

Infant Feeding Practices in Viet Nam

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Sustained efforts to promote healthful infant feeding practices are likely to be required to maintain and improve the Currently favourable situation

It is now well established that breast-feeding has important health and contraceptive benefits and for this reason there is much concern about potential shifts in infant feeding regimes in the course of socio-economic development (VanLandingham, Trussell and Grummer-Strawn, 1991). Knowledge of infant feeding patterns in developing countries has been substantially expanded in recent decades as a result of the increased use of sample surveys to monitor the situation. In particular, the World Fertility Survey (WFS) in the 1970s and early 1980s routinely incorporated questions about breast-feeding; its successor in the 1980s and 1990s, the Demographic and Health Surveys (DHS), has continued this tradition and has also commonly added additional questions about other aspects of infant feeding to its core questionnaire (Trussell and others, 1992). One important country for which such information has previously been lacking is Viet Nam since it did not participate in either of these programmes. Fortunately, it is now possible to redress this situation because two recent national surveys, the 1988 Viet Nam Demographic and Health Survey (VNDHS) and the 1994 Viet Nam Inter-censal Demographic Survey (VNICDS), provide the requisite data.

Data and methods

Although Viet Nam did not participate in the official programme of the Demographic and Health Surveys organization, in May and June 1988 the National Committee for Population and Family Planning (NCPFP) conducted the VNDHS using a simplified version of the typical DHS questionnaire. The nationally representative sample included 4,172 ever-married women aged 15-49 years in 12 provinces including Hanoi and Ho Chi Minh City. The survey questionnaire included basic questions on breast-feeding that were asked about all births during the previous five years (since January 1983). The questions determined whether the child had ever been breast-fed, whether the most recent child was still being breast-fed, and the age at weaning of children who were no longer being breast-fed. The only analysis of these data that has been presented to date are rudimentary tables in the basic country report (NCPFP, 1990).

The VNICDS was conducted by the General Statistical Office of Viet Nam (GSO) during the period April through June 1994. The nationally representative sample included almost 10,500 ever-married women aged 15-49 in all 53 provinces of the country. The questionnaire also modeled after the DHS but with considerably more detail than that of the 1988 VNDHS. Extensive information was solicited not only on breast-feeding but also on other aspects of infant feeding, including questions about food given concurrently with breast milk as well as the age at which various types of food were first given regularly (see GSO, 1995). The survey also included questions about the return of menstruation following childbirth. Questions on infant feeding and the return of menstruation were asked either about the most recent birth during the previous 10 years or about the three most recent births during this period.

The 1994 VNICDS sample is much larger and far less clustered than that of the 1988 VNDHS. Thus, comparisons between the two surveys can be at best only suggestive of recent trends over time. Comparison of results are nevertheless useful for determining if general patterns are similar and thereby to serve as a basis for judging the overall credibility of both surveys.

Various methods exist for the analysis of breast-feeding durations and other infant feeding practices (Lesthaeghe and Page 1980; Page and others, 1982). In this analysis we rely on two: the "current-status" approach and the "life-table" approach. The current-status approach examines the proportions of children at successive ages who are still being breast-fed (or who have been started on other types of food). By assuming that the cross-section of children at successive ages resembles the experience of a cohort of infants as they age, it is possible to estimate the median duration of breast-feeding (or median age at introduction of other foods). Its main advantage is that there is likely to be minimum response error as to the status of the child since no recall is involved for the respondent to report if the child currently receives breast-milk or a particular type of food. Its main disadvantage is that the proportions currently being breast-fed need to be tabulated for relatively narrow intervals of age and thus may fluctuate because of the small numbers of cases on which they are based. In the present study, current-status results are based on all living children. To smooth irregularities in the pattern of decline with successive monthly ages, five-month, equal-

weight moving averages are used.

The life-table approach can provide more detailed information on the duration of infant feeding regimes than the current status approach because it takes advantage of additional information on retrospectively reported ages at which events occur.¹ As a result, however, life-table estimates are influenced by inaccuracies in recall of whether the child had ever been breast-fed and of the age at which breast-feeding ceased. The life-table method also ensures that the estimated proportions currently breast-feeding decline monotonically with successive months since birth.

A very common source of error in the recall of ages at which particular events occur (e.g. weaning) is the tendency of respondents to reply in approximate terms, thus "heaping" them at certain ages. Retrospectively reported ages at weaning are typically concentrated at ages corresponding to half-years even when responses are requested to be in terms of months. Such a pattern of responses is found in both surveys with the most commonly reported age at weaning by far being 12 months (or one year) and sharp peaks evident at durations of 18 months, 24 months, and durations corresponding to successive half years. We have adjusted the life-table results to reduce the inaccuracy that would otherwise be introduced by the severe heaping of responses at particular reported ages at weaning. More specifically, we first calculate the monthly probabilities of weaning using usual life-table procedures. We then calculate five-month, equal-weight moving averages of the observed monthly probabilities of a child being weaned starting at the duration of three months since birth. The smoothed monthly probabilities, rather than the observed ones, serve as the basis for calculating the cumulative proportion weaned at successive monthly ages.

Trends and differentials in breast-feeding patterns

Breast-feeding initiation

Table 1 shows the percentage of children ever breast-fed by selected background characteristics as determined from the 1988 and 1994 surveys. The results clearly indicate that breast-feeding in Viet Nam is practically universal. In addition, almost no change is evident over the decade covered, whether measured by an internal comparison between the two half-decade periods shown for the VNICDS or by a comparison between the VNDHS results and those for the most recent half decade covered by the VNICDS. The persistent universality of breast-feeding over the past 10 years is also consistent with the results from a study recently conducted by the National Institute for Nutrition (Khoi and Giay, 1994:54).

Table 1: Percentage of children ever breast-fed, by selected background characteristics, 1988 VNDHS and 1994 VNICDS

1988 DHS		1994 VNICDS	
During first 5 year before the survey		During first 5 years before the survey	During second 5 years before the survey
Total sample	98	97	98
Residence			
Urban	96	96	98
Rural	98	98	98
Sex of child			
Male	98	97	98
Female	98	98	98
Education of mother			
No schooling	97	97	99
Grades 1-4		98	98
Grades 5-7	99	97	98
Grades 8-11		98	98
Grades 12+	97	97	98
Occupation of mother			
Agricultural	98	98	98
White collar		96	98
Other working	98	96	98
Not working	92	98	98

Wealth status by residence			
Urban low	n.a.	96	98
Urban middle	n.a.	97	99
Urban high	n.a.	94	98
Rural low	n.a.	97	98
Rural middle	n.a.	98	98
Rural high	n.a.	98	98

Notes: Results are weighted. The percentage of children ever breast-fed (from the VNICDS) refers to the last three children born within 10 years of the survey; the percentage of children ever breast-fed (from the VNDHS) refers to all the children born within five years of the survey.

n.a.= not available.

In the VNICDS, mothers who indicated they had not breast-fed a particular child were asked the reason for not doing so. The responses are revealing and help to confirm that the norm of breast-feeding in Viet Nam is virtually universal. In two-thirds of the cases, the child either died or was too weak to breast-feed, in 9 per cent of the cases the mother was too ill or too weak herself to breast-feed and in 16 per cent of the cases the mother said she had insufficient breast-milk to feed the child. Thus, in the vast majority of cases of non-breastfed children, the decision not to breast-feed was essentially not a matter of choice but forced by circumstances.

The universality of breast-feeding is underscored by the lack of any pronounced difference in the percentage ever breast-fed according to the child's sex, mother's educational level or occupation, or household wealth status.² Moreover, for none of the categories of women shown is any appreciable decline in breast-feeding initiation evident.

The VNICDS also inquired, with respect to the most recent birth, how long after giving birth the respondent waited before first giving her breast to the child. Since colostrum, the early milk present in the breast during the first few days after childbirth, provides necessary nutrients and immunological protection for newborn infants, health professionals advocate starting breast-feeding immediately, i.e. within the first hour after the child is born (Institute for International Studies in Natural Family Planning, 1990). This practice, which is currently being promoted by Viet Nam's Ministry of Health, is apparently followed only by a minority of Vietnamese women (18 per cent nationwide) according to the results in table 2. Nevertheless, most mothers start to breast-feed the same day that they give birth and only slightly more than one in ten mothers who breast-feed start two or more days after giving birth. Differences in the timing of breast-feeding initiation are minimal only between urban and rural mothers.

Some trend towards early initiation is suggested from a comparison of the three-year period prior to the survey and the previous two years before that. While this could reflect some impact of government efforts to promote this practice, it is significant that the percentage of mothers who started breast-feeding in the first hour is highest when delivery took place in the mother's own home and only about average for cases where the mother gave birth in a government facility.

Table 2: Percentage of mothers who initiated breast-feeding within 1 hour, within 12 hours, and after 2 or more days, by residence and by place of delivery, 1994 VNICDS

	Percentage of mothers initiating breast-feeding		
	Within 1 hour	Within 12 hours	After 2 or more days
Total sample	18	59	11
Period prior to survey			
0-2 years	19	60	11
3-4 years	14	58	12
Residence			
Urban	16	59	11
Rural	19	59	11
Place of delivery			
Own home	22	59	14
Other home	7	34	23
Commune health centre	16	62	7
District hospital/health center	17	65	8
Provincial hospital	14	57	14

Central hospital	14	52	16
Other	22	64	6

Notes: Results are weighted. Tabulations refer to the mother's most recent birth within five years of the survey and are restricted to children who were ever breast-fed.

n.a.= not available.

Duration of breast-feeding

Figures 1a and 1b show the smoothed current-status estimates of the percentages still being breast-fed and the adjusted life-table results for both the 1988 VNDHS and the 1994 VNICDS. In both surveys, the current-status approach indicates modestly higher percentages of children being breast-fed at ages over 12 months than do the estimates derived through the life-table approach. The modest differences observed in the case of the two Vietnamese surveys is likely attributable to memory error in the reported ages at weaning as it affects results derived from the life-table approach. Although the life-table estimates are substantially improved by the adjustment procedure described above, apparently the procedure does not completely overcome distortions in the estimates attributable to heaping.

Overall the estimates produced by current-status analysis and by the life-table method based on births during the three years prior to each survey show similar patterns. Almost all children are breast-fed through the first six months with both surveys indicating that 80 per cent are breast-fed at least a year. Most children are weaned sometime during their second year of life. As a result, only a small minority are still being breast-fed by their second birthday.

Comparisons between the two surveys with respect to the median durations of breast-feeding for each of two estimation methods, as can also be seen in figures 1a and 1b, suggest little change over time. The current-status estimates indicate a median duration of 16.3 months based on the 1988 VNDHS and 16.9 months based on the 1994 VNICDS. The life-table estimates, based on births occurring within the three years prior to each survey, are 15.3 months according to the 1988 survey and 15.9 months according to the 1994 survey. Thus, both sets of estimates indicate slightly higher figures for the more recent survey. Given the differences in sampling and other aspects of the two surveys, these results are only suggestive, at most, of a recent increase in breast-feeding duration.

Differentials in breast-feeding duration based on the VNICDS and as derived through both the current-status and the life-table approaches are shown in table 3. The median duration of breast-feeding indicate that rural women breast-feed their child longer than urban women. Nevertheless, the median duration for urban women is still over one year according to both types of estimates. Although son preference has been a traditional norm, this apparently has little bearing on the breast-feeding durations of boys and girls, who are breast-fed for about the same amount of time. Although there is not a uniformly inverse association between the mother's education and the duration of breast-feeding, children of mothers with no schooling are breast-fed the longest and children whose mothers are the most educated are breast-fed the shortest. For those children whose mothers are engaged in agriculture, the duration of breast-feeding is longer than for children of mothers in other occupations, especially those with white-collar type jobs. Occupation is of course linked to residence and thus the occupational differentials coincide with the longer breast-feeding in rural than urban areas. Within both rural and urban areas, the duration of breast-feeding is associated with the household wealth level. Despite the small number of cases in the urban categories, the results clearly indicate that children in wealthier households are breast-fed for shorter durations than children in poorer households, both in urban and rural areas.

Table 3 also shows the proportion of children who were breast-fed at least 6, 12 and 18 months according to the adjusted life-table calculations. Differences between the different categories of children shown are quite small with respect to the percentages breast-fed at least six months, and rather modest even with respect to the percentage breast-fed 12 months. Over 90 per cent of children, regardless of the category they were in with respect to the variables examined, were breast-fed at least six months. Moreover, in none of the groupings of children shown are less than 70 per cent of the children breast-fed for less than a year. In contrast, far more pronounced differences are apparent in the percentages breast-fed 18 months for most of the categories shown, except for the sex of the child. Thus, much of the differences reflected in the median durations arise from differences in weaning after the child reaches age one and thus only appear in the probabilities of being breast-fed beyond the first year of life.

Perhaps the most striking feature of the demographic and socio-economic differentials in breast-feeding duration is how weak they are compared with many other developing countries (Trussell and others, 1992). For all categories of children, the median duration of breast-feeding is well over a year and breast-feeding for at least half a year is almost universal.

Table 3: Median durations of breast-feeding, as estimated by the current status and life-table approaches, by selected background characteristics, 1994 VNICDS

	Median duration (months) as estimated from:		Life-table estimates of percentage breast-fed at least:		
	Current status	Life table	6 months	12 months	18 months
Total sample	16.9	15.9	95	80	36
Residence					
Urban	13.9	13.9	91	72	18
Rural	17.5	16.3	96	82	40
Sex of child					
Male	16.9	16.0	94	80	37
Female	16.7	15.5	95	79	34
Education of mother					
No schooling	19.2	17.4	93	79	47
Grades 1-4	17.5	15.4	93	77	36
Grades 5-7	16.8	15.4	94	79	34
Grades 8-11	17.3	16.2	96	82	37
Grades 12+	15.4	14.8	94	79	25
Occupation of mother					
Agricultural	17.5	16.5	95	81	41
White collar	16.0	15.0	93	78	28
Other working	17.1	14.5	92	74	26
Not working	15.6	14.7	94	78	25
Wealth status by residence					
Urban low	14.5	14.3	90	74	20
Urban middle	13.2	13.6	93	70	16
Urban high	13.1	13.8	90	70	19
Rural low	17.9	16.2	94	79	41
Rural middle	17.7	16.5	96	82	40
Rural high	15.8	15.0	95	81	35

Notes: Results are weighted. Current status results refer to all living children born within three years of the survey. Life-table estimates refer to all live births during the same period.

Supplemental food for breast-fed children

Most health specialists not only advocate breast-feeding but also recommend that, during the first four to six months of life, the child be limited exclusively to breast milk. Neither liquids, including plain water, nor solid or mushy food are thought to be beneficial for the infant at least for months (Institute for International Studies in Natural Family Planning, 1990). The recent breast-feeding promotion campaign in Vietn Nam also recommends that exclusive breast-feeding be practised for the first four months and than no solid food be given before six months.

The 1994 VNICDS collected several types of information on food and liquids other than breast milk that were given to children. Mothers who were currently breast-feeding a child were asked whether or not the child was given various types of supplemental foods and liquids during the day or night before the survey. In addition, for each of the last three children born within 10 years of the survey, respondents were asked if the child was ever given supplemental food or liquids and, if so, at what age foods or liquids were first given regularly.

The percentage of currently breast-fed children who were given different types of supplemental foods during the prior day or night are shown in table 4. Since most children are weaned by the age of 24 months, results are shown only for children under two years old. Although the VNICDS questionnaire included a separate question on infant formula and tinned or powdered milk, it is likely that many respondents were unfamiliar with the technical term used to inquire about formula and did not distinguish powdered milk from formula. Thus, in the presentation of results we have combined the responses to these two items. For convenience, we refer to the combined category of tinned/powdered milk and formula as "other milk".

Plain water has no nutritional value and thus in this sense is not truly a supplemental food. Nevertheless, its provision is of concern as a potential source of contaminants (Khan, 1990). The results make clear than it is very common to give plain water to infants at very young ages. Overall, more than two-thirds of breast-fed infants under three months old were given plain water and over 90 per cent of those 3-5 months old had received plain water.

Children born to mothers living in urban areas appear to have been given plain water earlier than those born to rural mothers.

Table 4: Percentage of currently breast-fed children under two years of age who received various types of supplemental liquids and food within last day or night, by age of child, 1994 VNICDS

	Age of child (in months)					
	0-2	3-5	6-11	12-17	18-23	Total
Plain water						
Total sample	68	91	95	95	97	91
Urban	(93)	(90)	99	99	(97)	97
Rural	63	91	94	94	97	90
Sugar water						
Total sample	16	18	20	25	18	20
Urban	(17)	(18)	18	28	(23)	21
Rural	16	18	20	24	17	20
Juice						
Total sample	5	8	20	22	19	17
Urban	(5)	(27)	45	53	(77)	41
Rural	5	6	16	18	14	14
Fresh milk						
Total sample	0	1	1	1	0	1
Urban	(0)	(3)	4	3	(0)	3
Rural	0	0	0	1	0	1
Other milk (tinned or powdered milk/formula)						
Total sample	14	19	19	16	12	17
Urban	(42)	(36)	43	32	(51)	40
Rural	9	16	15	14	9	14
Other liquid						
Total sample	3	5	11	11	14	10
Urban	(1)	(13)	26	30	(38)	22
Rural	3	4	9	9	12	8
Solid/mushy food						
Total sample	15	63	90	92	96	78
Urban	(11)	(58)	96	98	(100)	78
Rural	16	64	89	92	95	78
Any liquid/solid food						
Total sample	73	94	99	98	99	95
Urban	(93)	(96)	100	100	(100)	98
Rural	70	94	99	98	98	95
Any liquid other than plain water						
Total sample	29	36	44	44	37	40
Urban	(51)	(56)	67	69	(79)	64
Rural	25	33	40	41	33	37
Any liquid or food other than plain water						
Total sample	37	72	93	96	97	85
Urban	(55)	(73)	99	98	(100)	88
Rural	33	72	92	96	97	84

Notes: Results are weighted. Results in parentheses are based on fewer than 50 weighted births.

Other supplemental foods and liquids not only risk being contaminated but, because they have some nutritional content, also will reduce the child's intake of breast-milk. All other liquids asked about in the VNICDS were given far less commonly than plain water. Least common of all was fresh (cow's) milk which is almost completely absent in Viet Nam as a supplement to breast-feeding. Sugar water was reported to be the most common, although other

milk and juice were given almost as commonly, judging by the proportion of all breast-fed children under age two years who received them. However, the ages at which children received these three types of liquids differ. In particular, juice was largely limited to children at least six months old while sugar water and other milk were given in fair proportions even to younger infants. There is relatively little difference in the proportion of urban and rural children who received sugar water. However, both juice and other milk were far more common supplemental liquids in urban than in rural areas.

In Viet Nam young children are traditionally given solid/mushy food, mostly rice products. Although only 15 per cent of breast-fed infants aged 0-2 months were given solid/mushy food, the majority of those 3-5 months old received such food as did 90 per cent or more of older breast-fed children. The results also suggest that solid or mushy food is given earlier to rural than urban infants.

If all liquids and foods are considered, a very substantial proportion (73 per cent) of even the youngest breast-fed infants received at least something in addition to breast milk. Thus, only a minority of infants in the first few months of life can be considered as truly exclusively breast-fed. If plain water is excluded, however, a somewhat different picture emerges with most breast-fed infants under the age of three months having received no liquids or food with nutritional content other than breast milk. By 3-5 months the situation reverses with most receiving some form of supplement to the breast milk. The situation differs for urban and rural children with supplements having nutritional content being far more common for the youngest urban than for the youngest rural infants. The difference between urban and rural children in this respect disappears within a few months after birth. By the time breast-fed children are in the second half of their first year of life, almost all receive some supplemental food having nutritional content.

Based on responses as to whether and when particular categories of food were first regularly given to a child, the life-table approach can be utilized to estimate several features of infant feeding practices. These estimates refer to all children regardless of whether or not they were still being breast-fed at the time the other liquids or food were introduced. The results, presented in table 5, indicate that few infants in their first month of life were given solid or mushy food but that the practice of doing so increased rapidly thereafter. Overall, by four months 50 per cent of children were already given solid/mushy food regularly. Such food is introduced into the diet of rural infants somewhat earlier than urban infants as reflected by the earlier rural median age. By age six months, however, the urban-rural difference has disappeared and by nine months over 90 per cent of children, regardless of residence, receive solid or mushy food. For both urban and rural children, half receive food or liquids other than plain water between ages three and four months. The lack of an urban-rural difference in this respect reflects the earlier introduction of liquids in urban areas (thus compensating for the earlier introduction of solid or mushy food in rural areas).

Table 5: Selective measures of receiving food or liquids and of exclusive breast-feeding by age of child as estimated by the life-table approach, by residence, 1994 VNICDS and 1988 VNDHS

	Percentage who regularly received		Percentage breast-fed exclusive of:	
	Solid/mushy food	Food or liquids excluding water	Solid/mushy food	Food or liquids excluding water
Total sample				
By age 1 mo.	4.7	14.5	91.8	83.1
By age 2 mo.	14.1	26.1	82.2	71.5
By age 3 mo.	26.8	41.4	70.0	56.5
By age 6 mo.	77.1	84.5	21.7	14.8
By age 9 mo.	93.3	95.2	6.3	4.5
By age 12 mo.	95.8	96.	93.9	2.9
Median (in months)	4.0	3.4	3.9	3.3
Urban				
By age 1 mo.	0.8	16.3	94.6	82.5
By age 2 mo.	4.4	30.0	90.1	73.0
By age 3 mo.	13.1	42.1	80.9	57.0
By age 6 mo.	78.3	90.4	19.9	9.5
By age 9 mo.	96.5	98.8	3.2	0.9
By age 12 mo.	98.1	99.2	1.7	0.2
Median age (in months)	4.0	3.3	4.2	3.3
Rural				

By age 1 mo.	5.4	14.1	91.3	83.2
By age 2 mo.	15.8	26.1	80.8	71.3
By age 3 mo.	29.2	41.2	67.6	56.4
By age 6 mo.	76.8	83.5	22.0	15.8
By age 9 mo.	92.7	94.6	6.8	5.1
By age 12 mo.	95.4	96.5	4.3	3.3
Median age (in months)	3.3	3.4	3.8	3.3

Note: Results are weighted and refer to all births during five- year period prior to the survey.

The duration of breast-feeding exclusive of solid or mushy food and liquids other than plain water is closely related to when these foods are introduced into the diet. As the results show, exclusive breast-feeding is relatively short in Viet Nam. Half of the children were breast-fed exclusive of solid or mushy food for about four months and exclusive of any food or liquid other than plain water for only a little over three months. Although breast-feeding exclusive of solid or mushy food was slightly longer in urban areas, there is no urban-rural difference in the median duration of breast-feeding exclusive of food and liquids.

Breast-feeding, amenorrhoea and contraceptive use

The link between infant feeding practices and the return of menstruation and ovulation following childbirth is well known. Continued breast-feeding tends to prolong the period of post-partum amenorrhoea and with it the return of ovulation. The 1994 ICDS is the first national-level survey in Viet Nam to have collected information on post-partum amenorrhoea. Table 6 presents current-status estimates of the percentages of women still amenorrhoeic. The median duration of amenorrhoea at the national level is almost nine months following childbirth. The steady decline in the percentage of women still amenorrhoeic reflects the increasing proportions of women who experience the return of menstruation as the time since childbirth increases.

The duration of amenorrhoea varies significantly among different groups of mothers in Viet Nam. In general, the differentials in the duration of amenorrhoea parallel those indicated for breast-feeding. Thus, urban women experience more rapid return of menstruation than do rural women. Also, the least educated women are characterized by a longer time to the return of menstruation than the best educated ones, and women with agricultural jobs experience a longer period of amenorrhoea than women not in agriculture.

As figure 2 shows, the return of menstruation is not only closely associated with whether or not a woman breast-feeds but also with whether she supplements breast-feeding with other food. For women not breast-feeding, the return of menstruation is very rapid, with the median duration implied by the current status estimates being only slightly over two months. However, the results also show that women who supplement their breast-feeding with solid or mushy food for their child are more likely to experience the return of menstruation at the various successive months since giving birth than those who do not. This result is consistent with what is known about the physiology of the link between breast-feeding and amenorrhoea. Ovulation (and hence menstruation) tends to be suppressed by the release of prolactin which is stimulated by the intensity and frequency of suckling by the child. When children who breast-feed are also given supplemental food, they tend to suckle less frequently and intensely because their appetite for breast milk is partially met by eating the other food. (McCann and others, 1981).

Table 6: Percentage of women currently amenorrhoeic by months since childbirth and median duration of amenorrhoea, by selected background characteristics, 1994 VNICDS

	Months since childbirth				
	0-2	3-5	6-11	12-17	Median
Total sample	93	74	53	25	8.9
Residence					
Urban	89	57	38	10	5.6
Rural	94	77	55	28	9.8
Education of mother					
Less than 5 years	93	82	59	35	9.0
Grades 5-7	97	71	51	22	8.6
Grades 8-11	96	70	51	26	8.7
Grades 12+	76	59	42	8	6.8
Occupation of mother					

Agricultural	94	77	58	30	10.3
Other working	82	60	41	16	7.1
Not working	97	76	46	19	8.0

Notes: Results are weighted and refer to experience with the most recent birth. Medians are determined from five-month, equal-weight moving averages of single-month values. Results in parentheses are based on fewer than 50 weighted cases.

Discussion and conclusions

Given the clear health benefits of breast-feeding for children, concern about declines in the practice in numerous developing countries during the last several decades has been widespread among health professionals (McCann and others, 1981; Millman, 1986; Trussell and others, 1992). Thus, the results of the present study indicating that breast-feeding is virtually universal in Viet Nam, that the average duration of breast-feeding is well over a year, and that there appears to be no indication of a decline during the last decade in either breast-feeding initiation or duration are quite welcome. Moreover, the nearly universal initiation of breast-feeding and reasonably long durations, i.e. in excess of a year on average, are characteristic of a wide spectrum of socio-economic groupings.

Viet Nam is not alone in having a tradition of universal and long breast-feeding. Indeed most Asian countries, at least until very recently, followed similar practices (see March 1990 issue [vol.5, No. 1] of this Journal, which contains nine articles on breast-feeding in various countries and areas of Asia). There are several likely reasons why in Viet Nam there has so far been no sign of the erosion of breast-feeding as appears to have occurred in some other national settings.

First, during most of the last two decades, Viet Nam has been relatively closed to international commercial and other influences outside the Socialist Block. This relative isolation conditioned social and economic change in a rather different way than was taking place elsewhere in the non-socialist developing world and this phenomenon held important implications for consumer tastes and attitudes. Undoubtedly of particular relevance was the absence of commercial activities by multinational corporations marketing and promoting breast-milk substitutes, especially infant formula. During this same period, domestic production of infant formula was very limited and not promoted commercially. Only in the last few years have multinational companies come on the scene with active marketing of formula and other potential substitute infant food products. Thus, consumption of such products has so far been quite low.

Second, most of the population live in the countryside and engage in agricultural occupations. The rural life-style they follow has been conducive so far to maintaining the traditionally universal initiation and long duration of breast-feeding.

A third and related factor is the prevalent low standard of living. This acts as an important barrier to the consumption of non-breast-milk products because most families are unable to afford to buy commercially made breast-milk substitutes.

Government policies and programmes have also been supportive of extended breast-feeding and may be contributing to its continued prevalence. These may be of interest to other developing countries when formulating policies and implementing programmes for this purpose. For example, various programmes of Viet Nam's Ministry of Health have included information both for staff and the public intended to promote a better understanding of the value of breast-feeding and appropriate timing for the introduction of supplementary foods. Public "mass" organizations such as the Women's Union, Youth Union, and Voluntary Health Workers have also participated in these programmes. Another government policy that probably helps to sustain breast-feeding, especially among the urban non-agricultural population, are labour regulations regarding maternal leave from work. Since 1985, the duration of maternal leave in the government sector was extended from 10 weeks to 4-6 months, depending on the particular working conditions. The explicit purpose of this regulation is to facilitate full breast-feeding for at least the first few months of a child's life. Many state enterprises have crèches located on the premises or nearby to facilitate breast-feeding after the mothers return to work. In addition, those mothers who return to work are entitled to take off one hour daily with no penalty to their pay until the child reaches the age of 12 months; this time can be taken off at any time during the work day.

There are also some aspects of infant feeding in Viet Nam that are less than ideal. Health professionals typically recommend that women start to breast-feed their child during the first hour following childbirth. However, only a minority of mothers apparently follow this practice. Interestingly, our analysis indicates that the delivery of a baby at a government health facility is not associated with an increased chance of early breast-feeding initiation. Supplemental foods and liquids, including plain water, are introduced to infants by many mothers before the time considered by health professionals to be ideal. Government efforts to promote early breast-feeding and to encourage the appropriate timing of the introduction of supplementary food apparently have yet to have much impact on

changing less-than-ideal traditional practices.

There are reasons to suspect that the social and economic change now under way in Viet Nam, if not effectively counteracted, may weaken breast-feeding. Free market reforms (Doi Moi) implemented from 1986 and a considerable opening of the country to broader international commerce are likely to exert negative pressures on breast-feeding. Infant formula and powdered milk, including major brands from multinational companies as well as a domestic brand, are far more available than previously. Furthermore, even though commercial promotion and advertisements for food substitutes through the mass media and in hospitals and health care centres are officially banned, there is anecdotal evidence that formula companies evade the regulations. For example, in Ho Chi Minh City, company agents obtain lists of new mothers from ward health stations and contact the mothers directly, providing free samples or selling formula or milk products initially at below market prices. The official ban against selling formula and similar products in hospitals is also not vigorously enforced. Even when it is, shops right outside the hospital gate openly sell these products that, in the big cities at least, are becoming a fashionable gift for visitors to bring to new mothers.

Besides increased commercial availability and promotion of breast-milk substitutes, other social changes may contribute to a decline in breast-feeding. Living in urban areas, working outside of agriculture, having higher levels of education, and being wealthier are all associated with shorter duration of breast-feeding. Given that socio-economic change in Viet Nam is operating to increase the relative share of women in each of these categories, such compositional changes would serve to modestly reduce the average breast-feeding duration in the future. Moreover, economic growth is likely to lead to improved living standards which in turn will make store-bought formula and powdered milk more affordable to an increasing number of mothers. The fact that many of the infant formula products are from foreign companies adds to their image as a desirable good and to their appeal to consumers with increased disposable income.

It is probably true that the long duration of breast-feeding is currently still largely an outcome of a long tradition in the infant feeding practices of Vietnamese mothers. As a normative practice, its persistence probably reflects traditional thinking more than conscious decisions based on knowledge of the benefits of breast-feeding. Thus, these practices may be quite vulnerable to change as Viet Nam follows the path to rapid socio-economic development.

The Ministry of Health already recognizes many of the potential threats to breast-feeding and has in 1994 launched a new national-level programme designed to promote favourable practices, including the issuance of regulations to control the production, circulation and advertisement of food substitutes.³ Fortunately these regulations and programmes have been issued while the traditional pattern of universal and prolonged breast-feeding still persists. Continued monitoring of the situation and sustained efforts to promote healthful infant feeding practices in a coordinated programme by government and non-governmental organizations and health-care institutions are likely to be required to maintain and improve the currently favourable situation.

Footnotes

1. In the present analysis, children who died but were breast-fed until the time of death are included in the life-table calculations but are treated as "censored events" rather than as "terminal events" for which the age at weaning is known (see Norusis, 1992).

2. The wealth index was constructed based on a combination of information on selected household possessions and quality of the house.

3. Directive of the Ministry of Health 8257/PC, Hanoi, 18 December 1992: decision of the Government of Viet Nam, No. 307/TTg, Hanoi, 10 June 1994.

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Breast-feeding in Bangladesh: Patterns and Impact on Fertility

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Measures should be taken that will help to promote the practice of breast-feeding

Breast-feeding has been the subject of rapidly growing interest in developing countries because of its important implications not only for the improved health of children, but also for lowering fertility. The suckling infant stimulates the flow of hormones within the mother that delay the return of ovulation. Extended breast-feeding lengthens the period of non-exposure to the risk of conception and thus lengthens the interval between consecutive births, which in turn indirectly reduces fertility (Huffman, 1984; Thapa and Williamson, 1990). Since breast-feeding has no direct impact on fertility, an attempt is made in this article to examine the association between breast-feeding and post-partum amenorrhoea as a proxy for the fertility-inhibiting effect of breast-feeding in Bangladesh.

Bangladesh is considered one of the world's most densely populated countries (836 persons per square km) with an annual population growth rate of 2.2 per cent (ESCAP, 1995). In such a setting, the pressure on the land for agricultural production and the demand for jobs result in large-scale migration to cities and industrial zones. Thus, rapid changes have been occurring in the country's socio-economic and demographic characteristics. Against this backdrop, it is reasonable to expect that the levels and patterns of breast-feeding will have been changing over time. It is in this context that the present study has been undertaken. It should be mentioned that this study is the first one detailing breast-feeding differentials in Bangladesh by the life-table method, using national-level data to monitor the changes taking place over time.

Source and quality of data

This study utilizes data extracted from the 1989 Bangladesh Fertility Survey (BFS) which was conducted on behalf of the Government of Bangladesh by the National Institute of Population Research and Training (NIPORT). Information was collected from a nationally representative sample of 11,906 ever-married women under 50 years of age. Information on the duration of breast-feeding was collected for ever-married women with at least one live birth within the six years preceding the interview. Questions on breast-feeding duration were related to the last four births of the women. A total of 7,516 women provided information on breast-feeding of their last child: of this number, 198 (2.6 per cent) reported that they never breast-fed their most recently born child, 2,050 (27.3 per cent) said that they had already weaned the child by the date of the interview, 381 (5.1 per cent) breast-fed the child until its death and the remaining 4,887 (65.0 per cent) were still breast-feeding their child.

Retrospective information collected in any survey in most developing countries is affected by memory lapse and a preference for certain numbers. Retrospective data on durations of breast-feeding and amenorrhoea show heaping at multiples of six months. Srinivasan (1980) suggested quotients for measuring digital preference from retrospective data on breast-feeding in both the current open and last closed intervals. These were found to be 0.79 and 0.55, respectively, when the quotient ranges from 0 to 1; the value 0 is used when there is absolutely no digital preference and the value 1 is used when all the frequencies are in multiples of six months. However, in a predominantly Muslim country such as Bangladesh -- especially in rural areas -- it is possible that women continue breast-feeding for 24 months as is a common practice in other Muslim countries (Page and others, 1982; Rabei, 1988). However, current status data on breast-feeding do not show such heaping at multiples of six months.

Women reporting at the last closed interval represent, at least partially, a self-selected group of short-duration breast-feeders and thus add selection bias to the recall bias. Data for the last closed interval under-represent women with a longer-than-average birth interval, because these women have had less chance of having had their second birth. Data for the current open interval do not suffer from this limitation. These biases are minimized in the current status analysis of breast-feeding in the open birth interval (Page and others, 1982).

Methodology

The methods available for the estimation of breast-feeding patterns differ in their data requirements as well as with regard to the objectives of the study. The methods also differ slightly in their assumptions. Thus, the choice between them will depend in part on the availability and quality of different types of data. In order to evaluate the characteristics of the frequency distribution such as means, median, standard deviation, differences in the survival distributions or the interquartile range, one has to use the life-table method of estimation (Page and others, 1982). If one is interested only in the mean, then one may use the very simple method of prevalence/incidence. But this method does not take full advantage of the data typically available. In contrast, the life-table method permits full utilization of periods of observation of censored and non-censored cases. Moreover, results from the prevalence/incidence method depend on the assumption that the number of births per month has been constant throughout "Z" years preceding the survey when Z is the longest duration of breast-feeding in the population (Mosley and others, 1982). The assumption of a constant flow of births per month may hold true as a broad characteristic, but it is unlikely to be so when a broad group is subdivided into smaller subgroups. The life-table method of analysis, though quite complex, does not suffer from such limitations. Thus, the life-table method is preferred over other analytical techniques such as prevalence/incidence or current status methods (Thapa and Williamson, 1990).

In life-table analysis, the breast-feeding status of mothers whose children subsequently died and yet are still breast-feeding another child or children are considered as censored cases. Inclusion of data on the duration of breast-feeding, disregarding the survival status of children, may introduce a bias because women whose last child had died during the previous 30 months would obviously be unable to breast-feed the child following its death and thus would have an artificially shortened duration of breast-feeding. For this reason, data on children who died during this interval (30 months preceding the interview) were excluded from our study (Weis, 1993).

If two or more groups in the study can be considered as samples from some large population, then we may want to test the null hypothesis that the survival distributions are the same for the subgroups, thus establishing the statistical significance of the differences. The statistics available in survival analysis are calculated according to the algorithm of Lee and Desu (1972).

Results of analysis

The results of the actuarial life-table method (Cutler and Ederer, 1958) are presented in table 1. Studies on a few characteristics of breast-feeding differentials using World Fertility Survey (WFS) and 1976 BFS data were performed by Ferry and Smith (1983) and Ahamed (1986), respectively. Two other studies of limited scope were carried out using data from rural areas of Bangladesh by Huffman and others (1980) and Nessa and others (1987). However, Huffman and his colleagues (1980) reported median values only. The results of the present study are compared with those from previous studies whenever these are available. This comparison will indicate any change in breast-feeding patterns in Bangladesh for different subgroups, although the values of the means may vary owing to the differences in the sources of data used and techniques employed (Ferry and Smith, 1983).

The average duration of breast-feeding in Bangladesh for surviving children is 28.2 months. While Ferry and Smith (1983) found duration to be 28.9 months, Ahamed (1986) using the prevalence/incidence method found it to be 27.3 months and Nessa and others (1987) found it to be 26.4 months for all children. Huffman and others (1980) found the median duration to be 32.0 months for surviving children.

As may be expected, urban women were found to breast-feed for a relatively shorter duration, i.e. 27.1 months, compared with rural women who breast-feed for 28.6 months on average. Ferry and Smith (1983) found these durations to be 26.0 and 29.2 months for urban and rural women, respectively; Ahamed (1986) found that the average durations were 24.0 and 27.6 months, respectively. Among the four administrative divisions of Bangladesh, the average duration of breast-feeding has been lowest in Chittagong division (27.4 months) and highest in Rajshahi division (28.9 months), while it is 28.0 and 28.8 months, respectively, in Dhaka and Khulna divisions.

There is a clear indication that breast-feeding duration is negatively associated with the educational level of the mother. Respondents having no schooling were found to breast-feed on average for 28.8 months, which linearly decreases to 26.2 months for mothers with a higher education. Ferry and Smith (1983) found these durations to be 29.6 and 27.1 months for women having no schooling and schooling, respectively. Ahamed (1986), Huffman and others (1980) and Nessa and others (1987) also found similar inverse associations. Husband's education also demonstrates an inverse relationship with the duration of breast-feeding. The study shows a decrease in the mean duration of breast-feeding from 28.9 months for women having husbands with no schooling to 27.2 months for women having husbands with a higher education.

Mother's age at the birth of the index child exhibits a positive association with the duration of breast-feeding. Only older women (aged 35-49 years) have a different breast-feeding pattern than the others. Ferry and Smith (1983) found that the average durations increased from 26.7 to 31.5 months for mothers aged 15-24 and 35-49 years, respectively; Ahamed (1986) found that the average duration increased from 24.7 months for mothers aged 15-19 years to 32.5 months for those aged 45-49 years. Ferry and Smith (1983), Huffman and others (1980) and Nessa and others (1987) also found similar positive associations between breast-feeding duration and mother's age.

The differential in breast-feeding duration by religion shows that Muslim women breast-feed on the average for 28.1 months while their non-Muslim peers breast-feed for 28.8 months. Huffman and others (1980) also found a similar pattern.

Currently working women breast-feed for a slightly longer duration (29.0 months) as compared with their non-working counterparts who breast-feed for 28.1 months. Ahamed (1986) found that these durations were 28.5 and 28.1 months for working and non-working women, respectively. 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, since the majority of such working women perform physical or manual work, it is reasonable to assume that they are mostly less educated or uneducated.

Parity demonstrates a positive and linear association with duration of breast-feeding. Women with a parity of 1-2 breast-feed for an average of 27.5 months, which rises linearly to 28.6 months for those who were reported to have at least five children. Ferry and Smith (1983) found that the average durations increased from 26.7 to 31.4 months for mothers with parities 1-2 and 5 or more, respectively. Ahamed (1986) and Huffman and his colleagues (1980) also observed such an association, which may be expected, since women of higher parity are also those who are likely to be older; younger women may be expected to have a higher level of education and be more likely to break with traditional behaviour patterns than older and less well educated women.

The differences in breast-feeding patterns according to the occupational status of husbands suggest that the wives of service workers and businessmen breast-feed on average for 27.5 months, wives of production workers breast-feed for 28.6 months, while those of farmers and land-owners breast-feed on average for 29.0 and 27.9 months, respectively.

Current use of contraception shows a very weak positive impact on the duration of breast-feeding. Women currently using contraception breast-feed on average for 28.3 months, whereas those not currently using contraception breast-feed for 28.1 months, so the difference is only marginal.

Possession of household items appears to have a negative impact on the duration of breast-feeding. Respondents possessing specific household items breast-feed on average for a shorter duration (27.2 months) compared with those not possessing such items (29.2 months). This means that mothers belonging to lower socio-economic groups and having a more traditional life-style breast-feed their babies longer than their more affluent counterparts.

Visits by health workers have a positive impact on the duration of breast-feeding. Women are more likely to breast-feed for a longer duration (28.8 months) when health workers have visited them than those who are not visited at all by health workers (28.0 months). Examination of the effect of health decision-making on the duration of breast-feeding shows that women whose husbands make health decisions breast-feed for an average of 28.3 months while women who make health decisions by themselves or jointly with their husbands breast-feed for 28.1 months; however, this difference is only marginal.

BFS 1989 data provide no evidence of a marked differential in breast-feeding duration by sex of the breast-fed child. Male children were found to be breast-fed for an average duration of 28.3 months while female children were breast-fed for 28.1 months, but the difference is only marginal. Ahamed (1986) also found that male children were breast-fed for a longer duration than female children.

Comparison of survival distributions

So far the results of breast-feeding patterns have been discussed only on the basis of the differences in the mean values of certain characteristics. A complementary but statistically more powerful method of comparison is the use of the chi-square test for the survival distributions of the subgroups of a broad category (Lee and Desu, 1972). The differences in the survival distributions for the different subgroups of a variable based on the chi-square test are given in table 1.

Table 1: Mean duration of breast-feeding (in months) in Bangladesh by life-table method for selected variables (BFS 1989)

Characteristic	Means (in months)
Bangladesh	28.2
Residence	
Rural	28.6
Urban	27.1
	p<0.001
Administrative divisions	
Chittagong	27.4
Dhaka	28.0
Khulna	28.8
Rajshahi	28.9
	p<0.001
Mother's age at birth of index child	
15-24	28.1
25-34	28.1
35-49	29.3
	p<0.01
Parity	
1-2	27.5
3	27.7
4	28.1
5+	28.6
	p<0.01
Mother's education	
No education	28.8
Lower primary	28.3
Upper primary	27.6
Higher	26.2
	p<0.001
Husband's education	
No education	28.9
Lower primary	28.3
Upper primary	27.8
Higher	27.2
	p<0.001
Work status	
Working	29.0
Not working	28.1
	p<0.01
Husband's occupation	
Sales/service	27.5
Production workers	28.6
Labourer/farmers	29.0
Land-owners	27.9
	p<0.001
Religion	
Muslim	28.1
Non-Muslim	28.8
	p>0.05

Sex of the index child	
Male	28.3
Female	28.1
	p>0.05
Current use of contraception	
Yes	28.3
No	28.1
	p>0.05
Visit of health workers	
Never	28.0
Yes	28.8
	p<0.001
Health decision	
Respondent alone/jointly	28.1
With husband	28.3
	p>0.05
Household possessions	
No	29.2
Yes	27.2
	p<0.05

The results show that the differences between survival distributions are highly significant ($p<0.001$) for the following variables: place of residence, administrative division, mother's education, husband's education, husband's occupation and visits by health workers. The differences in the variables mother's age, parity, mother's current work status ($p<0.01$) and household possessions ($p<0.05$) are also significant.

Breast-feeding and fertility

Before the introduction of modern contraceptives, breast-feeding was the main factor determining the interval between pregnancies in developing countries (Kleiman and Senanayake, 1984). In this study an attempt has been made to examine the association between breast-feeding and fertility in the country as a whole and in rural and urban areas. Because breast-feeding has no direct impact on fertility, more emphasis should be given to the effects of the breast-feeding process on the period of post-partum amenorrhoea as a proxy for the fertility-inhibiting effect of breast-feeding. The temporary cessation of ovulation, accompanied by cessation of menstruation after every birth, can be prolonged as a result of breast-feeding (Thapa and Williamson, 1990). Post-partum amenorrhoea lasts for an average of about two months in non-breastfeeding women and increases to roughly 60-70 per cent of the average duration of breast-feeding in a population customarily practising breast-feeding (Leridon, 1977). Thus, breast-feeding affects fertility by prolonging the period of post-partum amenorrhoea, which in turn affects birth intervals. Accordingly, a logical starting point is to study the relationship between breast-feeding and post-partum amenorrhoea. This study is designed to investigate such a relationship, taking into account some of the socio-economic and demographic variables of respondents such as the mother's age, her education, place of residence and parity. It also attempts to evaluate the contraceptive potential of breast-feeding in Bangladesh.

Bivariate analysis

Bivariate analysis (tables 2, 3 and 4) shows that an increase in breast-feeding duration prolongs the length of post-partum amenorrhoea. A longer duration of breast-feeding by women in rural areas leads to longer periods of amenorrhoea compared with those experienced by women in urban areas. The mean duration of amenorrhoea is positively associated with parity, but variations in amenorrhoea by parity are marginal as compared with variations by breast-feeding duration. Urban-rural differentials are more pronounced when breast-feeding durations are controlled. The mean length of post-partum amenorrhoea is positively associated with mother's age while the impact of mother's education on the mean length of amenorrhoea is more pronounced in urban areas than in rural areas.

Table 2: Mean length of amenorrhoea by breast-feeding duration and parity in open birth interval

Parity	Place of residence	Breast-feeding duration	Overall means
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		(in months)			
		0-11	12-23	24+	
1	Rural	3.6	7.4	11.0	9.0
	Urban	3.9	5.3	9.8	6.6
	Total	3.8	6.6	10.6	8.1
2	Rural	7.6	10.8	12.8	11.8
	Urban	4.9	8.8	11.3	9.3
	Total	5.7	10.1	12.2	10.6
3	Rural	8.2	9.8	13.8	12.3
	Urban	4.9	8.4	10.0	8.3
	Total	6.1	9.2	12.8	10.9
4+	Rural	8.6	10.9	14.8	13.6
	Urban	6.1	10.6	13.0	11.5
	Total	7.5	10.8	14.3	13.0
Overall means	Rural	7.4	10.1	13.8	12.5
	Urban	4.8	8.6	11.7	9.4
	Total	5.6	9.6	13.2	11.4

Table 3: Mean length of amenorrhoea by breast-feeding durations, age of mothers and residence in open birth interval

Mother's age		Residence Breast-feeding duration (in months)			Overall means
		0-11	12-23	24+	
15-24	Rural	4.5	9.0	11.9	10.2
	Urban	3.9	6.4	11.5	7.8
	Total	4.1	8.2	11.7	9.2
25-34	Rural	8.9	10.6	13.5	12.8
	Urban	5.7	9.4	10.8	9.4
	Total	6.8	10.1	12.7	11.4
35-49	Rural	9.2	11.1	15.8	14.7
	Urban	4.5	11.6	14.3	12.7
	Total	7.8	11.2	15.5	14.2

Table 4: Mean length of amenorrhoea by breast-feeding duration, educational status and residence in open birth interval

Mother's education		Breast-feeding duration (in months)			Overall means
		0-11	12-23	24+	
No schooling	Rural	8.5	10.2	14.5	13.2
	Urban	8.2	10.0	13.7	12.4
	Total	8.4	10.2	14.3	13.0
Schooling	Rural	6.0	9.8	12.5	11.2
	Urban	4.1	7.9	10.0	7.6
	Total	4.5	8.9	11.5	9.5

Multivariate analysis

The bivariate analysis in our study establishes a relationship between breast-feeding and post-partum amenorrhoea after controlling for one or two variables. So it is important to examine the association between breast-feeding and post-partum amenorrhoea while statistically controlling for the effects of all other variables that might influence the post-partum amenorrhoea period. This relationship can be expressed by using multiple regression analysis, taking the post-partum amenorrhoea period as a dependent variable and duration of breast-feeding as the independent variable along with place of residence, mother's education, mother's age, parity, work status of the mother and ever use of contraception as other

independent variables. In order to obtain an accurate picture of the examined relationship between breast-feeding and post-partum amenorrhoea, the regression analysis is carried out only for those who stopped breast-feeding. The analysis has been performed over both the current open and last closed birth intervals of post-partum amenorrhoea to determine whether breast-feeding is the principal determinant of post-partum amenorrhoea in both intervals. The closed amenorrhoea interval reflects the complete experience of amenorrhoeic mothers, whereas the current open interval does not give the complete experience of amenorrhoeic mothers owing to the exclusion of censored cases from the analysis. Table 5 shows the values of the coefficient of determination (R^2) and partial regression coefficient (B) in the two models. The variables are included in the models by a step-wise regression method.

The results show that breast-feeding has a positive significant effect on amenorrhoea and is the principal determinant of amenorrhoea in both the current open and last closed birth intervals. However, the effect of breast-feeding on the post-partum amenorrhoea period is stronger in the last closed interval than in the current open interval. The breast-feeding duration explains 18.9 per cent of the total variation in post-partum amenorrhoea, which is 86.3 per cent of the total variation explained by the seven variables: breast-feeding, place of residence, mother's education, mother's age, parity, mother's work status and ever use of contraception in the last closed interval. Breast-feeding explains 9.8 per cent of the total variation in the post-partum amenorrhoea period in the current open interval, which is 71.5 per cent of the total variation explained by all the variables, excluding parity. The partial regression coefficient (B) for breast-feeding indicates that, on average, one month of breast-feeding adds about 0.36 month to the period of post-partum amenorrhoea in the last closed interval, whereas this value is about 0.2 month in the current open interval. The other variables such as place of residence, mother's education, mother's work status, mother's age and ever use of contraception were found to be significant in both models, although to a much lesser extent than breast-feeding. Parity was found to have a positive significant effect on the length of amenorrhoea only in the last closed interval; it was found to be insignificant in the other model.

Table 5: Summary results of multiple regression analysis using post-partum amenorrhoea period as dependent variable in current open and last closed birth intervals

Variables	Current open interval		Last closed interval	
	R^2	B	R^2	B
Duration of breast-feeding	0.098	0.199 *	0.189	0.358 *
Mother's age	0.018	0.155 *	0.007	0.157 *
Education of mother				
(No schooling)	-	-	-	-
Schooling	0.012	-1.467 *	0.005	-1.207 *
Ever use of contraception				
(No)	-	-	-	-
Yes	0.004	-1.199 *	0.013	-1.374 *
Residence				
(Rural)	-	-	-	-
Urban	0.003	-1.248 *	0.002	-1.044 *
Work status of respondents				
(Never worked)	-	-	-	-
Ever worked	0.002	1.273 * *	0.002	0.975 *
Parity	-	-	0.001	0.204 *

Note: The reference category is in parentheses.

* $P < 0.01$

* * $P < 0.05$

Contraceptive role of breast-feeding

Background

We have studied the effect of breast-feeding on post-partum amenorrhoea as a proxy for the fertility-inhibiting effect of breast-feeding. In the absence of spontaneous intrauterine mortality, amenorrhoea is one

of the most important phenomena that occur during the birth interval (Bongaarts and Potter, 1983). Thus, it would be most pertinent to study the extent to which breast-feeding delays pregnancy as a result of post-partum amenorrhoea since breast-feeding is known to prevent women from becoming pregnant under certain circumstances. Although neither the contraceptive effects (for the mother) nor the health benefits (for the infant) of breast-feeding can continue for an indefinite period post-partum, breast-feeding does function as a nearly perfect contraceptive under two conditions: (a) when a mother is fully or nearly fully breast-feeding and (b) when a mother remains amenorrhoeic (ignoring any bleeding or "spotting" during the first two post-partum months).

If these two conditions are fulfilled, breast-feeding provides highly effective contraceptive protection for the first six months post-partum. Thereafter, the contraceptive effect decreases, although for the majority of women, the contraceptive benefits do not end abruptly with the return of menses (Kennedy and others, 1989).

In view of this effect, in countries where modern contraceptive use is limited, breast-feeding has been established as a major mechanism in achieving birth intervals of up to 30 months, accounting for an average of five fewer births per woman than would have occurred in the absence of breast-feeding (Family Health International, 1989). However, in the context of Bangladesh, breast-feeding actually inhibits an average of 6.5 births per woman (Huq and Cleland, 1990).

Discussion and conclusion

The work previously done by Weis (1993) has been reconfirmed independently by the authors. The results of this study are presented here because the implications are important for policy purposes. It may be observed that in Bangladesh the adoption of contraception is quite low, i.e. ranging from a low of 10 per cent at three months post-partum to about 22 per cent at nine months, with the percentage then rising very steadily to about 40 per cent at 36 months post-partum. At three months post-partum, 9 and 15 per cent of rural and urban women use contraception, respectively. At nine months this figure increases to 20 per cent for rural women and 40 per cent for urban women. For rural women, use of contraception increases very slowly to about 25 per cent at 36 months, while for urban women it rises to 60 per cent at 36 months post-partum. The study further shows that for non-amenorrhoeic women the first subsequent pregnancy occurs only at three months post-partum while for amenorrhoeic women it occurs at 12 months post-partum. Thus, lactational amenorrhoea offers breast-feeding women a significant degree of natural protection against pregnancy for the first 12 months post-partum.

For women who are currently using contraception and are amenorrhoeic, exposure to pregnancy starts from 12 months post-partum; the percentage of pregnancy assumes a slightly fluctuating but low value between 0 and 5 per cent up to 36 months post-partum. However, for mothers who are not currently using contraception and are not amenorrhoeic, the first subsequent pregnancy occurs after only three months, steadily increasing to a value of 35 per cent at 36 months post-partum. Therefore, the timing of initiation of contraception should be revised since there would be no point in offering contraception to amenorrhoeic women fully breast-feeding their babies during the first 12 months post-partum, since lactational amenorrhoea provides natural protection against pregnancy during this time. However after the period of 12 months post-partum, contraceptive use should be initiated as women are highly susceptible to pregnancy from that time on.

Summary and policy implications

This study shows that breast-feeding is virtually universal (97.4 per cent) and homogeneously prolonged in Bangladesh. The average duration of breast-feeding in Bangladesh for surviving children was found to be 28.2 months, whereas it was 28.9 and 27.3 months for all children according to WFS and 1976 BFS data, respectively.

It was observed that rural women have a higher duration of breast-feeding than urban women. Also, older women are likely to breast-feed for a longer duration than younger women. Women in Rajshahi and Khulna divisions have comparatively longer breast-feeding durations than women in the two other divisions, while women in Chittagong division have the shortest breast-feeding duration. Women with post-primary education breast-feed quite markedly less than other women, while mother's exposure to education up to but not beyond the primary level has little impact on breast-feeding duration. Higher parity women have a longer duration of breast-feeding than those with lower parity. Women belonging to the lower socio-economic groups and having a more traditional life-style, breast-feed longer than their more affluent counterparts. The sex of the index child does not result in any marked differential in breast-feeding duration. Working women have a slightly longer breast-feeding duration than their non-working counterparts. Women are likely to breast-feed for a longer duration when they are visited by health

workers; however, the differential by current use of contraception is marginal. Women whose husbands make decisions on family health breast-feed longer than those who make health decision by themselves alone or jointly with their husbands, but the difference is only marginal. Wives of labourers and farmers breast-feed for a longer duration than those of other professions, while wives of salesmen and those working in services breast-feed for shorter durations than the others.

Our examination of the effect of breast-feeding on post-partum amenorrhoea as a proxy for the fertility-inhibiting effect of breast-feeding has identified breast-feeding as the principal determinant of post-partum amenorrhoea. Breast-feeding duration is positively associated with the length of amenorrhoea and thus contributes to a reduction in fecundability. Lactational amenorrhoea offers breast-feeding women an excellent natural protection against pregnancy for up to 12 months post-partum. Therefore, frequent breast-feeding for up to 12 months post-partum should subsequently be followed by the use of modern contraceptives in order to derive the maximum benefits from breast-feeding as a family planning method, confirming the conclusion by Weis (1993).

These findings hold the following implications for policy purposes:

- The Government and policy makers should take appropriate measures that will help to preserve the practice of breast-feeding where it is currently common, and encourage and facilitate breast-feeding where the practice is declining.
- The family planning programme should identify mothers who are highly susceptible to pregnancy, i.e. women who have started to menstruate after they have given birth but who are not using a modern contraceptive method, and promote modern contraception among them.
- The Government should embark upon a balanced programme of family planning that simultaneously promotes the practice of breast-feeding and the use of modern contraception.
- Programmes advertising the various benefits of breast-feeding, particularly those related to improved infant health and lowered susceptibility to pregnancy, should be undertaken. Likewise information, education and communication (IEC) programmes using the mass media such as radio and television should be used to increase awareness of such beneficial effects. A ban should be imposed on advertising infant formula and related breast-milk substitutes through the mass media.
- The marketing of breast-milk substitutes should be controlled in order to encourage and promote the practice of breast-feeding, and a code of conduct for substantially restricting the marketing of breast-milk substitutes should be formulated through government and private-sector consultations.

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The new policy has succeeded in increasing the annual number of births, but fertility remains below the replacement level

More than eight years have passed since Mr. Goh Chok Tong, then First Deputy Prime Minister, announced in March 1987 the slogan "have three, or more (children) if you can afford it" as Singapore's new population policy. The policy, which may be described as "selectively pro-natalist", represented a fundamental change in direction from the blanket "stop at two" policy which had been in effect for about two decades until the mid-1980s. This article reviews the first five years of achievement of the "three or more" policy. Although the evaluation of the effectiveness of the policy ideally should await the availability of more data, some useful indications of its likely success may be obtained by examining the information available so far.

Goals and strategies

The overall goal of the new population policy may be characterized as "population rejuvenation" in the broadest sense of the term. The policy is intended to address three anticipated trends concerning the future quantity and quality of the population arising from current marriage and reproductive patterns, namely:

- Diminution of the population owing to the failure of parental generations to adequately replace themselves with equally large numbers of children ("below-replacement" fertility);
- Rapid increase in the proportion of the elderly, and decline in the proportions of the young and the working-age adults, as fewer children are born to replace the parental generation (the ageing of the population); and
- Decline in the proportion of talented persons as the less educated marry and reproduce themselves at higher rates of fertility than the better educated (the "lopsided" pattern of procreation).

The last point mentioned has been the most controversial because of its eugenic implications. For example, the graduate mother scheme,¹ a policy measure that resulted directly from this concern, was withdrawn after much controversy.

The most recent projections published by the Ministry of Health in the National Report for the International Conference on Population and Development (ICPD) held at Cairo in September 1994, show that Singapore's resident population will increase to 3.5 million by the year 2030, by which time, 24.6 per cent of the population will be in the 60 and older age groups. In that year also, there will be 43 elderly persons for every 100 persons of working age (15-59 years), up from only 14 elderly persons in 1990. The National Report provides little other information on future population trends except that population decline would have set in, after peaking in the year 2025. The Government has been concerned that, if left unchecked, both the ageing of the population and the "lopsided" pattern of procreation could affect the future quality of the population and its ability to adapt to changing economic circumstances.

The new population policy attempts to redress these potentially disruptive trends by encouraging single persons to get married and by promoting a larger family size of three or more children among the married couples who can afford them. The latter effort is to compensate for those who do not marry and those who do not have any children, in order to attain the two-child average necessary for generational replacement. It is expected that, by raising fertility to the replacement level, i.e. about 2.1 children per woman, and then maintaining this level of fertility indefinitely, the population will be maintained at a constant size with a balanced age structure, i.e. with neither too many of the elderly nor too many very young to be supported.

A series of policy measures or incentives have been introduced to support the "three or more" policy. These policy measures may be classified as follows: (a) incentives to ease the financial burden of child-rearing (tax rebates for third and fourth children, and income tax relief for up to four children), (b) incentives to ease the conflict between women's work and child-rearing roles (child-care subsidy, rebates on maid levies; child-care leave, no-pay leave and part-time work in the public sector) and (c) modification of the earlier, two-child incentives in line with the new policy (priority in allocation of housing and primary school registration for families with three instead of two children). However, the sterilization cash grant scheme, an incentive for low-income lowly-educated women to permanently limit their family sizes to two or fewer children, was retained. Appendix I lists measures introduced at the time of the announcement of the new population policy in 1987. In 1990, an incentive for earlier child-bearing, i.e. a tax rebate of S\$20,000 (US\$1 = currently S\$1.40) for mothers giving birth to their second child before age 28, was also introduced. The purpose was to counter the trend towards later ages at child-bearing which, in the long run, would slow the rate of population growth. The sterilization cash grant scheme was enhanced in 1993 by requiring only that the women agree to accept reversible contraceptive methods (instead of sterilization), and by the addition

of educational bursaries for their children. To date, there have not been any direct incentives for marriage. In 1995, however, the Government introduced measures to enable young couples to rent or purchase their own public housing flats and start their families earlier. These measures include lower rental and shorter waiting time for first-time applicants (who are mostly young couples) to rent a flat while waiting for their purchase units to be ready, and a housing grant worth S\$40,000 to be put into the provident fund account of such couples to help them purchase a flat on the re-sale market (the sum is increased to S\$50,000 if they chose a flat close to their parents' home, the higher incentive being in line with another government objective, namely, promoting inter-generational togetherness).

At the press conference organized to announce the new population policy in 1987, the then First Deputy Prime Minister disagreed with the suggestion that the policy was targetted at specific educational or ethnic groups. While he urged couples to consider carefully their ability to afford the larger families, he also said that the Government "had no objection" to those with less than secondary education having more children if they could afford them. Similarly, the better-educated Malays who were also under-reproducing should be encouraged, although the Chinese were the main cause of Singapore's population problem (the Chinese comprise more than 75 per cent of the country's population). Be that as the case may be, there is nevertheless a strong positive correlation between education and income in Singapore and it is the better-educated who are also the "under-achievers" in the reproductive sense. On the other hand, it could be argued that incentives such as the tax rebates would appear relatively more attractive to the lower income (lower educated) than higher income (better educated) groups, and the extension of the eligibility period, from five to seven and then to nine years, will likely increase the pool that can benefit from them.²

This article is confined to an evaluation of the success of the "three or more" policy. To do this, trends in live-births before and after the introduction of the policy are compared. The study design adopted in this article is a time-series design based on repeated observations before and after an intervention programme. In the absence of other confounding factors, a sudden change in the level or the direction of the trend line following the introduction of the new policy may reasonably be attributed to the policy. In line with the goals and strategies outlined above, three measures of effectiveness are used in this report: namely, increases in the number of annual births, increases in third and higher order births, and increases in higher order births to the better-educated mothers. Maternal qualification is used here as a proxy for economic status. As the policy was introduced in March 1987, its effect on live births would only have been felt from 1988 onwards given the normal time-lag before conception and between conception and birth. The data on births and maternal characteristics used in this report are drawn from the Yearbook of Statistics and various issues of the Report on the Registration of Births and Deaths. While the appropriate data base would have been births to Singapore citizens and permanent residents, as the measures are aimed at this group, such information is not publicly available. However, the share of non-resident births is unlikely to be so large as to significantly distort the overall live-birth trends.

Results

Annual births

Table 1 shows the number of babies born annually over the period 1980-1992. Prior to 1987, the number of births in Singapore had stabilized at about 40,000-42,000 annually. The exception was in 1986, when it dipped below 40,000, a phenomenon commonly believed to be attributable to the effects of the economic recession and the inauspicious "Year of the Tiger" in the Chinese zodiac. The number of births increased to 43,616 in 1987. This was followed by a sudden jump to 52,957 in 1988, an unusually high figure commonly attributed to the coincidence of the auspicious Chinese "Year of the Dragon" and "88", which in the Cantonese dialect is homonymic with "double prosperity". Annual births remained at the 47,000-51,000 level over the next four years. In 1992, total births numbered 49,400.

Birth order

This refers to the rank order of a birth in relation to all previous live births of the mother. Table 1 shows further that the number of third children born has also increased, from below 7,000 in 1987 to 9,624 in 1990, before declining to about 8,900 in 1991 and 1992. At the same time, the number of fourth births rose from about 1,600 in 1987 to over 2,000 annually over the next five years. As a proportion of total births, third births rose from 16 per cent in 1987 to about 18 per cent over the next five years, reversing the earlier declining trend. The proportion of fourth order births followed a similar declining, then rising, trend. The decline in the number and proportions of third births since 1990 is interesting and deserves further monitoring, become a major aim of the new policy is to raise family sizes to at least three children (or more than three if the couple can afford them). Is this decline a temporary phenomenon or is it the beginning of a long-term trend towards smaller family sizes? If the latter is the case, then more study may be needed to identify the reasons couples continue to prefer smaller family sizes in spite of the incentives offered to larger families.

Table 1: Live births by birth order, Singapore, 1980-1992

Birth order	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Number													

1st	17,968	18,599	19,105	18,255	18,071	18,638	17,336	17,586	20,522	19,465	20,235	19,623	20,3
2nd	13,999	14,431	14,593	14,078	15,171	15,498	13,406	16,441	19,495	16,631	18,232	17,578	17,3
3rd	6,236	6,305	6,228	5,757	5,877	5,900	5,443	6,966	9,806	8,845	9,624	8,938	8,84
4th	1,885	1,876	1,777	1,655	1,606	1,525	1,337	1,590	2,036	2,017	2,258	2,299	2,22
5th+	1,012	960	897	772	712	679	587	633	688	708	699	676	654
Total *	41,217	42,250	42,654	40,585	41,556	42,484	38,379	43,616	52,957	47,669	51,142	49,114	49,4
Per cent													
1st	43.6	44.0	44.8	45.0	43.5	43.9	45.2	40.3	38.8	40.8	39.6	40.0	41.1
2nd	34.0	34.2	34.2	34.7	36.5	36.5	34.9	37.7	36.8	34.9	35.6	35.8	35.2
3rd	15.1	14.9	14.6	14.2	14.1	13.9	14.2	16.0	18.5	18.6	18.8	18.2	17.9
4th	4.6	4.4	4.2	4.1	3.9	3.6	3.5	3.6	3.8	4.2	4.4	4.7	4.5
5th+	2.5	2.3	2.1	1.9	1.7	1.6	1.5	1.5	1.3	1.5	1.4	1.4	1.3
Total *	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100

* Note: The sum of the cells may not equal the total owing to unknown birth orders.

The increase in the number of total births in the latter part of the 1980s and early 1990s was not, however, entirely due to increases in the larger family sizes. The number of first births has risen as well, to about 20,000 per year from 1988, compared with 18,000 in the years preceding the introduction of the new population policy. Second births have also increased to 16,000-18,000 from 14,000-15,000 previously. As a proportion of total births, first and second births declined post-1987 owing to the more rapid increases in third and fourth births (table 1). In 1992, the proportion of first births was 41.3 per cent, up from 39.7 per cent in 1990.

The increase in the number of first and second births since 1987 may be attributed to the rising marriage trends in the latter part of the 1980s. The number of marriages registered annually rose from 23,100 in 1987 to 25,800 in 1992. More pertinently, the number of spinster brides, i.e. women marrying for the first time, rose from about 21,800 in 1987 to nearly 23,800 in 1992, probably because of the pro-marriage and pro-family environment created by the Government's marriage promotion efforts following the "Great Marriage Debate" started in 1983 by then Prime Minister Lee Kuan Yew. These newlywed women were likely to be giving birth to their first children during the later part of the 1980s and the early 1990s.

Figure 1 presents trends in the age-specific fertility rates (ASFRs) for resident Singapore women in the reproductive ages over the period 1987-1992. The ASFR is a measure of the number of children born per thousand women in that age group. While the appropriate base for study would have been all women of reproductive ages in Singapore, this information is not available as the Department of Statistics publishes estimates of only the resident (i.e. citizen and permanent resident) population. An indication of the trends can, however, be obtained by examining these data, assuming that the foreign population does not differ significantly from the resident population. Figure 1 shows that fertility levels have increased for all age groups from ages 25-29 onwards. On the other hand, fertility rates among the below-25 age groups have declined as Singapore women continued to delay marriage and child-bearing. The total fertility rate (TFR) rose from 1.62 children in 1987 to 1.96 in 1988 and 1.86 in 1990, but remained just below 1.8 since 1991.

Figure 1: Age-specific fertility rates in Singapore

Mothers' Education

In terms of maternal qualification, the number of babies born to mothers with secondary and higher education increased while the number born to less well-educated mothers declined compared with 1987. In 1992, the number of babies born to mothers with a secondary education nearly doubled to 19,745 from 10,178 in 1987. The number born to graduate mothers also increased by nearly the same proportion, from 2,107 to 3,904. Babies born to mothers with an upper secondary level of education increased nearly 70 per cent over the same period, from 3,817 to 6,440. On the other hand, the number of babies born to mothers with no qualifications or only primary-level qualifications declined by 22 per cent and 34 per cent, respectively, from 13,959 to 10,919 and from 12,760 to 8,376. As a result of these changes, the proportion of mothers with secondary and higher education has risen from 37 per cent in 1987 to nearly 61 per cent in 1992 (figure 2).

Figure 2: Births to mothers in Singapore with secondary and higher educational qualifications

Since one of the specific aims of the new population policy is to promote larger family sizes among those who can afford them, it is important to look at maternal qualifications for the higher order births. As mentioned previously, education is being used here as a proxy measure of economic status. In this regard, it may be pointed out that, even as the proportions of third and higher order babies born to secondary and better-educated mothers have increased

over the years, the better-educated women continue to be under-represented in these categories relative to all the women giving birth each year. Thus, while 61 per cent of the women giving birth in 1992 had secondary and higher qualifications, the proportion among third order births was 52 per cent and among fourth and higher order births, it was 36 per cent, respectively. A disproportionate percentage of the higher order births continue to be born to women with lower qualifications and who may not be able to afford them.

Conclusions

At the press conference to announce the new population policy in 1987, the then First Deputy Prime Minister announced that if the "three or more" policy worked, Singaporeans would be replacing themselves by 1995. The Government was hoping that the quarter of a million women aged 25-34 would respond to the new policy and prevent the shrinking of the population and the prospect of having only two young people to support one elderly person in the year 2030. It was expected that, by returning fertility to the replacement level by 1995, the population would peak in 2030 and then stabilize. The Government also rejected reliance on immigration as a means to increase the size of the population.

At another forum to discuss the National Agenda, the then Trade and Industry Minister and Second Defense Minister, Brigadier-General Lee Hsien Loong (currently Deputy Prime Minister) addressed the ethnic differential in population growth trends and the Governments views on gender roles in Singapore. General Lee presented, in graphic form, a projection showing that the population would decline to half the mid-1980's level in the year 2100 if the TFR remained at the 1986 level of 1.44 children per woman, and that the decline would be most severe among Chinese women who averaged only 1.26 children that year. The Malay and Indian populations were expected to remain more or less constant. According to General Lee also, while the Government wanted more women in the work force, this must be balanced with their traditional role of having children and raising families, and attitudes towards marriage and child-bearing would have to be changed. He urged Singaporeans to "keep our institutions and traditional roles intact".

Based on the limited data examined in this article, the following conclusions may tentatively be drawn regarding the success of the "three or more" population policy. The new population policy succeeded in increasing the number of annual births. The relative proportions of third and fourth order births have also increased since 1987. Fertility in the age groups comprising women 25 years and older has increased and more of the better-educated women are also having three or more children. However, the increase in third order births seems to have stalled since 1990 and the better-educated women continue to be under-represented among the higher order births. Perhaps more significantly, the TFR appears to have stabilized at about 1.8 children per woman, and even under the especially favourable cultural circumstances that existed in 1988, the TFR remained below two children per woman.

The Government has taken further steps to help Singapore women combine their work and familial roles, as is evident in the recent increase in subsidy for children attending child-care centres. It has also widened the pool who stand to benefit from the tax rebates by extending to nine years the period over which the rebates can be claimed. Appendix II lists the most recent incentives to promote three or more children. The Government has also relaxed its immigration policy to attract talented and skilled workers from overseas.

The above conclusions on the success of the "three or more" policy are only tentative given the limited time-frame. More definitive conclusions will have to await the availability of more data in the future.

Footnotes

1. This scheme gave priority in the registration for primary one classes to children of graduate mothers.
2. Income tax rates were lowered in 1994 following the introduction of the Goods and Services Tax.
3. Portion of compulsory old-age savings set aside for medical purposes.
4. Agencies set up by the Government to promote more social interaction among men and women with university and secondary qualifications, respectively.
5. The document on which this list is based covers only those policies to promote three or more children. Other related policies, though in effect, have not been included here.

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Appendix I: The push for more babies

- Tax incentives

No increase in child relief for first and second child but third child relief raised to S\$750 effective Fiscal Year 1988. Mother needs only three General Certificate of Education "O" level passes taken in one sitting, instead of five, to qualify for enhanced child relief. Fourth child also qualifies for enhanced child relief, which is S\$750 plus 15 per cent of mothers earned income up to a maximum of S\$10,000. Special tax rebate of S\$20,000 to be offset against either or both the husbands and wives income tax liabilities for newborn third child. Another rebate -- only for the working wife -- equal to 15 per cent of her earned income. Any excess of both rebates can be carried forward for up to four years.

- School registration

All disincentives against the third child will be removed. Children from three-child families will have the same priority as those from one and two-child families. Where there is competition for admission, priority will be given to children from three-child families.

- Child-care centres

The Government will pay a S\$100 subsidy on all children, regardless of parents income, in government-run or government-approved centres, including those privately operated.

- Medisave

Medisave³ can be used, with immediate effect, for the hospital costs of a third child, whether delivered in a government or private hospital. But no overdraft of Medisave account is allowed.

- Accouchement fees

No change in the fee for the first, second and third child. Fee for fourth child raised, from 1 January 1988, to S\$1,000 for all ward classes, and to S\$1,300 for fifth and other children. But delivery and hospital costs for fourth child, with a S\$3,000 maximum, can be offset against parents earned income.

- Housing allocation

Families in three-room or larger (public) flats who want to upgrade their flats on the birth of their third child will get priority allocation.

o Employers attitudes to working mothers

Employers to be asked to be more understanding and flexible towards working mothers with young children. They should offer part-time and flexi-time work, extended no-pay maternity leave, and retrain women who rejoin the workforce. The civil service will lead the way.

- Abortion and sterilization counseling

There will be compulsory counseling before and after abortions to discourage abortions of convenience, and women with fewer than three children will be counselled before sterilization.

- Getting singles to mingle

The infrastructure of the Social Development Unit and the Social Development Section⁴ will be strengthened, and their activities and programmes widened.

Source: Business Times, 2 and 5 March 1987.

Appendix II: Social policies related to family formation (1995)⁵

- Income tax relief

Normal child relief

S\$1,500 each for first three children and fourth child born after 1 January 1988.

Enhanced child relief

A working mother with at least three "O" level passes at one sitting or equivalent qualifications eligible for enhanced child relief of S\$1,500 and 5-15 per cent of her earned income if the children are above age 12, and 5-25 per cent if the children are below age 12. The maximum relief for each child in each age category is S\$10,000 and S\$15,000, respectively.

Special nine-year tax rebate

Parents who have a second, third or fourth child qualify for special tax rebates which can be used to offset against either or both the parents income tax liabilities within nine years from the child's year of birth (the maximum period within which the rebates can be claimed is 27 years). Second child rebate varies from S\$20,000 if the mother's age at delivery is below 28 to S\$5,000 if the mother is below 31. For a third child born on or after 1 August 1987 or a fourth child born on or after 1 January 1988, a rebate of S\$20,000 and 15 per cent of mother's earned income in the year of the birth in lieu of maternity leave (can be offset only against mother's income tax liabilities).

- Child-care subsidy

With effect from 1 April 1995, a monthly subsidy of S\$150 per child is granted to the first four children attending approved child-care centres for full-day care and S\$75 per child for half-day care.

- Public housing scheme

Priority in housing allocation given to families having three or more children with the third child born on or after 1 January 1987 if they are existing public flat owners who want to upgrade to bigger flats, or tenants of rental public flats, or occupiers of purchased or rental public flats who want to purchase public flats, or residents of non-public premises/properties who want to purchase public flats.

- Medical fees

Medisave can be used for the hospital and delivery charges incurred for the first, second and third children. The delivery and hospital expenses for the fourth child, subject to a maximum of S\$3,000 are tax deductible against the parents' earned income.

Source: Pamphlet produced by the Family Life Education Co-ordinating Unit, Training and Health Education Department, Ministry of Health, 1995.

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Recent Fertility Declines in China and India: A Comparative View (Demographers' Notebook)

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China and India are the two most populous countries in the world and together they account for almost 38 per cent of the global population. China's population has already crossed the 1.2 billion mark and India's is expected to exceed 1 billion around the turn of the century. However, in recent years, the annual growth rate of the Chinese population has slowed down, to about 1.1 per cent, whereas in India it continues to be almost 2 per cent. The available evidence shows that China has experienced a large and remarkably rapid fertility transition in recent years, whereas although fertility in India has also fallen, the decline has been much smaller. Why has India not been as successful as China in achieving a fertility decline?

The crucial role played by socio-economic development in fertility decline is by now widely recognized in the demographic literature. However, when such development takes place at a slow pace, direct intervention in the form of family planning efforts can be, and often is, attempted. Thus, both socio-economic development and family planning programme efforts are expected to contribute to fertility decline. A number of studies have tried to assess the relative roles of development and programme in bringing about a fertility change. Based on an analysis of 94 countries, Mauldin and Berelson (1978) observed that, although programme efforts are important, programmes in countries with a better social setting are more successful. Srikantan (1977) also highlighted the importance of the socio-economic context for the success of family planning programmes. A recent analysis by Bongaarts and others (1990:303) confirms some of the earlier findings; it has been observed that declines in fertility are associated with both development and strength of programme effort, and that socio-economic development and family planning programmes "operate synergistically, with one reinforcing the other".

In the context of China and India, both of these factors plausibly can play a role. While it is true that both countries are characterized by low income and are predominantly agrarian and thus belong to the less developed world, notable changes have occurred recently. India became independent in 1947 and China completed a socialist revolution not much later. Soon thereafter both countries undertook massive programmes for social and economic development. Moreover, both China and India introduced government-sponsored family planning programmes on a large scale, the Indian efforts beginning earlier than those of the Chinese.

China's success in bringing about a large and rapid fertility decline has generated considerable interest in the causes of that decline (Tien, 1984; Bongaarts and Greenhalgh, 1985; Wolf, 1988; Poston and Gu, 1987; Whyte and Gu, 1987; Lavelly and Freedman, 1990). However, a consensus on the relative importance of socio-economic development and the family planning programme has yet to emerge. While some analysts argue that China's family planning campaign of the 1970s played a decisive role in bringing about the fertility transition, especially in rural areas, others argue that socio-economic changes also played an important role in this (see, in particular, Tien, 1984). The causes of the fertility decline in India have attracted relatively less attention, principally because the quantum of decline is quite moderate. Some analyses of fertility changes in regions of India that have experienced higher than average fertility declines differed on the relative contributions of the family planning programme and socio-economic development (Caldwell and others, 1982; Zachariah, 1984; Rao and others, 1986; Bhat and Irudayarajan, 1990).

In this paper, it is proposed to provide a comparative view of fertility decline in these two countries. This comparison is made against the background of socio-economic changes and programme effort. The evidence on fertility decline is examined first, followed by a brief description of socio-economic changes and population policies and programmes. The fertility decline is then discussed in the context of these two sets of factors.

Evidence of fertility decline

The fertility level in China in the immediate post-revolution period was remarkably close to the level in India around the time of independence. A computer reconstruction by Banister (1987:357) estimated the crude birth rate (CBR) in China to be in the range 41-44 per thousand population during the period 1949-1951 and the total fertility rate (TFR) in the range 5.7-6.1 children per woman. For India, recent estimates show that the CBR was near 45 per thousand and the TFR near 6 during the period 1941-1951 (Bhat,

1989:96, 100).

For China, estimates based on the 1982 census data, the 1982 One-Per-Thousand Fertility Sample Survey, and the 1987 One-per-cent Population Changes Sample Survey are available (Coale, 1984; Banister, 1987; Feeney and others, 1989). The estimates by Coale and Banister are for a longer period and the two series are nearly identical. The estimates by Feeney and his colleagues are for a more recent period. Trends from these are given in table 1. It can be seen that the CBR in China was moderately high at around 40 per thousand in the early 1950s, dipping drastically to the low value of 22 per thousand in 1961 towards the end of the post-Great Leap Forward crisis, but soon recovering and after some fluctuations reaching a level of around 36 per thousand towards the end of the 1960s. A secular decline began in the 1970s and the CBR declined sharply to 21 per thousand by the end of that decade. The trends in TFR give an almost identical picture. TFR was around 6 during the early 1950s; it fluctuated widely in the 1960s before reaching a level just below 6 (5.81-5.82) in 1970. But throughout the 1970s it declined by over 50 per cent, to 2.75 in 1979. Fertility was extremely low in 1980 but soon recovered to the 1978/79 level. Some fluctuations occurred during the 1980s, with a small decline taking place in 1983/84 and a recovery by 1987, but with no clear trend emerging. Recent estimates indicate that the CBR in 1990 was almost identical to that in 1981 (Zeng and others, 1991). Thus, the major fertility transition in China appears to have been completed by 1981 and over the period 1970 to 1981 the decline was on the order of 15 points in CBR and over 3 points in TFR.

Table 1: Fertility trends in China, 1950-1987

	Source Crude birth rate			Total fertility rate		
	1	2	3	1	2	3
Year						
1950	42.0	40.5		5.81	5.81	
1951	41.0	39.8		5.70	5.70	
1952	46.0	45.1		6.47	6.57	
1953	42.2	42.2		6.05	6.05	
1954	43.4	43.5		6.28	6.28	
1955	43.0	42.7		6.26	6.26	
1956	39.9	39.4		5.86	5.85	
1957	43.3	42.5		6.40	6.49	
1958	37.8	36.9		5.68	5.68	
1959	28.5	27.7		4.31	4.30	
1960	26.8	26.0		4.0	4.02	
1961	22.4	21.9		3.29	3.29	
1962	41.0	40.1		6.03	6.02	
1963	49.8	48.9		7.51	7.50	
1964	40.3	39.9		6.18	6.18	
1965	39.0	38.9		6.07	6.08	
1966	39.8	39.6		6.26	6.26	
1967	33.9	33.4		5.32	5.31	
1968	41.0	40.4		6.45	6.45	
1969	36.2	35.8		5.73	5.72	
1970	37.0	36.5		5.82	5.81	
1971	34.9	34.6		5.45	5.44	
1972	32.5	31.8		4.99	4.98	
1973	29.9	29.5	29.7	4.54	4.54	4.73
1974	28.1	28.0	27.3	4.17	4.17	4.27
1975	24.8	24.8	24.7	3.58	3.57	3.80
1976	23.1	23.2	22.9	3.23	3.24	3.28
1977	21.0	21.1	21.4	2.85	2.84	3.05
1978	20.7	20.8	21.0	2.72	2.72	2.69
1979	21.4	21.6	21.0	2.75	2.75	2.78
1980	17.6	18.1	19.7	2.24	2.24	2.54

1981	21.0	21.2	21.3	2.69	2.63	2.43
1982	21.1	21.3	21.6	2.71	2.66	2.88
1983	19.0	-	19.6	2.35	-	2.54
1984	18.1	-	18.9	2.16	-	2.36
1985	-	-	19.5	-	-	2.27
1986	-	-	21.0	-	-	2.33
1987	-	-	21.2	-	-	2.45

Sources: 1. Banister (1987:352);

2. Coale (1984, unadjusted series:47);

3. Feeney and others, (1989:301, 304).

In India, the coverage of the vital registration system is not yet good enough to provide reliable estimates of fertility measures. However, indirect estimates obtained from the census data or from special surveys are available (Preston and Bhat, 1984; Rele, 1987; Srikantan and Balasubramanian, 1989; Bhat, 1993). There is close correspondence among these (table 2). According to estimates by Preston and Bhat (1984), CBR fell from 40.2 per thousand in the period 1966-1971 to 34.0 per thousand in the period 1976-1981 and the TFR declined from 5.67 to 4.69 over the same period; most of the decline probably occurred in the late 1970s. Rele's estimates show that the CBR was around 45 per thousand until the mid-1960s, but declined to 34.4 per thousand by the period 1976-1981, and the TFR, which was close to 6 up to the middle of the 1960s, also fell to 4.65 by the period 1976-1981 (Rele, 1987). Srikantan and Balasubramanian (1989) estimated the CBR to be 43.4 per thousand in 1961, declining to 34.9 per thousand by 1981; the implied decline in the TFR over the same period was from 5.82 to 4.78. Thus, regardless of the set of estimates used, the fertility decline from the 1950s to about 1981 was 6-11 points in CBR and about 1 point in TFR.

The detailed age distributions as well as the data on current and cumulative fertility obtained in India's 1991 census are not yet available as of this writing (1995). However, Bhat (1993) provided reverse survival estimates of the crude birth rate from the 1991 census data. These indicate that the CBR in India was 32.0 per thousand during the period 1984-1990, indicating a further decline in the 1980s. In recent years, the Sample Registration System (SRS) in India has been providing annual estimates of vital rates. Although in the early phase of the implementation of this system there were some interruptions, the more recent data appear to be of good quality. It is still possible that the SRS estimates slightly underestimate the vital rates and hence should not be used in conjunction with the census-based indirect estimates for the earlier dates to ascertain trends. However, for the recent period, the SRS series by itself can be used to examine the trends; hence, SRS estimates are also given in table 2 for the period 1981-1991. These show that declines of about 4 points in the CBR and 1 point in TFR appear to have taken place during the 1980s. Added to the decline up to 1981 inferred from the census-based estimates, the CBR in India appears to have declined by 10-15 points and the TFR by nearly 2 points between the 1950s and 1991.

Thus, although both China and India have experienced fertility declines in the recent period, the Chinese decline has been much greater, i.e. over 3 points in TFR as compared with only about 2 points in India. Until 1971, there was very little gap in the TFRs of the two countries, but by 1981, a gap of over 2 points had opened up (Coale's estimate for China was 2.63, and Srikantan-Balasubramanian's for India, 4.78). The gap narrowed somewhat through the 1980s; however, the Indian fertility rate remains well above that of the Chinese.

Table 2: Fertility trends in India, 1951-1991

Source	Crude birth rate				Total fertility rate			
	1	2	3	4	1	2	3	4
Period/year								
1951-1956	-	45.9	-		5.95	-	-	
1956-1961	-	45.2	-		6.03	-	-	
1961	-	-	43.4		-	-	5.82	
1961-1966	-	44.0	-		6.05	-	-	
1966-1971	40.2	41.9	-		5.67	5.78	-	
1971	-	-	40.1		-	-	5.74	
1971-1976	37.9	39.3	39.8		5.37	5.37	-	

1976-1981	34.0	34.4	35.0		4.69	4.65	-	
1981	-	-	34.9	33.9	-	-	4.78	4.5
1986	-	-	-	32.6	-	-	-	4.2
1991	-	-	-	29.5	-	-	-	3.6

Source: 1. Preston and Bhat (1984:498);

2. Rele (1987, series A:516, 518);

3. Srikantan and Balasubramanian (1989:76-77);

4. India, Registrar General, various years: unadjusted series from the Sample Registration System.

Note: Dashes (-) indicates that no estimate for that year/period is available from the respective source. In the case of the Sample Registration Series, estimates prior to 1981 are not given; and from 1981 onwards, though annual estimates are available, estimates are given only at intervals of five years in order to save space.

Decomposition of fertility declines and differences

A decomposition of the fertility decline into the contribution of changes in proportions married and marital fertility provides a better picture of the nature of the decline. Rani (1990) obtained such a decomposition for the fertility changes in China by taking three time points: 1950, to represent the early post-revolution period; 1970, the point just before the major birth control campaign began; and 1981, a point after the major decline in fertility occurred. The TFR in 1970 was the same as that in 1950 (though there were wide fluctuations in the interim period), but the pattern of fertility had changed. The mean age at marriage for females rose by 1.5 years over this period, from 18.7 to 20.2 years (Banister, 1987), contributing to a decline in the TFR by a little over half a point. But this was balanced by an equal positive effect of a rise in marital fertility. Female age at marriage continued to rise even during the period 1970-1981, the mean increasing to 22.8 years in 1981, and thus contributing to a 0.74 point decline in the TFR. But the total decline in the TFR over this period was very large, i.e. 3.18 points; of this figure, 2.44 points or about three-fourths (76.7 per cent) of this was attributable to a drastic fall in marital fertility which occurred in all age groups except among those 15-19 years of age.

Cheng (1993) also analyzed the contributions of changes in marital status and marital fertility to the fertility decline in China over essentially the same period using Coale's If, Ig and Im indices. It was found that If declined from 0.5169 in 1953 to 0.2259 in 1981, i.e. by 56.3 per cent; Ig declined from 0.5924 to 0.3340, or by 43.6 per cent; and Im declined from 0.8726 to 0.6754, or by only 22.5 per cent. Thus, Cheng's results corroborate the earlier observation that changes in marital fertility have played a major role in the Chinese fertility decline.

For India, Retherford and Rele (1989) estimated that, of the 1.06 point decline in TFR between the periods 1960-1964 and 1980-1984, 0.76 (about three-fourths) was due to a decline in marital fertility. Mean age at marriage for females rose in India, but less impressively than in China; this factor contributed to a decline in TFR of only 0.30 points.

Thus, in absolute terms, changes in both nuptiality and marital fertility have made greater contributions to fertility decline in China than in India. But in the recent decline the relative share of marital fertility has been about the same in both countries.

The difference in the recent fertility of both India and China can also be decomposed in a similar manner (table 3). The year 1981 has been chosen for this purpose. The choice was dictated by the following reasons: by 1981 the fertility transition in China may be considered as having been completed, estimates of marital fertility and proportions married in India were also available for this year, and the 1991 Indian census data on marital status and fertility are not yet available. The age-specific rates given by Banister (1987:230) yield a TFR of 2.635 for China, and the rates given by Srikantan and Balasubramanian (1989) imply a TFR of 4.776 for India in 1981. The difference of 2.141 points is about evenly divided into contributions of proportion married (1.153 points) and marital fertility (0.987 points). Since Chinese women on average marry at a much later age than Indian women (in 1981, the mean for Indian women was 18.4 years, as compared with 22.8 years for Chinese women), fertility in the 15-19 and 20-24 age groups is very low in China, even though Chinese marital fertility at these ages is higher. For women older than 30, marital fertility itself is very low in China. The substantial China-India differences in marital fertility in late

but not early child-bearing ages indicate that the propensity to limit families is much greater in China than in India.

Changes in socio-economic and health conditions

As mentioned previously, both China and India are low-income, less developed countries. But over the years there has been an improvement in certain aspects of their socio-economic conditions. In India, the overall literacy rate for the population aged five years and older increased from 18.3 per cent in 1951 to 41.4 per cent in 1981 and for females from 8.9 per cent in 1951 to 28.5 per cent in 1981 (India, Registrar General, 1993). The estimates for 1991 for the population aged seven years and older are 52.1 per cent for both sexes combined, and 39.4 per cent for females. In spite of this increase, the level of literacy in India falls well short of the Chinese level, i.e. 68.1 per cent in 1982 for the population above age 12 (80.8 per cent for males and 54.7 per cent for females) (Banister, 1987). School enrolment at the primary level is also higher in China. In terms of per capita income, China was better off than India until the mid-1980s, although the gap subsequently narrowed (World Bank, 1989). In certain aspects of socio-economic development that are not easily quantifiable, China is reported to be more advanced. For example, the status of Chinese women has improved considerably in the post-revolution period (Banister, 1987).

Table 3: Decomposition of difference between total fertility rates of China and India, 1981

Age group years	India (1981)				China (1981)				Differ- ence in ASFR India- China	Contribution of differences in	
	ASMFR	PM	ASFR	PM	ASMFR	PM	ASFR	ASMFR		PM	
15-19	219.9	0.4347	95.6	331.8	0.0452	15	80.6	-26.9	107.5		
20-24	309.2	0.8444	261.1	384.1	0.4738	182	79.1	-49.4	128.5		
25-29	260.3	0.9433	245.5	228.1	0.9338	213	32.5	30.2	2.3		
30-34	167.1	0.9481	177.4	72.6	0.9786	71	106.4	110.3	-4.0		
35-39	116.3	0.9317	108.4	32.2	(0.9622)	31	77.4	79.6	-2.3		
40-44	52.9	0.8781	46.5	14.3	(0.9086)	13	33.5	34.5	-1.0		
45-49	24.9	0.8293	20.6	2.3	(0.8599)	2	18.6	19.1	-0.4		
TFR		4.776					2.635	2.141	0.987	1.153	
Percentage of total difference							100.0	46.1	53.9		

Notes: 1. ASMFR = age-specific marital fertility rate; PM = proportion currently married; ASFR = age-specific fertility rate; TFR = total fertility rate.

2. For the methodology of decomposition, see Retherford and Rele (1989).

3. For India, the ASMFR and the PM are from Srikantan and Balasubramanian (1989:77).

4. For China, the ASFR are from Banister (1987:230), and the proportions married are computed from Coale (1984:82-84). The proportions from Coale are of "ever married women"; these are accepted as proportions "currently married" for age groups up to 30-34; for the higher age groups, the proportions are assumed to be higher than the corresponding proportions in India by 0.0305 (the difference in the 30-34 age group), and shown in parentheses. The ASMFRs are computed from ASFR and PM values.

5. A small difference in the sum of the contributions of the two components and the total appears in some cases to be slightly imprecise due to rounding.

Until the past decade, the availability of food was relatively low in both China and India; it is well known that China was severely affected by a famine during the period 1958-1961. However, in more recent times there has been an improvement in the availability of food in China and per capita calorie consumption is moderately higher in China than in India (Smil, 1986). In both countries, health services, mainly through government sources in China and through both government and private sources in India, have improved over the years. But due to certain successful schemes such as the "barefoot doctors" scheme, health services are currently within easier reach of the Chinese population than the Indian population. This is reflected in the impressive rise in the expectation of life in China, from 40.3 years in 1953 to 64.8 years in 1981 (Banister, 1987). According to United Nations figures, life expectancy at birth in China is currently about 68 years (United Nations, 1994). Life expectancy increased in India as well but to a much lesser degree, i.e.

from 41.3 years during the period 1951-1961 to 52.5 years during the period 1976-1980 and 57.7 years during the period 1986-1990 (India, Department of Family Welfare, 1992; India, Registrar General, 1994b). United Nations estimates indicate that life expectancy in India currently is 60 years (United Nations, 1994).

There are major differences in the political and administrative structures of the two countries. Following the socialist revolution in 1949, China established a government that follows a Marxist ideology with the Communist Party playing a dominant role. It was only in the early 1980s that both the commune system, introduced for collective agricultural production, and the system of government control of almost all industrial production were liberalized. The party cadres play an important role in administration at the grassroots level and can be effective in popularizing and implementing government policies.

After India achieved independence, it adopted a multi-party democratic system in which the majority party formed the Government, which is answerable to a parliament comprising members of various parties. Further, in the Indian federal structure it is possible, and has often been the case, that the governments in some of the States (provinces) and municipalities are formed by parties other than the one that forms the central (national) Government. Thus, although one party has been in power at the central level during most of the post-independence period, it has not enjoyed the kind of dominance its counterpart in China has. Moreover, the party organizations in India have not been as strong and hence the party cadres have little involvement in the actual implementation of government programmes. Most of this task is entrusted to various departments of the Government staffed by professionals and administrators.

Thus, in terms of social aspects as well as health conditions, China appears to have done much better than India in recent years (see table 4). In terms of the economy the Chinese superiority is not as conspicuous, although with the socialistic pattern of society the inequalities in China are much lower and consequently the extent of poverty smaller than in India. The more crucial difference is perhaps in the administrative-political structures: the role of the Chinese party system in social reforms and in the implementation of government programmes has not been matched by any political organization in India.

Table 4: Socio-economic and health indicators: China, India and the Indian State of Kerala, around 1981

Indicator	China	India	Kerala
Education			
Percentage literate (ages 10+ or 12+)			
1. Females	54.7	29.0	74.6
2. Males	80.8	57.0	87.6
3. Female school enrolment ratio	106	64	
Economic			
4. Per capita GDP (US\$)	300	210	186
5. Percentage of GDP from non-agricultural activities	65	63	61
6. Percentage of economically active population outside agriculture	31	33	59
7. Percentage of population residing in urban localities	20.6	23.3	18.7
Health and mortality			
Life expectancy			
1. Female	65.0	53.4	69.5
2. Male	64.5	53.1	64.4
10. Infant mortality rate	44	110	37
11. Population per physician	1,920	3,640	n.a.

Source: Banister (1987): for China, indicators 1, 2, 7-10.

India, Department of Family Welfare (1992): for India, indicators 1-4, 7, 10; for Kerala, indicators 1, 2, 4, 7, 10.

World Bank (1983): for China, indicators 3-6, 11; for India, indicators 5, 11.

India, Registrar General (1983): for India and Kerala, indicator 6.

Bhat and Irudayarajan (1990): for India and Kerala, indicators 8, 9; the life expectancies for the periods 1976-1980 and 1981-1985 are averaged to obtain the estimates for 1981.

Oxford University Press (1987): for Kerala, indicator 5.

Note: GDP = Gross domestic product, converted into United States dollars at the then prevailing exchange rates.

Family planning programmes in India and China

India launched a nationwide family planning programme in 1952 with full government support. This was in response to the concern about rapid population growth that was expressed in its developmental policy. Initially, the programme was clinic based, providing information about contraceptives and contraceptive services to couples who requested these. Later, in the mid-1960s, the extension approach was adopted and efforts were made to motivate couples to accept contraception, including sterilization, with the help of the mass media and personal communication by government health workers and others (an overview of the Indian programme can be found in Srikantan and Balasubramanian, 1983). Acceptor targets were set, incentives to acceptors and motivators provided, and innovative approaches such as mass sterilization camps attempted. The Indian programme reached a peak in 1976 at the time of the national emergency. The sterilization campaign was intensified, there were greater pressures on the government workers to achieve allotted quotas of sterilization acceptors, and a proposal to make sterilization compulsory for couples with a designated number of children was considered although not approved. Over 8 million sterilizations were performed in a single year. However, there was much public resentment about the pressure tactics applied and there were complaints of compulsion and poor services (for a discussion, see Gwatkin, 1979). These became major issues in the 1977 elections which the then ruling party lost. The successor Government assured the people that there would be no compulsion in family planning and the name of the programme was changed from "family planning" to "family welfare". The acceptance of birth control thus received a severe setback in 1977. The efforts in motivation and services, however, continued and after 1980 the acceptance of all types of contraceptives has generally increased. The contraceptive prevalence level was very low in 1967, i.e. 4.4 per cent, rising only slightly to 10.4 per cent by 1971. A substantial increase took place later, and the prevalence level reached 23.5 per cent in 1977. After remaining stagnant around 22 per cent up to 1981, it rose further to 44 per cent by 1991 (India, Department of Family Welfare, 1992).

In China, although birth control services were made available in the 1950s, there was hesitation about including population control within the national development policy. In the course of some ideological debates during the period of the Great Leap Forward (1958-1961) and again during the "Cultural Revolution" (1966-1976), because population growth was not considered an obstacle to development, proponents of fertility regulation were often ridiculed. Nevertheless, birth control services had become available in all the urban and most of the rural areas by the end of the Cultural Revolution (Banister, 1987). By 1970, a consensus emerged that the population growth rate needed to be curbed and the famous *wan xi shao* ("later" marriage, "longer" gap between births, and "fewer" children) campaign was introduced. Incentives were provided for the acceptance of birth control and disincentives for non-adoption. The birth control programme was treated as a part of overall economic programme and targets were set at the commune and lower levels. As a result, government workers and party cadres became involved in the motivation efforts. The close contact between them and the people enabled the programme to be implemented effectively. In 1979, the now well-known one-child-per-couple campaign was introduced. The acceptance of contraceptives increased rapidly during the 1970s, and by 1981, 64.4 per cent of couples of reproductive age were using some form of contraception (Jimin, 1989). During the 1980s, contraceptive prevalence rose further, i.e. to 77.3 per cent in 1987, though there were some fluctuations during this time.

Because of the strong disincentives involved, the Chinese programme has been criticized (Banister, 1987). However, some relaxation was allowed later, particularly in the one-child campaign. Besides, specific concessions to minority populations were given even during the programme in the 1970s, and this is reflected in variations in contraceptive practice and fertility across regions and ethnic groups (Poston, 1986; Kulkarni, 1989; Yusuf and Byrnes, 1994).

The foregoing discussion primarily addresses issues of programme approaches and strategy, but the quality of a programme can play a crucial role in its impact. Recent work by Jain (1989) and Bruce (1990) has drawn attention to this aspect of the programme and provided a framework for the assessment of quality. Kaufman and others (1992) have discussed the quality of the Chinese programme in four counties. They observed that, though a number of contraceptive methods are available, the choice is primarily that of the provider. Further, the poor quality of some methods (for example, the stainless steel IUD) has contributed to many contraceptive failures. It was also observed that the users have not been well informed about method risks and potential side-effects. Many of the providers, especially village family planning service workers themselves have poor knowledge of such side-effects. In India, the providers often aggressively advocated sterilization even though a "cafeteria approach" was advocated under the programme. Further, information about method risks was poor, little attention was paid to clinical screening of prospective

acceptors, and clearly the overall quality of service has not been good (see reviews by Banerji, 1989; Bhatia, 1989; Levine and others, 1992).

Overall, though the Indian programme started well before the Chinese programme did, it was quite weak during the early phase, and only moderate or moderately strong later, with a notable break after the emergency. By comparison, the Chinese programme though a late starter can be labelled as having been quite strong throughout the 1970s. Mauldin and Berelson (1978) classified the Indian programme as "weak" up to 1965, and "moderate" later; they classified the Chinese programme as "strong". In a more recent assessment, both the Chinese and the Indian programmes have been classified as "strong" (Mauldin and Ross, 1991). Even though the latest classification is accepted, it cannot be denied that since 1970 the Chinese programme has been considerably "stronger" than the Indian one.

Discussion

The description of socio-economic changes and the family planning programmes in China and India clearly shows that China has done better than India in both aspects. It remains to be seen whether China's superiority in socio-economic development, or in programme effort, is primarily responsible for the greater fertility decline in China, or alternatively, whether the Chinese superiority in both has substantially contributed to it. With regard to socio-economic factors, China scores over India in some of them, especially literacy and survival levels, and is not worse off in any of them (table 4). However, even as late as 1981, when the major fertility decline was completed, many of the key indicators of socio-economic development in China were below the thresholds normally associated with the onset of fertility decline and well below the levels in most of the low fertility countries. In 1970, when the decline began, the conditions could not have been better, and probably were somewhat worse (non-availability of data on many indicators for China for a time around 1970 has compelled us to present the levels around 1981 for China, and for the sake of comparison, for India as well). Thus, although socio-economic development in China has been greater than that in India, the Chinese setting can only be considered moderately favourable for a fertility decline but not adequate on its own to induce the decline. Even without major socio-economic changes, a decline is possible if some sections of the society, usually an elite, adopt the small family norm and birth control practices, with this innovative behaviour later being adopted by others. Organized family planning programmes can assist in the diffusion of such behaviour and help to bring about a fertility decline. Clearly, in the absence of adequate structural changes, the role of such programmes needs to be examined carefully in assessing a fertility decline.

The contemporaneity of the fertility decline and the initiation of the birth control campaign would tempt one to conclude that this campaign has primarily been responsible for China's fertility decline. The major socio-economic changes in China, mass education, provision of health services, improvement in the status of women, reduction in income inequalities etc., began soon after the formation of the People's Republic in 1949. However, these did not show an influence on fertility except through a rise in age at marriage. Also, it is not that fertility for all subgroups remained high. Recent evidence shows that even before 1970 the urban educated population experienced a fertility decline (Lavelly and Freedman, 1990). However, for most of the rural population the secular decline began only after the 1970s' birth-control campaign was introduced. Yet this would not provide enough evidence to conclude that the socio-economic changes did not play an important role in the fertility decline. Instead, it could be argued that such changes provided an environment conducive to the introduction of the family planning programme in China in 1970 and its successful implementation which the inadequate socio-economic changes in India could not provide for the Indian programme. Further, a portion of the India-China fertility difference is attributable to the higher age at marriage in China. Social factors, particularly higher female literacy, are known to be primarily responsible for the late marriage of females. A question that could be asked is: Would India have experienced a fertility decline similar to China's had there been comparable socio-economic changes in India?

As a step towards answering this question, the fertility decline in China may be compared with the trends in a region of India with a socio-economic setting that is closer to China's. The natural choice for such a comparison is the Indian State of Kerala, which enjoys high female literacy and low childhood mortality.

China-Kerala comparison

A comparative picture of some conditions in China and Kerala is given in table 4. Kerala is a little better off than China with respect to literacy and life expectancy, and China is a little better off in terms of income level, but overall the gaps are narrow and the Kerala-China correspondence is fairly close in social and health indicators in contrast to the India-China comparison. In addition to these indicators, Kerala is comparable to China with respect to many other relevant factors. Women in Kerala enjoy a high status; also, the level of political awareness in Kerala is high, even in rural areas, with strong trade unions for farm

workers. Further, successful implementation of land reform programmes has reduced inequities in land ownership, and various welfare schemes have been in operation for some time. In addition, Kerala has had long spells of Communist Party government, though within the framework of the Indian federal structure.

Fertility trends in Kerala are given in table 5; the corresponding values for China are given alongside those data to facilitate comparison. During the 1950s, the CBR in Kerala was 43.9 per thousand and the TFR, 5.6; thus, fertility in Kerala was only slightly lower than that of China at that time. But a decline began soon thereafter and has continued fairly steadily through the 1960s, 1970s and 1980s. By the period 1985-1987, the CBR had fallen to 22.1 per thousand and the TFR to 2.3, i.e. almost to the replacement level of 2.1. The fertility decline has continued further, and in 1991 the TFR was only 1.8, well below the replacement level. Thus, between the 1950s and the mid-1980s, both China and Kerala experienced a fertility transition from a "moderately high" to a "low" level of fertility, marked by a total decline of 3.3-3.4 points in TFR. But there is a conspicuous contrast in the trends. While the decline in Kerala has been fairly well paced and spread over the time-frame of about three decades, from the 1950s to the 1980s, most of the decline in China took place within the short span of a single decade, corresponding to the implementation of the country's intensive birth control campaign. Thus, the superiority of the Chinese programme over its Indian counterpart can be said to be reflected in the greater speed of the transition.

Table 5: Fertility trends in the Indian State of Kerala and China, 1950-1991

Year/period	Crude birth rate	Total fertility rate
	Kerala s	China Kerala China
1950		40.5 5.8
1951-1960	43.9	5.6
1961-1970	37.1	5.0
1970		36.5 5.8
1971-1975	29.3	29.7 3.7 4.5
1976-1980	26.3	21.0 3.1 2.8
1981-1985	24.6	20.2 2.6 2.5
1985-1987	22.5	20.6 2.3 2.4
1991	18.3	1.8

Sources: For China: up to 1980, Coale (1984:47); and from 1981 onwards, averages are computed from single-year reverse survival estimates given by Feeney and others (1989). For Kerala: up to 1980, census-based estimates given by Bhat and Irudayarajan (1990:1965); from 1981 onwards, by India, Registrar General, various years; SRS series; and for 1991, by India, Registrar General (1994a).

Note: In the case of China, there were large fluctuations in the CBR in the late 1950s and early and mid-1960s. Hence, instead of decadal averages, only the end-point figures at 1950 and 1970 are given for comparison; for details, see table 1. For Kerala, the estimates for the 1950s and 1960s are obtained from the censuses, which are available for 10-year periods rather than for single years.

Why should the Chinese programme have done a better job in speeding up the fertility decline? The strong package of incentives and disincentives is one of the factors. The acceptors of contraception in China get substantial salary rises and the non-acceptors face severe cuts and thus the incentives have long-term implications. The incentives in the Indian programme are one-time payments of small amounts; occasionally, other incentives are given, but these too have little monetary value. There are hardly any disincentives in India; employees in some sectors do lose maternity benefits at high parity births, but very few are seriously affected by these.

Yet it would be wrong to attribute the greater effectiveness of the Chinese programme purely to the incentive-disincentive schemes. The Chinese have been quite successful in implementing various other national programmes as well. For example, health conditions in China have improved remarkably since 1949, and at a faster pace than in India. It seems that China has been able to ensure greater involvement of people in development programmes. A number of researchers, administrators and social scientists in India have drawn attention to the crucial role played by the participation of people including village leaders in programmes such as health and family planning, and efforts have been made to form village committees and involve them in the programmes. But there has been little success along these lines and most programmes in India are perceived as being imposed by the Government rather than being developed as people's programmes. India's "village guides" scheme, which was modeled after China's "barefoot doctors" scheme and was heavily dependent on local participation, failed to take off and has been practically

abandoned.

One reason why the Chinese can ensure better local participation in government programmes is that party cadres from the villages and lower level administrative structures have a large say in their administration because of a closer identification of the Party with the Government. But in India, the civil servants who implement various programmes are not aligned with any political party (in fact, they are expected to be strictly apolitical) and the party workers do not have a role to play in day-to-day administration. Besides, most parties in India do not have a network of workers at the grassroots level and are not in a position to assist in the implementation of mass programmes. Finally, in the Indian political system, general elections are held at regular intervals and no party in the Government can afford to antagonize a large section of the people by implementing what could be perceived as a coercive programme and then expect to get re-elected. The 1977 elections clearly demonstrated this; since then, hardly any political party has advocated a strong family planning programme. Although it is true that there has been some resentment too over the one-child campaign especially in rural areas of China, and some changes have had to be made, the Government as such has never faced the risk being ousted over the issue.

Mauldin and Berelson (1976:111) identified ethnicity as one of the qualitative factors associated with fertility behaviour and remarked that Chinese and Chinese-related ethnic groups are associated with lower fertility through pragmatic responses to changing conditions. In a later re-examination of the Mauldin-Berelson analysis, Menard and Moen (1987) also noted that Chinese ethnicity in the presence of social change appears to have a fertility-depressing effect. But if this is so, why did Chinese fertility, especially in the rural areas, not show a decline before the introduction of the birth control campaign? Nevertheless, it may be argued that the Chinese people respond to government efforts more quickly than other national groups, and if this is so, at least part of the credit for the speedier fertility decline in China as compared with that in Kerala should go to aspects related to Chinese ethnicity.

The China, Kerala and India examples represent three combinations of socio-economic conditions and programme strength: moderately favourable socio-economic conditions and a strong programme in China, moderately favourable socio-economic conditions and a moderate programme in Kerala, and less favourable socio-economic conditions and a moderate programme in the rest of India. The results also differ: rapid, large decline; slower but large decline; and smaller decline, respectively. A consequence of the faster transition is that population growth before reaching the replacement level of fertility remains low.

Prospects for fertility transition in India

Finally, we briefly discuss the prospects for the completion of the fertility transition in India in the near future. Would a Chinese type programme yield similar results in India? This question would make sense only if it were possible for India to implement such a programme. There are two difficulties. Firstly, the production system in India is much different from that of China, where most workers are employees of a governmental or collective organization. In India, a majority of rural workers are either owner-cultivators or agricultural labourers engaged on a casual basis by landowners. Hence, incentive schemes that manipulate the wages of individuals can cover a large proportion of the population in China but that is not the case in India. Secondly, an attempt to enforce a stronger birth control programme in India, e.g. the one attempted in 1976, had to be abandoned because of public disapproval. In fact, that attempt caused a major setback in the implementation of the entire programme. In its aftermath, the political leadership was for some time wary of giving prominence to family planning as a component of national development activities. It is worth noting that public resentment and the subsequent setback were less prominent in Kerala and some other States with above-average socio-economic indicators of development. Perhaps the less developed regions of India, with high infant mortality and low literacy, were not ready for such a programme. In any case, at this point in time the implementation of the Chinese model of a family planning programme does not appear feasible or promising for India.

If then India cannot adopt a Chinese-type programme, can it hope to follow Kerala's route to fertility transition? This would require a large change in the social and health conditions in the rest of the country. Kerala appears to be decades ahead of most of the other regions of India in terms of these conditions. If other regions of the country are not likely to catch up with Kerala in the near future, what chances does India have of achieving even a slower fertility transition?

In a recent article, Caldwell (1991) remarked that the thresholds required for fertility transition may vary across regions. Would India then be able to manage a fertility transition at a level of development lower than China's? The available evidence does not lend support to an affirmative answer. In fact, if any, it is Chinese and not Indian ethnicity that has been considered to be more favourable to fertility decline.

Thus, the prospects of an early completion of the fertility transition in India do not appear to be good. A

favourable socio-economic setting is lacking. Also, there are institutional constraints in implementing Chinese-type programme measures. Further, even the ethnicity factor seems to go against India. However, paralleling Caldwell's arguments on the variation in the thresholds required for a fertility transition across regions, it could be argued that these may also vary over time. It is possible that with the passage of time portions of the total population may be able to achieve low fertility at lower levels of literacy, survival and other commonly used development indicators. Recent data indicate that some large Indian States with moderate -- albeit substantially lower than Kerala's -- levels of literacy and child survival have experienced large fertility declines in the past few years. The State of Tamil Nadu, which is in the southern region of the country as is Kerala, has practically reached replacement-level fertility; the CBR there in 1991 was estimated to be 20.8 per thousand and the TFR, slightly over the replacement level, at 2.2 (India, Registrar General, 1994a). Some other States have CBRs around 25 per thousand and TFRs around 3. If the trend continues, these States too would be able to achieve near replacement-level fertility by the end of this century. Yet they will have done so 5-15 years after Kerala. Thus, one could say that a level of development equivalent to Kerala's is not a necessary condition for completing the fertility transition, but the less developed societies would have to pay the price in terms of time. Moreover, States in the central region of India, characterized by very low levels of development, have yet to show evidence of substantial fertility declines. It is not clear whether they would be able to do so even at a later date without sufficient advances in socio-economic conditions and child survival. That the Kerala level of development is not a threshold for achieving the fertility transition does not necessarily imply that there is no threshold as such.

Summary

The comparison of the fertility transitions achieved in China and parts of India reveals that the decline in China has been much more impressive than that of India and the decline has been achieved in a very short time. It is true that the socio-economic conditions in China were more favourable to a fertility decline than those existing in India, but China's superiority was not overwhelming enough to attribute the difference in the declines to socio-economic factors. The Indian State of Kerala, which has a social setting comparable to that of China, has also experienced a large fertility decline but at a slower pace. Clearly, China's birth control campaign has played an important role in speeding up the fertility transition. A consequence is that China has succeeded in keeping the transition period quite short. India's political-administrative-economic system is not conducive to the application of China's programme strategies to achieve similar rapid results. Thus, India would have to follow its own route to achieving the fertility transition. This means that it would take a longer time to reach replacement-level fertility. At this stage, the chances of India's achieving low fertility in the near future appear to be poor. But there are large regional variations within India and a number of major States have either completed, or are on the verge of completing, the fertility transition.

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