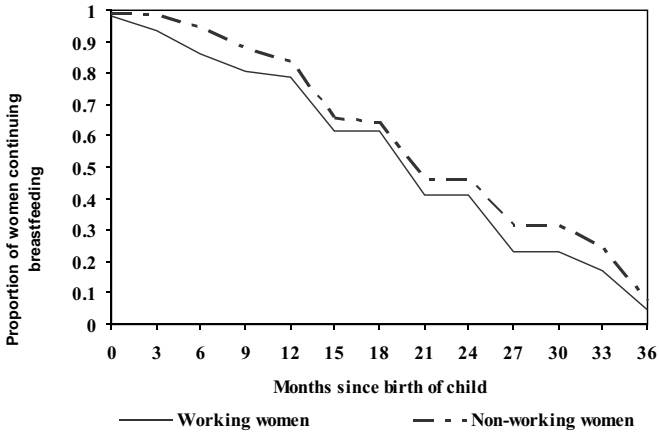


Figure II. Duration of breastfeeding: rural constructed life table

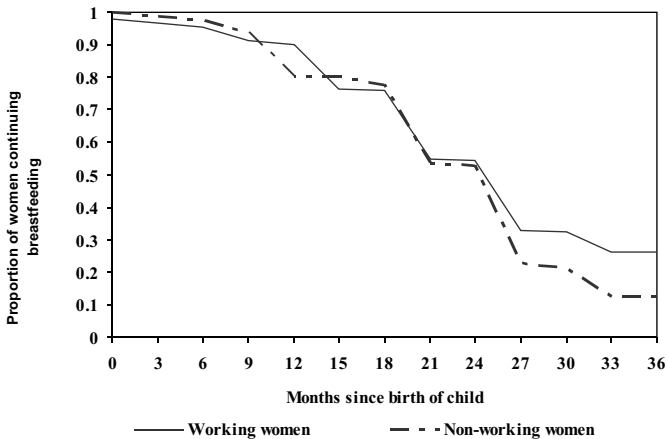


Table 4. Estimated regression coefficients from Cox proportional hazards model for the risk of discontinuing breastfeeding

Explanatory variables	Urban		Rural	
	Beta	Exp.(Beta)	Beta	Exp.(Beta)
Work status of the mother				
Non-working (Ref.)	0.0	1.0	0.0	1.0
Working	0.0929** (0.037)	1.0973	-0.0798 (0.186)	0.9233
Education of the mother				
Illiterate (Ref.)	0.0	1.0	0.0	1.0000
Literate	0.0334 (0.469)	1.0339	0.0024 (0.970)	1.0024
Annual household income (log)	0.1829** (0.049)	1.2007	0.0309 (0.777)	1.0314
Age of the mother (in completed years)	-0.0021 (0.774)	0.9979	-0.0044 (0.624)	0.9956
Sex of the child				
Male (Ref.)	0.0	1.0	0.0	1.0
Female	0.0829* (0.057)	1.0864	0.0915* (0.065)	1.0958
Type of birth				
Single (Ref.)	0.0	1.0	0.0	1.0
Multiple	0.4418 (0.130)	1.5555	1.3772*** (0.000)	3.9637
Chi-square value		14.367		31.688
-2 Log likelihood		5,925.935		4,535.745
Number of live births		627		536

Notes: Figures in the parentheses are “p” values.

Coefficients significant at at least the 10 per cent level are shown in bold type.

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

Mean length of breastfeeding (truncated at 36 months) and median length of breastfeeding, that is the month by which half of the women discontinued breastfeeding, for both working and non-working women are given at the bottom of table 3. The mean length of breastfeeding is higher among non-working women than to working women by about two months (19.3 months for working women and 21.6 for non-working women) in urban areas. By contrast, in rural areas, the mean length of breastfeeding is longer by about one and a half-months for working

women than for non-working women. In the rural areas, for working and non-working women, those figures are 23.0 and 21.6, respectively. It is seen that the median length of breastfeeding does not vary much between working and non-working women in both rural and urban areas. One reason could be that the difference in the median is smaller presumably because large differences in the life-table values in later months influence the mean but not the median. But the median length of breastfeeding is about five months longer in rural areas than in urban areas.

Cox proportional hazards analysis

The Cox regression estimates (beta values) are provided in table 4. Exp (beta) gives the relative risk of discontinuation of breastfeeding (relative to the risk for the reference category). The analysis has been carried out separately for urban and rural areas. In urban areas, work participation of women has a significant positive effect on stopping of breastfeeding. That means that the risk of stopping of breastfeeding is significantly higher among working women than among non-working women in urban areas. It is also observed from the table that the hazard of discontinuation of breastfeeding is higher for female children. As household income increases, the risk of discontinuation of breastfeeding rises. Education does not show any significant effect on stopping of breastfeeding.

The results of the Cox regression analysis show that in rural areas, participation of women in the labour force does not have any significant effect on stopping of breastfeeding when other variables are controlled. Variables that show a significant effect are sex of the child and type of birth. That is, the risk of discontinuation is higher for female children and twins. Education, income and age of the mother do not show any significant effect on stopping of breastfeeding in rural areas.

Cox proportional hazards analysis with work participation as a time-dependent covariate

In this section, the effect of work participation on stopping of breastfeeding was examined by treating it as a time-dependent covariate. The other explanatory variables (fixed variables) are as used in the earlier analysis, namely, education of the mother, sex of the child, annual household income, type of birth and age of the mother. The analysis is carried out separately for urban and rural areas.

The results of the analysis using work participation as a time-dependent covariate are shown in table 5. These are similar to those of the earlier analysis, which used work status at survey as a variable (shown in table 4). In urban areas, maternal work participation has a significant positive effect on stopping of breastfeeding. Note that the coefficient in the time-dependent model is different but the level of significance is about the same. Income has a positive effect and sex of the child a moderate positive effect (the risk of stopping breastfeeding for a female child is greater than that for a male child).

Table 5. Estimated regression coefficients from the Cox proportional hazards model for the risk of discontinuing breastfeeding with work status as a time-dependent covariate

Explanatory variables	Urban		Rural	
	Beta	Exp.(Beta)	Beta	Exp.(Beta)
Work status of the mother (time-dependent)				
Not-working (Ref.)	0.0	1.0	0.0	1.0
Working	0.2209** (0.050)	1.2472	-0.1843 (0.140)	0.8317
Education of the mother				
Illiterate (Ref.)	0.0	1.0	0.0	1.0000
Literate	0.0264 (0.564)	1.0268	0.0038 (0.951)	1.0038
Annual household income (log)	0.1883** (0.041)	1.2072	0.0032 (0.998)	1.0003
Age of the mother (in completed years)	-0.0037 (0.606)	0.9963	-0.0040 (0.660)	0.9960
Sex of the child				
Male (Ref.)	0.0	1.0	0.0	1.0
Female	0.0810* (0.064)	1.0844	0.0820* (0.095)	1.0854
Type of birth				
Single (Ref.)	0.0	1.0	0.0	1.0
Multiple	0.4358 (0.135)	1.5461	1.4054*** (0.000)	4.0770
Chi-square value		13.957		32.092
-2 Log likelihood		5,926.603		4,535.261
Number of live births		627		536

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

Coefficients significant at at least the 10 per cent level are shown in bold type.

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

In rural areas, work participation does not show a significant effect (table 5), as was noticed in the previous analysis (table 4) as well. Type of birth shows a strong effect and sex of the child a moderate effect. These effects too are similar to those in the previous analysis. Thus, the time-dependent covariate model yields essentially the same results as the fixed work status model used earlier but it must be seen whether a large sample size yields the same results. It may be noted, however, that the time-dependent model is more appropriate in that case. Overall, breastfeeding is universal and differentials by work status persist only in urban areas when other socio-economic and demographic variables are controlled.

Discussion

In recent years, many Governments have become concerned with declines in breastfeeding because of its health effects on infants as well as women. One argument is that the recent rise in female labour force participation has a negative impact on the health of the child owing to the abandonment of breastfeeding (Zachariah and others, 1994). The data in the present investigation show that breastfeeding is nearly universal among poor women in Tamil Nadu as is the case in other parts of India and developing countries as a whole. The life tables constructed from the completed and censored breastfeeding cases reveal that the mean length of breastfeeding is longer by about two months among non-working than among working women in urban areas but shorter by about one and half months among non-working than working women in rural areas. The proportional hazards analysis clearly shows that differentials by work status persist in the urban areas even after controlling for other socio-economic and demographic factors like income of the household, sex of the child, type of birth, education and age of the mother. But in rural areas, the net effect of mother's work status on the length of breastfeeding is not significant. The analysis using work status as a time-dependent covariate confirms these results. Thus, labour force participation of women is to some extent incompatible with breastfeeding in the urban areas but not in the rural areas. The present study is in agreement with earlier findings indicating that in traditional settings women's work is nearly always compatible with breastfeeding and other aspects of childcare (Brown, 1970).

That is probably because of the nature of the work in rural areas, which is often seasonal and carried out mostly in the same or a neighbouring village. Hence, it is possible for working women to come home and take care of the children, especially for breastfeeding, because of the short distance between the workplace and home. That may not be possible for working women in urban slums, where the main economic activities for women are construction and domestic service. Often in urban areas, the available jobs are very restrictive in terms of work schedules. The jobs are also available throughout the year. In rural areas, agricultural work allows women to take some time off and that flexibility allows rural women to give greater attention to an infant. However, job insecurity usually forces women in the urban unorganized sector to continue to work throughout the year.

Although the mean length of breastfeeding for working women was lower than for non-working women in urban areas, the difference still is not large while the median length remains almost equal. Overall, one would expect that the mean length of breastfeeding might decrease in the future because of modernizing influences or increase in income. But as more and more young cohort women with a better education and employment chances enter the reproductive years, the difference in mean length of breastfeeding between working and non-working women might widen over a period of time, especially in urban areas. One reason could be that modernization and rise in income help more women to become aware of easily accessible substitutes for mother's milk and consequently chances increase that they could resort to those substitutes even when the child is quite young. However, given that the cost of such substitutes is high, rural working

women are not likely to use them so long as women can take the child along to their workplace. The effect of annual income on discontinuation of breastfeeding was considered in this paper. Annual income is found to be positively associated with discontinuing the practice in urban areas only. That is, as the household income increases, the risk of discontinuation of breastfeeding rises in urban areas.

As Huffman (1984) indicated, it is important for policy purposes to determine who the women are that work away from home, why they do so, what the working conditions are, what the implications are for breastfeeding, childcare and time allocation within the household and what in turn the effects are on the health and development of infants, children and family welfare in general. If the work location tends to be close to home and the nature of the work does not preclude breaks to breastfeed, a far stronger case can be made for legislation requiring infant day-care facilities at places of women's work. The size of the place of employment of women will also be relevant since larger-scale industries can much more easily provide such special facilities for women. One of the major problems of women in developing countries who are working outside their home is time constraints. Any time-saving methods that can be promoted may help to enhance their ability to breastfeed. That would include enhanced transport and availability of water supply and electricity. All of those factors are associated with modernization and the development process. Probably the most beneficial way to increase breastfeeding among working women is to encourage partial feeding for extended durations. That will imply encouraging women to breastfeed before they go to work, once they return home from work, before they go to sleep and also during the night. The encouragement of partial feeding can be made through media campaigns, education, health services available in work and industrial settings and also through women's support groups.

The fact that mother's work participation has some adverse effect on breastfeeding in poor urban localities in Tamil Nadu does not mean that women should not participate in economic activities. However, to compensate for the possible adverse effects on breastfeeding, there is a need to have crèches in the workplace even within the informal sectors. For women who are employed in major organizations such as factories and mills, crèches for their babies are provided by the employers. That is a legal obligation. However, employers in the unorganized sector do not provide such facilities. Virtually no such facilities are available for children of women who perform arduous tasks like construction work. Hence, crèches at the workplace, even in the unorganized sector, may allow poor women to spend adequate time with their children, especially at the time of breastfeeding. However, crèches at the workplace may be possible where large numbers of women work together at a particular site as is the case for construction work but difficult for sectors such as fisheries which are mobile in nature. Future research on such communities may provide answers in this regard.

As a consequence of rising women's participation in gainful activity, certain changes are called for in attitudes vis-à-vis the traditional role of women and the way in which domestic responsibilities are shared. Positive support from husbands, cooperative attitudes of family members and sharing of household

duties may help working women to manage dual roles as income earners and family-care providers especially in the case of urban areas. As female participation in the labour force increases, the problem will become acute. Temporal flexibility of work may enable employed mothers to devote more time to their children, especially during breastfeeding (Presser, 1989). That calls for adjustments at the family level and for policy measures at the societal level.

Table 6. Number of births in different categories

	Urban	Rural
Work status of the mother		
Non-working	298	230
Working	329	306
Education of the mother		
Illiterate	230	415
Literate	397	121
Sex of the child		
Male	331	274
Female	296	262
Type of birth		
Single	619	532
Multiple	8	4
Number of live births	627	536

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Endnotes

1. Scheduled Castes are castes which were historically oppressed and treated as untouchables and enumerated as such by Census authorities. Most are generally very poor, own little land and traditionally engage in low-paid occupations.
2. A *taluk* is a unit of revenue administration in India below the state and district level. It is headed by a *tehsildar*.
3. A *pucca* house is one that is made with high-quality materials throughout, including the roof, walls and floor.

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