Breast-feeding in Asia: An Overview

While the patterns of breast-feeding in Asia vary widely, there has not been a universal decline in breast-feeding in recent years

By Shyam Thapa and Nancy E. Williamson*

Breast-feeding has always been synonymous with human reproduction and the nourishment of infants. Yet it is only in the last 20-25 years that its effects on fertility and child survival have been systematically investigated. In light of the accumulated scientific evidence, the promotion of breast-feeding through family planning and maternal and child health programmes is

* The authors of this overview are Shyam Thapa, Senior Research Associate, and Nancy E. Williamson, Director, Program Evaluation Division, both of Family Health International, Research Triangle Park, North Carolina 27709-3950, United States. The authors would like to thank Kathy I. Kennedy and Cynthia Visness for their helpful comments on an earlier draft. The views expressed in this article are solely those of the authors and not necessarily of Family Health International or the U.S. Agency for International Development.

increasingly considered to be a public health policy priority, especially in developing societies. In some countries, explicit policies to promote breast-feeding have been enacted. Research is being undertaken to assess the infant feeding situation, monitor changes, if any, in infant feeding patterns, and evaluate the impact of specific policies and programmes.

This review considers some of the multiple reasons why researchers and health policy makers are increasingly concerned about changes in breast-feeding. It reviews major trends and patterns in breast-feeding in selected developing countries in Asia, discusses the complementarity between breast-feeding and contraceptive use, and highlights the studies contained in this issue of the *Journal.*

Role of breast-feeding

In developing countries, a significant proportion of women of reproductive age are lactating at any given time, suggesting that breast-feeding is an important aspect of reproductive behaviour. Within Asia in the 1970s, the proportion of married women of reproductive ages who were breast-feeding at any given time ranged from more than 40 per cent in Bangladesh, to approximately one-third in Indonesia and Sri Lanka, to about one-quarter in the Republic of Korea (Pebley, Goldberg and Menken, 1985). These variations reflect both the differences in fertility levels and in cultural norms and practices regarding breast-feeding, although lower fertility levels do not necessarily imply lower initiation or duration of breast-feeding.

Demographic analyses have demonstrated that in populations without access to modern forms of contraception, birth intervals are determined principally by the duration of breast-feeding (Bongaarts and Potter, 1983).

Reproductive physiologists are uncovering the mechanisms by which lactation inhibits reproduction. Afferent neural inputs to the hypothalamus following nipple stimulation seem to cause a local release of beta-endorphin, which in turn inhibits hypothalamic secretion of gonadotrophin-releasing hormone and dopamine, which in turn suppresses gonadotrophin secretion and ovarian activity while stimulating prolactin secretion (Gordon *et al.*, 1987; McNeilly, Glasier and Howie, 1985; Robyn, Meuris and Hennart, 1985).

With the application of radio-immunoassay techniques, which became common in the 1970s, ovarian hormone levels could be measured to detect the recovery of fertility. Endocrinological studies (Howie *et al.*, 1981, 1982a, 1982b) have made two important discoveries. First, during the post-partum lactation period, the earlier a woman experiences menses, the less likely it is that the bleeding has been *preceded* by ovulation. Second, the earlier the first

ovulation occurs, the *less likely* the woman will have a luteal phase of adequate duration and sufficient progesterone production to sustain a pregnancy.

The contraceptive effect of breast-feeding has been well documented both in aggregate and individual level analyses (Bongaarts and Potter, 1983; Habicht *et al*., 1985; Santow, 1987). In Asia and Africa, breast-feeding has been shown to inhibit an average of four potential births (representing 25 per cent of the total fecundity) per woman (Thapa, Short and Potts, 1988). As the use of modern contraceptives increases in a society, it tends to substitute for the contraceptive effects of breast-feeding. Yet this also means that if breast-feeding declines, contraceptive use must increase just to maintain existing fertility levels. Since in most developing countries, government policy is to *reduce* fertility, not just to maintain or prevent if from rising, very dramatic increases in contraception would be required if significant declines in breast-feeding should occur (Thapa, Short and Potts, 1988).

Aside from its contraceptive effect, breast-feeding obviously plays a very important role in child nutrition and health in developing countries. Breast-feeding provides protection against morbidity and mortality especially during the first year of life (Habicht, DaVanzo and Butz, 1986; Cunningham, 1988); even partial breast-feeding has been found to be beneficial (Habicht, DaVanzo and Butz, 1988).

The review of several research results by Shah and Khanna in this issue of the *Journal* shows that, in spite of methodological constraints and limitations, studies have found that breast-feeding is associated with consistently significantly lower incidences of infant morbidity and mortality in Asian countries. It is possible that certain types of health benefits of breast-feeding to the infant may be due to some unknown exogenous factors and that the direct effects of breast-feeding in some situations may be only modest (Winikoff, 1981). But, given our present state of knowledge, and for programmatic and policy purposes, breast-feeding must be considered an important factor in promoting good health for infants.

The maternal antibodies found in human breastmilk protect the baby against gastrointestinal illness and provide some protection against respiratory infections (Feachmen and Koblinsky, 1984; Jason, Nieburg and Marks, 1984). The enteromammary circulation ensures that the appropriate immunoglobulin-A is secreted into the breast milk within hours of exposure of the mother's gut-associated lymphoid tissue to a potential pathogen (Hayward, 1983; Walker and Isselabacher, 1977). Milk substitutes do not provide such immunological protection; they can even cause health problems if they are contaminated with bacteria or incorrectly formulated.

Recent research shows that lactating women use their dietary caloric intake much more efficiently than non-lactating women (Illingworth *et al*., 1986). But, at the same time, it has been generally established that lactating women need much higher levels of daily nutrient allowance for many vitamins and trace metals than non-lactating mothers (Casey and Hambidge, 1983). Deficiency in nutrient content may lead to maternal depletion, especially among poorly nourished mothers, although neither the volume nor composition of their milk is detrimentally affected. In some cultures, post-partum mothers eat special diet preparations, and these diets may help to maintain the extra nourishment needed for lactation. In other cultures, lactating women are discouraged from eating certain nutritious foods. Reasonably nourished lactating mothers can feed their babies solely on breast-milk for 4-6 months and breast-milk is the best nutritent for the growth and health of almost all babies (Casey and Hambidge, 1983; Seward and Serdula, 1984).

Psychologists have postulated that breast-feeding promotes "bonding" between mother and baby, although more definite research on this topic is needed (Morgan, 1981; Post and Singer, 1983). Breast-feeding is also economical both at the societal and individual levels. In Indonesia, the fifth largest country in the world, the value of mother's milk to the national economy is estimated to be at least $US520 million per year (Rhode, 1982). At the household level in developing countries if breast-feeding is not practised, the cost of buying adequate amounts of infant formula could comprise a substantial portion of income for many families.

Recently, the risk of transmission of the human immunodeficiency virus (HIV), which causes AIDS (acquired immune deficiency syndrome), from an infected mother to her child via breast milk has emerged as a new disincentive to breast-feeding. However, a recent study has shown that the infant mortality associated with HIV infection through breast-feeding is likely to be considerably lower than the mortality associated with diseases of infancy if breast milk were withheld and breast-milk substitutes were given (Kennedy *et al*., 1990).

Historians of science have traced the fascinating history of attempts to pre-empt the nutritive role of mothers through the practice of sending babies to a wet nurse or rearing them artificially on the bottle (Fildes, 1986; McLaren, 1985). Such practices can dramatically increase the mother's fecundity and decrease her infant's chance of survival.

Diversity and change

As a result of the work of the World Fertility Survey (WFS) in the 1970s, it became possible, for the first time on a comparative national basis, to examine patterns of breast-feeding and assess the extent to which breast-feeding regulates fertility in developing countries. The data from the Contraceptive Prevalence

Surveys (CPS) further permitted an assessment of changes in trends and patterns of breast-feeding, albeit in a limited way. For a select few countries (e.g. Thailand), regular national survey data have been available for several decades; however, for many developing countries, the WFS and CPS are the only national data sources available. The on-going Demographic and Health Surveys (DHS) will provide an even better opportunity to examine changes in breast-feeding trends and patterns for many countries, since they collect detailed information on breast-feeding.

In its simplest form, and for much of the available data, breast-feeding behaviour is defined only in terms of the dichotomy "breast-feeding/not breast-feeding" by age of the child. This definition does not distinguish between full or partial (supplemented) breast-feeding. Nor does it specify the timing of food supplementation or the duration of breast-feeding. In some cultures, liquid supplementation is introduced at a very early age. Hence, it is often difficult to make a meaningful distinction between full and partial breast-feeding.

Even if women report that they are "fully" breast-feeding their babies, their patterns of breast-feeding (e.g. frequency, feeding on fixed schedules vs. on demand, or duration of feeding episodes) are not generally ascertained in surveys. These breast-feeding behaviours have been found to be important correlates of the contraceptive effectiveness of breast-feeding and of child survival. It is only recently that attempts have been made to develop an international consensus regarding standard terminology for defining breast-feeding behaviour (Labbok and Krasovec, 1988).

The complexities associated with definitions notwithstanding, three summary measures of breast-feeding are commonly employed to analyze survey data. They are initiation, age at weaning and duration. The last measure is actually a function of the first two. A more refined way of considering duration of breast-feeding is to examine the proportion of women still breast-feeding at an exact time (usually months) post-partum. This approach can be especially helpful for gaining insights on the differential effects of breast-feeding at different ages post-partum on infant health and mother's fecundity. However, retrospective reporting, digital preferences and heaping sometimes limit the potential value of such data.

The estimates for these summary measures based on *all* births during a specific time period have been found to be less biased than estimates based on either open or closed last birth intervals (Page, Lesthaeghe and Shah, 1982). Further, the actuarial life table method is preferred over other analytical techniques (current-status or prevalence-incidence), since it takes into account the full range of information by incorporating the proportion of infants ever breast-fed, age at weaning and current breast-feeding status.

It is often difficult to get accurate information on breast-feeding behaviour, especially in retrospectively collected survey data (Lesthaeghe, 1987). Nonetheless, available data for Asia from the WFS, CPS and DHS, as well as other sources, suggest a considerable diversity of patterns of change.

In the South Asian countries of Bangladesh, India, Nepal, Pakistan and Sri Lanka, the pace of change in breast-feeding (measured in terms of initiation and duration) appears to be only modest (Ferry and Smith, 1983; Khan, in this issue; Martin, 1989; Millman, 1986, 1987; Mohiuddin, 1986). However, the differentials between urban and rural populations have been widening over time, suggesting that in urban areas, initiation and/or duration of breast-feeding are declining more rapidly.

Although systematic information regarding breast-feeding in China is still scarce, exploratory and area-specific studies have suggested that the initiation of breast-feeding remains nearly universal, but there seems to have been a gradual decline in the duration of breast-feeding, particularly in urban areas (Pasternak and Ching, 1985; Scrimshaw and Ho, 1981). In Taiwan province of China, there has been a steady decline in breast-feeding since the early 1970s (Millman, 1981). This decline is pronounced for all measures of breast-feeding behaviour, including initiation, duration and age at weaning. However, the differentials between urban-rural populations have attenuated over time. In Shaanxi province, the duration of breast-feeding appears to have increased in some rural areas in recent years (Tu, in this issue). Elsewhere in East Asia, the Republic of Korea has experienced a steady decline in breast-feeding duration, but the initiation of breast-feeding remains high (Millman, 1986).

The pace of change in South-east Asia has generally been rapid. Changes have taken various forms – from steady declines, to a lull or halt in declines, to a revival of breast-feeding. Where a revival has taken place, it has been in recent years (i.e. in the 1980s). In some countries where a revival has taken place, it has generally occurred among affluent and better educated women (a pattern also found in developed countries), while in others it has occurred among women of lower socio-economic status. Overall, there are sharp differentials between urban and rural and between more educated and less educated women in South-east Asian countries.

Malaysia, Singapore and Thailand share a common characteristic of change: a revival of breast-feeding after a steady decline. The revival has been most pronounced in Malaysia and Singapore. In Singapore, the revival has taken place almost exclusively among upper income women (Chua, Viegas and Ratnam, in this issue; Millman,1986), a pattern also found in northern Europe and North America. By contrast, in Malaysia the revival has been among the

less educated women (Haaga, 1986). In Thailand, the overall decline has stopped, and a revival has taken place mainly among urban women (Knodel, Chayovan and Wongboonsin, in this issue).

In Indonesia and the Philippines, both the initiation and duration of breast-feeding are high. After a modest steady decline, the duration of breast-feeding in the Philippines appears to have stabilized (Williamson, in this issue). There is emerging evidence, in selected metropolitan areas of Indonesia, that the duration of breast-feeding may have increased (Joesoef, Annest and Utomo, 1989). Interestingly, this has occurred, as in Malaysia, among the mothers of lower socio-economic status.

The patterns emerging from within Asia suggest that the decline in breast-feeding was initiated in the 1970s among certain population sub-groups (e.g. urban and more educated) in many of the countries, and this phenomenon is still continuing in some countries. Nonetheless, a few countries have experienced a stabilization or actual resurgence in breast-feeding among some sub-groups. Hence, there has not been a universal decline in breast-feeding in Asia, at least in recent years.

The phenomenon of resurgence suggests one very important lesson: declines in breast-feeding are not irreversible. It is likely that appropriate policies and well- designed programmes will have positive effects on breast-feeding behaviour. In some Asian countries, the modern health sector has apparently played an important role in bringing about the change, Hence, rather than accelerate the decline in breast-feeding, this sector has shown the potential to stop or reverse the trend away from breast-feeding.

With continued efforts, the full resurgence in breast-feeding among all population sub-groups in some societies may take place. In countries where breast-feeding has declined only modestly, women need to be informed about optimum breast-feeding practices, while at the same time preventive policies should be implemented to thwart future declines in breast-feeding.

The mechanisms for the implementation of policies and the development of specific programmes may differ among settings. But the basic ingredients for the interventions necessary to bring about the changes are essentially the same across settings, although the relative importance of each of the factors could vary. Experience and research efforts in Asia and elsewhere have demonstrated that protection and promotion of breast-feeding require an integrated approach, including favourable public policies, attention to health care providers and the mothers themselves, and monitoring the results (cf. Green, 1989; Huffman, 1984; Jelliffe and Jelliffe, 1988; Winikoff, Castle and Laukaran, 1988).

Explicit public policies that discourage bottle-feeding and encourage breast-feeding need to be formulated. These include establishing policies for the modern health sector (both public and private hospitals and clinics) and formulating legislation to protect women's right to breast-feed. Health care providers should be trained and re-oriented, where necessary.

Proper attention to breast-feeding can and should be given by health professionals without romanticizing or "over-selling" it (e.g. telling mothers that their babies will have no health problems if the mothers breast-feed). Promotion programmes also should not make women feel guilty if they cannot breast-feed their babies. Finally, programmatic and socio-psychological barriers from the woman's perspective should be understood and identified before programmes are designed.

Whether a woman breast-feeds her baby is her and her spouse's decision. But health care providers can play a role by providing correct information on the contraceptive and other benefits of breast-feeding. Every pregnant woman should be considered a potential candidate for breast-feeding, and this consideration should be reflected in neonatal, post-neonatal, and family planning counselling and service delivery.

Breast-feeding and contraception

Neither the contraceptive effects (for the mother) nor the health benefits (to the infant) of breast-feeding can continue for an indefinite period post-partum. Breast-feeding functions as a nearly perfect contraceptive under two conditions: namely, when a mother is (a) fully or nearly fully breast-feeding her baby, and (b) remains amenorrheic (ignoring any bleeding 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 (Kennedy, Rivera and McNeilly, 1989). Thereafter, the contraceptive effect decreases, although for the majority of women, the contraceptive benefits do not end abruptly with the return of menses.

Several studies (reviewed in Williamson, 1987) have suggested that up to 12 per cent of breast-feeding women may get pregnant post-partum. But these data are crude; they do not take into account specific breast-feeding duration (such as in actuarial life-table analysis) or exposure months (for example, Pearl pregnancy rate), nor do they consider whether the woman is fully breast-feeding.

Similarly, in its nutritional role, breast-feeding usually provides, as discussed previously, full nutrition for the baby only during the first 4-6 months. The in-

fant's diet beyond this time has to come from supplementary foods. Furthermore, despite their positive attitudes, some mothers may find it difficult to continue breast-feeding frequently for a long time, while others may make a fully informed decision not to breast-feed at all or to breast-feed for a short duration.

For these and other reasons, women will need to turn to modern methods of post-partum contraception. Traditionally, the choice for many women in developing countries has been either to spend most of their reproductive lives with an infant in the womb or one at the breast; as was the situation in pre-industrial Europe. Today, she has a third choice: controlling her reproduction with modern contraceptives. The benefits of breast-feeding and contraception may be enhanced by appropriate timing of the adoption of an appropriate family planning method.

Family planning programmes seldom give explicit attention to the contraceptive benefits of breast-feeding; the joint promotion of breast-feeding and contraception has remained largely a missing component in such programmes. Some may even consider breast-feeding to be incompatible with the use of contraceptives. Yet family planning workers are well placed to advise women on the complementarity between contraception and breast-feeding.

When should a new mother begin other methods of contraception? In the past, there has been no fixed answer, for the process of return to fertility is shown to vary considerably among women with different breast-feeding styles. Even women having similar breast-feeding patterns sometimes have different endocrine profiles. Similarly, women of similar durations of breast-feeding are sometimes found to have different durations of lactational amenorrhea. The reasons for these findings are unclear. It has been difficult to develop a standard set of rules and guidelines applicable to each individual woman, especially because stochastic factors have been found to play an important role at the individual level of fertility behaviour (Bongaarts and Potter, 1983).

These difficulties notwithstanding, some rudimentary guidelines have been suggested. A woman should consider beginning contraception by the first occurrence of any one of three events: the return of vaginal bleeding after the end of lochia (vaginal discharge), initiation of supplemental feeding, or the baby's six-month birthday (Kennedy *et al.*, 1989). The use of one of these three sentinel events to initiate contraception could also avoid "double protection" when a woman is protected by both post-partum amenorrhea and another contraceptive and help her to expand the interval before the next birth by starting contraception when she needs it the most.

The relative advantages and disadvantages of the various available

contraceptive methods for lactating women and the appropriate timing of initiation post-partum have been reviewed in detail elsewhere (Kleinman and Senanayake, 1984; WHO, 1987; Winikoff, Semeraro and Zimmerman, 1988). The dynamics of the adoption of contraception among lactating women has been less well studied than among post-partum, non-lactating women. There is also a need to develop and make available new forms of contraception for lactating women.

There is generally a strong inverse association (particularly during the first year post-partum) between breast-feeding and contraceptive use at both the aggregate and individual levels (DeLeon and Potter, 1989; Millman, 1985; Smith, 1985), but the reasons are less clear (Millman, 1985). A review of the limited available data by Cleland and Rutstein (1986) suggests that this association is not necessarily caused by contraceptive use. Rather, the adoption of post-partum contraception could be in response to the resumption of menstruation, and therefore it is concluded that "the provision of contraceptives should not be held responsible for a change in breast-feeding practices which in many (developing) countries has resulted in a shortening of natural birthspacing" (Cleland and Rutstein, 1986). Rarely have large-scale studies attempted to directly ascertain the degree to which a woman's decision to stop breast-feeding is influenced by her decision to practise contraception.

For programmatic and policy purposes, it is useful to examine the proportion of lactating women using contraception by specific time segments post-partum. Within Asia, detailed analysis based on the WFS data is available for Bangladesh, Indonesia, Republic of Korea and Sri Lanka (Pebley, Goldberg and Menken, 1985). Overall, the breast-feeding women in these countries were as likely to use contraceptives as those not breast-feeding. Among currently breast-feeding women 0-3 months post-partum, the proportions using contraception (all methods) were 5 per cent in Bangladesh, 12 per cent in Indonesia, 3 per cent in the Republic of Korea and 24 per cent in Sri Lanka. Among women 4-6 post-partum months, the proportions of breast-feeding women using contraception were 6 per cent in Bangladesh, 28 per cent in Indonesia, 8 per cent in the Republic of Korea and 35 per cent in Sri Lanka. The higher proportions in Sri Lanka most probably reflected post-partum sterilization, but in other countries, the pill was the predominant method. Overall, the data show large variations across countries.

These data do not elucidate whether information on breast-feeding was given to the women and under what situations contraceptives (especially the pill) were prescribed. However, they do suggest that the introduction of contraceptive pills (the researchers believe them to be combined pills) in some settings may have been too early. This practice could result in early discontinuation (Bhatia and Kim, 1984). Too early introduction of contraceptives has a "double protective" effect, and therefore only minimal impact on fertility

(Bhatia, Becker and Kim, 1982). If there were more explicit emphasis on breast-feeding by family planning workers (see Suyono and Thapa, in this issue), the situation with regard to the timing of introduction of contraceptives might be different in the future. These issues underscore the importance of examining breast-feeding patterns in relation to contraceptive use patterns.

Several comparative studies (Cleland and Rutstein, 1986; DeLeon and Potter, 1989; Jain and Bongaarts, 1981) have suggested that a significant proportion of women in Asia and elsewhere may be consciously using breast-feeding as a natural contraceptive method. If this is really the case, breast-feeding should be considered as a contraceptive method in the analysis of survey data, not as a reason for not using contraception (which is the typical practice in family planning survey analyses). According to recent Demographic and Health Survey reports, for example, the proportion of women of all reproductive ages not using contraception because they are breast-feeding ranges from 16 per cent in Thailand, and 11 per cent in Sri Lanka, to less than 0.5 per cent in Indonesia. As with previous survey findings (Pebley, Goldberg and Menken, 1985), Indonesia appears to be a special case. It may be related to the fact that in Indonesia, contraceptives are introduced shortly after delivery, regardless of breast-feeding status.

If the health and family planning programmes are to help women to use breast-feeding as a contraceptive method, the implications for policy, service statistics and evaluation should be considered. First, breast-feeding needs to be explicitly recognized as a "lactational amenorrhea method" (Kennedy *et al*., 1989) in the "cafeteria" of family planning methods. Second, since the service statistics refer to programme acceptors, users of the lactational amenorrhea method need to be represented in service statistics and family planning field or clinic workers given credit for recruiting the women as family planning acceptors. Third, family planning surveys should explicitly ascertain whether breast-feeding is consciously and deliberately used for fertility regulation. Clearly, a new way of thinking would be required, if breast-feeding were to be considered as a programmatic contraceptive method.

For various reasons, breast-feeding differs from other methods of family planning (Williamson, 1987). In view of this, it has been a challenge to integrate breast-feeding into family planning programmes. But this should not prevent health (especially family planning) personnel from discussing breast-feeding while counselling women about contraceptives. A mother will be able to obtain the maximum benefits from both, if the appropriate contraceptive method is introduced at the appropriate time post-partum. In short, both breast-feeding and contraceptive use should be promoted. This calls for fine-tuning family planning policies and programmes explicitly to recognize the importance of breast-feeding for child health and child-spacing.

Contributions of the studies

The diversity in patterns of change in breast-feeding in Asia is demonstrated by this selected collection of articles. Differences between the studies with respect to the objectives and approaches are as important as their common focus on breast-feeding.

The article by Shah and Khanna examines the role of breast-feeding in infant health and child survival with special reference to countries in the Asian and Pacific region. The authors propose a simplified framework for investigating the direct influence of breast-feeding on infant and child health through its protective effects against infectious, especially gastrointestinal diseases, and the indirect influence on infant mortality through birth-spacing. Their article points out methodological contraints in studies conducted on this subject which limit the comparability of data and render difficult the drawing of unequivocal conclusions. Nonetheless, the available evidence supports the positive role of breast-feeding in lowering the incidence of infant morbidity and mortality. High prevalence and prolonged duration of breast-feeding have helped to keep the levels of morbidity and mortality lower than they would be otherwise. Although more research efforts are needed to isolate the role of breast-feeding from the other confounding factors as well as to overcome the methodological problems, the implications of the results reviewed in their article are straightforward: breast-feeding saves the lives of infants and children.

The article by Kennedy describes clinical studies which have examined the effect of breast-feeding on the return to fecundity. The main objective of the studies undertaken in Pakistan, Philippines and Thailand was to investigate whether a simple indicator of breast-feeding behaviour could be found to serve as a proxy for the end of post-partum infecundity. While these results confirmed that breast-feeding plays a significant role in delaying the recovery of ovulation, they also showed that the frequency of breast-feeding alone is not a good indicator of the protection from pregnancy. The findings provide evidence that multiple indicators (e.g. bleeding, supplementation, or age of the infant) are necessary to signal the end of lactation-induced infecundity.

In his article, Tu analyses changes in the patterns and determinants of breast-feeding in a less developed central province of China. The results show that the duration of breast-feeding has increased in the 1980s, particularly for higher order children. At the same time, the age at supplementation has declined. He finds that male children are breast-fed significantly longer than female children, suggesting that there is a gender bias in the rearing of infants. Mothers who work in non-agricultural sectors have significantly shorter durations of breast-feeding than women who work in the agricultural sector. The author suggests that the overall change in the duration of breast-feeding

behaviour may have been a consequence of the intensive family planning programme launched after the introduction of the "one-child" policy in 1979. The use of contraceptives has helped to lengthen the birth interval, which in turn increased the likelihood of breast-feeding. This is further confirmed by the evidence that children are breast-fed until their mothers again become pregnant. Tu suggests that breast-feeding may also have been used by some women as a means to space pregnancies. To the extent that this is the case, decreases in the age at which supplemental food is introduced may have implications for earlier recovery of the risk of pregnancy during the post-partum period.

Several aspects of breast-feeding behaviour in India are reviewed by Khan. These include initiation, duration and frequency, pre-lactation, age at weaning, food supplementation and contraceptive effects as well as women's attitudes towards breast-feeding. The review is based on results from major studies carried out in different regions in India. The studies find a nearly universal pattern of initiation and a prolonged duration of breast-feeding. Though most women appear to have strongly positive attitudes towards breast-feeding, the studies also point out that the normal practice is to delay the initiation of breast-feeding considerably, at least in some parts in India, so that the colostrum will not be fed to the child. There also appears to be a relatively long delay, often exceeding six months post-partum, in the introduction of food supplementation. This article draws some broad implications for policies and programmes.

Iskandar, Costello and Nasution analyze data from a 1987 Indonesian national survey. In their detailed analysis, the authors examine variations in the proportions of children never breast-fed, by the socio-economic characteristics of the mothers, and analyze factors affecting the duration of breast-feeding. The results show that breast-feeding initiation is nearly universal in Indonesia. Higher parity children are especially likely to be breast-fed, while unwanted children are less likely to be breast-fed. Generally, Indonesian mothers belonging to lower socio-economic groups and having a more traditional life-style breast-feed their babies longer than their counterparts. There are significant differences in both the proportion of children never breast-fed and the duration of breast-feeding, by urban-rural location and by geographic region of residence. The challenges for health professionals in Indonesia lie in developing programmes that help to maintain the high incidence as well as duration of breast-feeding while at the same time promoting optimum ways to breast-feed.

The brief note by Suyono and Thapa discusses the family planning sector's initiative to promote breast-feeding in Indonesia. It argues that the family planning sector provides a good opportunity for promoting the complimentarity

of breast-feeding and contraception. Family planning workers, through person-to-person communication, are well placed to alleviate misperceptions and provide accurate information regarding optimum infant feeding.

The article on the Philippines by Williamson provides an overview of the patterns and trends in breast-feeding and then describes the recent history of policies and programmes. Overall, the decline in the duration of breast-feeding, during the decade 1973-1983 appears to be halting, while the proportion of babies never breast-fed is shown to have increased slightly during the same period. The larger declines were confined to particular regions of residence and mothers having transitional types of employment. The article outlines various activities and the strategies through which breast-feeding has been promoted in the Philippines. These may be relevant to other countries as well.

The study on Singapore by Chua, Viegas and Ratnam documents a revival in breast-feeding, particularly among the upper socio-economic class, following a rapid decline in breast-feeding during the third quarter of this century. Although the data analyzed are not nationally representative, the findings are important, because the majority of the deliveries in Singapore take place in hospitals. This study underscores the importance of analyzing data on trends and patterns by major ethnic groups. The challenge for the public health workers is not only to make more concentrated efforts to promote breast-feeding among parents in the lower socio-economic classes, but to promote it among various ethnic groups as well.

The article by Knodel, Chayovan and Wongboonsin reviews trends and patterns of breast-feeding in Thailand and relates them to the policies enacted by the Government to promote breast-feeding. The decline in breast-feeding evident in the 1970s has stopped in recent years. Initiation of breast-feeding is close to universal in Thailand. Especially for urban women, there appears to be some increase in the duration of breast-feeding. There are, however, considerable differences in the duration of breast-feeding by urban-rural residence and by mothers' education. The authors note that the halt in further declines in breast-feeding practices "coincides with extensive efforts" undertaken by various agencies, including the Government of Thailand. This suggests that the new policies and programmes, particularly in the modern health sector, may be having an impact. The experiences of Malaysia, the Philippines, or Thailand may serve as good examples for other developing countries in Asia and elsewhere which would like to increase the level of breast-feeding in their populations.

Tuladhar's report discusses variations in the duration of breast-feeding in Nepal, based on the most recent (1986) survey data. The initiation of breast-feeding is almost universal. Similarly, the duration of breast-feeding for women

in both urban and rural areas remains high, although it is slightly lower for urban women. The results show that socio-economic and demographic factors play only modest roles in accounting for variations in the duration of breast-feeding. Such factors are more likely to exert a greater influence if the pace of modernization increases in Nepal.

The studies in this issue underscore the importance of not only documenting trends, but also examining variations within a country. Such efforts are often the basis for evaluating whether and in what ways the policies and programmes have had the desired effects. Even where explicit breast-feeding policies are lacking, the studies suggest alternate pathways and their potential outcomes.

One of the aims of this issue of the *Journal* is to encourage further research interest in breast-feeding practices in Asia, both in countries with little currently available information about breast-feeding and in countries with underutilized and as yet unpublished data. As the multiple benefits of breast-feeding are increasingly recognized, many surveys (e.g., nutrition surveys, demographic surveys, child survival surveys) and other types of studies have collected information on breast-feeding patterns. However, they are rarely pulled together in a coherent way to draw implications for policies and programmes. This may be considered a priority area for researchers as well as health and family planning policy makers.

References

Bhatia, S., S. Becker and Y.J. Kim (1982). "The Effect on Fecundity of Pill Acceptance During Post-partum Amenorrhea in Rural Bangladesh", *Studies in Family Planning*, vol. 13, No. 6/7, pp. 200-207.

Bhatia, S. and Y. Kim (1984). "Oral Contraception in Bangladesh", *Studies in Family Planning*, vol. 15, No. 5, pp. 233-241.

Bongaarts, J. and R.G. Potter (1983). *Fertility, Biology and Behavior*, (New York, Academic Press).

Casey, C.E. and K.M. Hambidge (1983). "Nutritional Aspect of Human Lactation" in M.C. Neville and M.R. Neifert (eds.) *Lactation: Psysiology, Nutrition and Breast-Feeding*, (New York, Plenum Press).

Cleland, J. and S. Rutstein (1986). "Contraception and Birthspacing", *International Family Planning Perspectives*, vol. 12, No. 3, pp. 83-90.

Cunningham, A.S. (1988). "Breast-feeding, Bottle-feeding, and Illness: An Annotated Bibliography, 1986" in D.B. Jelliffe and E.F.P. Jelliffe (eds.) *Programmes to Promote Breast-feeding*, (New York, Oxford University Press), pp. 448-480.

DeLeon, J.G., and J.E. Potter (1989). "Modelling the Inverse Association Between Breast-feeding and Contraceptive Use," *Population Studies*, vol. 43, No. 1, pp. 69-94.

Feachem, R.G. and M.A. Koblinski (1984). "Interventions for the Control of Diarrhoeal Diseases Among Young Children: Promotion of Breast-Feeding", *Bulletin of the World Health Organization*, vol. 62, No. 2, pp. 271-291.

Ferry, B. and D.P. Smith (1983). "Breast-feeding Differentials," *WFS Comparative Studies*, No. 23.

Fildes, V. (1987). *Breast, Bottles and Babies: A History of Infant Feeding*, (Edinburgh, Edinburgh University Press).

Gordon, K., M.B. Renfree, R.V. Short and I.J. Clarke (1987). *Journal of Reproduction and Fertility*, vol. 79, No. 2, pp. 397-408.

Green, C.P. (1989). *Media Promotion of Breast-Feeding: A Decade of Experience*, (Washington, D.C., Academy for Educational Development).

Habicht, J.-P., J. DaVanzo and W.P. Butz (1986). "Does Breast-Feeding Really Save Lives, or Are Apparent Benefits Due to Biases?" *American Journal of Epidemiology*, vol. 123, No. 2, pp. 279-290.

_____(1988). "Mother's Milk and Sewage: Their Interactive Effects on Infant Mortality", *Pediatrics*, vol. 18, No. 3, pp. 456-461.

_____and L. Meyers (1985). "The Contraceptive Role of Breast-feeding", *Population Studies*, vol. 39, No. 2, pp. 213-232.

Haaga, J.G. (1986). "Evidence of a Reversal of the Breast-feeding Decline in Peninsular Malaysia", *American Journal of Public Health*, vol. 76, No. 3, pp. 245-251.

Hayward, A.R. (1983). "The Immunology of Breast Milk" in M.C. Neville and M.R. Neifert (eds.) *Lactation: Psysiology, Nutrition and Breast-Feeding*, (New York, Plenum Press).

Howie, P.W., A.S. McNeilly, M.J. Huston, A. Cook and H. Boyle (1981). "Fertility After Childbirth: Effect of Breast-feeding in Ovulation and Menstruation", *British Medical Journal*, vol. 283, No. 6294, pp. 757-759.

_____(1982a). "Fertility After Childbirth: Post-partum Ovulation and Menstruation in Bottle and Breast-feeding Mothers", *Clinical Endocrinology*, vol. 17, No. 4, pp. 323-332.

_____ (1982b). "Fertility After Childbirth: Adequacy of Post-partum Luteal Phases", *Clinical Endocrinology*, vol. 17, No. 6, pp. 609-615.

Huffman, S.L. (1984). "Determinants of Breast-feeding in Developing Countries. Overview and Policy Implications", *Studies in Family Planning*, vol. 15, No. 4, pp. 170-183.

Illingworth, P.J., R.T. Jung, P.W. Howie *et al.* (1986). "Diminution in Energy Expenditure During Lactation", *British Medical Journal*, vol. 292, No. 6518, pp. 437-441.

Jain, A.K. and J. Bongaarts (1981). "Breast-Feeding: Patterns, Correlates, and Fertility Effects", *Studies in Family Planning*, vol. 12, No. 3, pp. 79-99.

Jason, J.M., P. Nieburg and J.S. Marks (I 984). "Mortality and Infectious Disease Associated with Infant-Feeding Practices in Developing Countries", *Pediatrics*, vol. 74, No. 4 (Part 2), pp. 702-727.

Jelliffe, D.B. and E.F.P. Jelliffe (eds.), (1988). *Programmes to Promote Breast-feeding*, (New York, Oxford University Press).

Joesoef, M.R., J.L. Annest and B. Utomo (1989). "A Recent Increase of Breast-feeding Duration in Jakarta, Indonesia", *American Journal of Public Health*, vol. 79, No.1, pp. 36-38.

Kennedy, K.I., J.A. Fortney, M.G. Bonhomme *et al.* (1990). "Do the Benefits of Breast-feeding Outweigh the Risk of Postnatal Transmission of HIV via Breastmilk?", *Tropical Doctor*, vol. 20, No. 1, pp. 25-29.

Kennedy, K.I., R. Rivera and A.S. McNeilly (1989). "Consensus Statement on the Use of Breast-Feeding as a Family Planning Method", *Contraception*, vol. 39, No. 5, pp. 477-496.

Kleinman, R. and P. Senanayake (eds.), (1984), "*Breast-Feeding, Fertility and Contraception*", (London, IPPF Medical Publications).

Labbok, M. and K. Krasovec (1988). "Breast-feeding Definitions". Interagency Group for Action in Breast-feeding, *Expert Meeting Report No. 1*, (Washington, D.C., Georgetown University).

Lesthaeghe, R. (1987). "Lactation and Lactation Related Variables: Contraception and Fertility: An Overview of Data Problems and World Trends", *International Journal of Gynecology and Obstetrics*, vol. 25, Supplement No. 1, pp. 143-173.

Martin, L. (1989). *An Annotated Bibliography on Breast-feeding Studies in Pakistan*. Report submitted to UNICEF, Islamabad, Pakistan.

McLaren, D. (1985). *Women in English Society 1500-1800*, (London, Methuen Press).

McNeilly, A.S., A. Glasier and P.W. Howie (1985). "Endocrine Control of Lactational Infertility-I" in J. Dobbing (ed.) *Maternal Nutrition and Lactation Infertility*, (New York, Raven Press), pp. l-24.

Millman, S. (1981). "Breast-Feeding in Taiwan: Trends and Differentials, 1966-1980", Paper presented at the 50th Annual Meeting of the Population Association of America.

_____(1986). "Trends in Breast-feeding in a Dozen Developing Countries", *International Family Planning Perspectives*, vol. 12, No. 3, pp. 91-95.

_____(1987). "Breast-feeding Trends in Eighteen Developing Countries." Final Report Submitted to Family Health International (Research Triangle Park, Family Health International).

Mohiuddin, M.M. (1986). "Breast-Feeding in Bangladesh", *Journal of Biosocial Science*, vol. 18, No. 4, pp. 425-434.

Morgan, L.J. (1981). "Methodological Review of Research on Mother-Infant Bonding", *Advances in Behavioral Pediatrics*, vol. 2, No. 2, pp. 17-31.

Page, H.J., R.J. Lesthaeghe and I.H. Shah (1982). "Illustrative Analysis: Breast-feeding in Pakistan", *WFS Scientific Reports*, No. 37.

Pasternak, B. and W. Ching (1985). "Breast-feeding Decline in Urban China: An Exploratory Study", *Human Ecology*, vol. 13, No. 4, pp. 433-466.

Pebley, A.R., H.I. Goldberg and J. Menken (1985). "Contraceptive Use During Lactation in Developing Countries", *Studies in Family Planning*, vol. 16, No. 1, pp. 40-51.

Post, R.D. and R. Singer (1983). "Psychological Implications of Breast-Feeding for the Mother", in M.C. Neville and M.R. Neifert (eds.), *Lactation: Psysiology, Nutrition, and Breast-Feeding*, (New York, Plenum Press), pp. 349-366.

Rhode, J.E. (1982). "Mother's Milk and the Indonesian Economy: A Major National Resource", *Journal of Tropical Pediatrics*, vol. 28, No. 4, pp. 166-174.

Robyn, C., S. Meuris and P. Hennart (1985). "Endocrine Control of Lactational Infertility-II" in J. Dobbing (ed.) *Maternal Nutrition and Lactation Infertility*, (New York, Raven Press), pp. 25-40.

Santow. C. (1987). "Reassessing the Contraceptive Effect of Breast-feeding", *Population Studies*, vol. 41, No. 1. pp. 147-160.

Scrimshaw M. and Z.C. Ho (1981). "Commentary", *Medical Anthropology*, vol. 5, No. 4, pp. 258-260.

Seward. J.F. and M.K. Serdula (1984). "Infant Feeding and Infant Growth", *Pediatrics*, vol. 74, No. 4 (Part 2), pp. 728-762.

Smith. D.P. (1985). "Breast-feeding Contraception, and Birth Intervals in Developing Countries", *Studies in Family Planning*, vol. 16, No. 3, pp. 154-163.

Thapa, S., R.V. Short and M. Potts (1988). "Breast-feeding, Birth Spacing and Their Effects on Child Survival", *Nature*, vol. 335, No. 6192, pp. 679-682.

Walker, W.A. and K.J. Isselbacher (1977). "Intestinal Antibodies", *New England Journal of Medicine*, vol. 297, No. 14, pp. 767-773.

WHO. Task Force on Oral Contraceptives (1987). "Contraception During the Post-partum Period and During Lactation: The Effects on Women's Health", *International Journal of Gynaecology and Obstetrics*, vol. 25, Supplement No. 1, pp. 13-26.

Williamson, N.E. (1987). "Breast-Feeding Women and Family Planning Programs: Special Needs and Opportunities", *Asia-Pacific Population Forum*, vol. 1, No. 5, pp. l-8 and 20-21.

Winikoff, B. (1981). "Issues in the Design of Breast-Feeding Research", *Studies in Family Planning*, vol. 12. No. 4, pp. 177-184.

_____, M.A. Castle and V.H. Laukaran (eds.) (1988). *Feeding Infants in Four Societies: Causes and Consequences of Mothers' Choices*, (Westport, Greenwood Press).

Winikoff, B., P. Semeraro and M. Zimmerman (1988). *Contraception During Breast-feeding: A Clinician's Handbook*, (New York, The Population Council).

Breast-feeding, Infant Health and Child Survival in the Asia-Pacific Context

Among the advantages of breast-feeding are better child nutrition and longer birth spacing

By lqbal H. Shah and Jitendra Khanna*

An important distinguishing characteristic of mammals is that the female has mammae (breasts in human beings), the function of which is to secrete milk for the nourishment of newborn offspring. The availability of artificial means (bottles and formula milk) of feeding human infants has considerably

* The authors of this article are scientists in the Special Programme of Research, Development and Research Training in Human Reproduction, World Health Organization, CH-1211 Geneva 27, Switzerland. The views expressed are those of authors and may not necessarily reflect those of the World Health Organization. They would like to express their gratitude to Dr. I. de Zoysa for providing relevant articles and references and to Mrs. R. Saadeh for the listings of data on breast-feeding. Comments and suggestions received from Dr. Axel I. Mundigo are also gratefully acknowledged.

reduced the dependency of infants on breast milk; however, the newborns of all other mammalian species remain exclusively dependent on mother's milk for survival in early life. The milk produced by each species is particularly suited to the needs of newborns of that species. It is not surprising then that breast milk is the most suitable food for the human newborn.

Evidence supporting the extra-nutritional advantages of breast-feeding for infant health and child survival, especially in developing countries, has been accumulating recently. These additional benefits include the protective effect of breast milk against infections, in particular those of the gastrointestinal tract. However, a survey of available literature shows that there are a number of methodological limitations of study design, definitions and measurement problems. Nonetheless, most of the articles reviewing the data on the link between breast-feeding and child health and survival provide convincing envidence of the health benefits of breast-feeding (Feachem and Koblinski, 1984; Jason *et al*., 1984; Anderson *et al*., 1984; WHO, 1989). Apart from being highly nutritious, breast milk contains important immunological factors which provide protection against infections of the gastrointestinal tract, allergies, obesity, and certain metabolic and other diseases.

The secretion of protective immunological agents in the mother's milk starts upon the birth of her child. For example, the colostrum, milk secreted mainly during the first five post-partum days, contains a high level of antibody-rich protein, especially secretory immunoglobulin A (SIgA), and lactoferrin which offer anti-infective protection to the newborn. SIgA resists proteolytic digestion in the gut and limits the replication of bacterial and viral pathogens in the intestine. In mature human milk, the protein level is about three times less than that of cow's milk formula, which helps to make it easily digestible. The levels of fat, vitamins, minerals and iron in human milk are optimum for the newborn's nutritional needs up to about four to six months. (For further details on the composition of breast milk and related issues, see WHO/UNICEF, 1981.)

The infant is not alone in benefitting from breast-feeding. There are advantages for the mother too. Not only does breast-feeding help to establish a closer relationship between the mother and infant, it also helps to delay the return of 'fertility' (fecundity) – and hence pregnancy – following delivery. This natural contraceptive mechanism, however, works best only when the infant is suckled frequently and breast milk remains the principal source of food for the infant. The advantages of breast-feeding in terms of savings on expenditures on alternative foods is also appreciable for poor families.

The objective of this article is to review the available information on the role of breast-feeding in infant health and child survival in countries of the Asian and Pacific region. More specifically, it considers the evidence about the protective effects of breast-feeding against infectious diseases and its role

in improving child survival through increased birth-spacing. In reviewing studies on this subject, various methodological constraints which limit the comparability and interpretation of results are first considered, followed by a simplified framework for a systematic discussion of relevant issues. The last section provides conclusions.

Methodological constraints

Despite some methodological constraints, which limit the comparability of data and render the drawing of inferences difficult, the weight of the available evidence suggests that breast-feeding lowers the incidence of infant morbidity and mortality. Only those studies which were not seriously flawed by biases have been selected. (See the annex on pp. 40-43 for more complete details.)

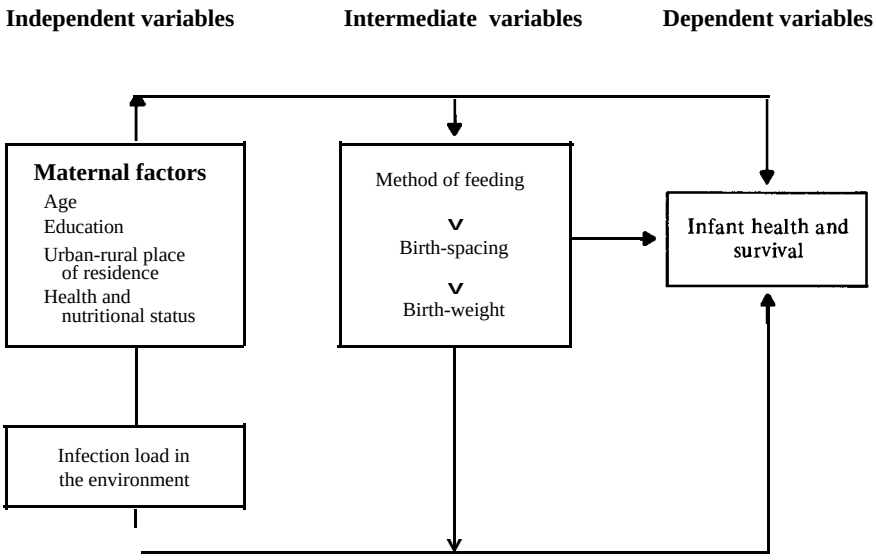
Breast-feeding versus bottle-feeding

In order to collect information on this subject, a library search for relevant articles was conducted through POPLINE and MEDLINE. The database maintained by the Nutrition Unit of WHO's Division of Family Health was also consulted. With the mass of scientific literature already collected, the difficulties in drawing up a manageable summary and systematic presentation became readily apparent. However, our reading of numerous studies and the realization of the methodological issues guided the formulation of a simplified framework on the interrelationship of breast-feeding and infant health and survival.

The framework presented in figure 1 shows the interrelationships among a number of factors that need to be considered in examining the health consequences of breast-feeding. Maternal factors, also referred to as "common cause" in the preceding section, influence a mother's decision to breast-feed her newborn baby as well as the duration of breast-feeding. These factors (e.g. age, education, urban/rural residence) also have an independent bearing on infant health and survival. Lower prevalence and duration of breast-feeding are generally found among women of higher educational level and those living in urban areas, which, on the surface, would shed some doubts on the validity of the evidence in favour of breast-feeding. In order to understand better the complex interrelationships, the level of the general environmental infection load must also be taken into account, together with maternal factors. These two sets of factors have been termed as "independent" variables owing to their direct influence on other "intermediate" and "dependent" variables listed in figure 1.

There are three main intermediate variables: namely, method of feeding the infant, birth spacing and birth weight. The independent variables mentioned above (first column in figure 1) affect the maternal choice of the infant feeding method, which in turn affects the birth interval and the birth weight of the next

Figure 1: A framework for the interrelationship between breast-feeding and infant health and survival



child. If the mother decides to fully breast-feed her newborn child for a prolonged duration, she is likely to have a delayed next pregnancy (even if she does not use any contraceptive method) and, consequently, a reduced risk of having a low-birth-weight infant in the next pregnancy. Thus, all three can influence infant health and child survival individually as well as in combination.

Finally, the outcome of the interrelationship between independent and intermediate variables is the status of the infant's health and its probability of survival. Clearly, the maternal decision to breast-feed or not has a very important bearing on infant health. However, infant health and child survival cannot be considered in the absence of the impact of the general infection load of the environment. In this regard, it should be noted that higher maternal education can have a mitigating influence on the impact of the infection load of the environment. Moreover, the infection load equally affects maternal health which may in turn affect the intermediate variables and consequently the outcome or the dependent variables of infant health and child survival.

This article does not cover all the relationships of independent maternal and environmental factors with the intermediate variables of breast-feeding,

birth-spacing and birth-weight. Instead, it examines the effects of intermediate variables on infant morbidity and survival, taking into account the influence due to independent variables.

In order to set the context for the following discussion, information on key indicators for 25 selected countries and areas in the Asian and Pacific region are shown in table 1. (Information for other countries and territories was not available or was missing for most of the items.) Infant mortality rates range from as low as five per thousand live births in Japan to 171 in Afghanistan. The proportion of infants with a low birth-weight also varies considerably from a low figure of 5-6 per cent in China, Hong Kong, Japan, Republic of Korea, Singapore, Islamic Republic of Iran, Australia and New Zealand to a high proportion of 20 per cent or more in the Lao People's Democratic Republic, Afghanistan, Bangladesh, India, Pakistan, Sri Lanka and Papua New Guinea. Somewhat similar differentials exist for other indicators such as the proportion of infants breast-feeding at six months, access to safe drinking water, access to health services, and the proportion of births attended by professional health staff.

In the Asian and Pacific region, on the one end of the continuum are countries (for example, Cambodia, Lao PDR, Viet Nam, Afghanistan, Bangladesh, Bhutan, India, Nepal and Pakistan) with higher levels of infant mortality and poorer access to health services, and on the other end are more developed societies (Hong Kong, Japan, Republic of Korea, Singapore, Australia and New Zealand). Interestingly, countries with better access to health services and lower infant mortality are also the ones which manifest lower prevalence of breast-feeding. It seems, therefore, that a high level of economic development, with its accompanying better access to health services and more hygienic environments, helps to offset the detrimental consequences of lower prevalence and short duration of breast-feeding in these countries. On the other hand, a high prevalence and prolonged duration of breast-feeding helps to reduce the detrimental effects of poor hygienic environments in economically less developed countries.

Breast-feeding and morbidity

The World Health Organization (WHO) estimates that 14.6 million children under the age of five die annually in developing countries because of three most common causes: (a) diarrhoeal diseases (4 million), (b) infections, particularly acute respiratory infections (2.8 million) and (c) malnutrition (WHO, 1990). It is now well known that the practice of breast-feeding can greatly reduce the morbidity and mortality due to these causes (see, for example, Victoria *et al*., 1987; Feachem and Koblinski, 1984; and Kovar *et al*., 1984).

Table 1: Background characteristics for selected countries and areas in the ESCAP region

Country or area	Infant mortality rate (per 1,000 births) 1988	Infants with low birth weight (%) 1982-1988	Breast-feeding at 6 months[1] (%) 1980-1987	Access to safe water (proportion of total population) (%) 1985-1987	Access to health services[2] (%) 1985-1987	Births attended by health staff[3] (%) 1983-1988
East Asia						
China	31	5	60	NA	NA	NA
Hong Kong	8	5	NA	NA	NA	92
Japan	5	5	52	NA	NA	100
Mongolia	44	10	NA	NA	NA	99
Republic of Korea	24	6	40	77	93	70
South-east Asia						
Cambodia	127	NA[4]	93	3	53	47
Indonesia	84	14	97	38	80	31
Lao People's Democratic Republic	109	39	99	21	67	NA
Malaysia	24	10	NA	84	NA	82
Myanmar (Burma)	69	16	NA	27	33	57
Philippines	44	18	70	52	NA	57
Singapore	9	6	NA	100	100	100
Thailand	38	12	79	64	70	40
Viet Nam	63	18	NA	46	80	99

South Asia						
Afghanistan	171	20	NA	21	29	8
Bangladesh	118	28	86	46	45	5
Bhutan	127	NA	NA	NA	65	7
India	98	30	NA	57	NA	33
Islamic Republic of Iran	61	5	NA	76	78	82
Nepal	127	NA	92	29	NA	6
Pakistan	108	25	92	44	55	24
Sri Lanka	32	28	92	40	93	87
Pacific						
Australia	9	6	40	NA	NA	NA
New Zealand	10	5	NA	NA	NA	NA
Papua New Guinea	57	25	NA	27	NA	34

Source: Grant, J.P. (1990). *The State of the World's Children 1990*, (New York, UNICEF).

Notes:
1. Per cent of mothers either wholly or partially breast-feeding;
2. Proportion of total population with access to health services; and
3. Health personnel, including physicians, nurses, midwives, trained primary health care workers or trained traditional birth attendants.
4. NA = not available.

The most important parameter of infant health is growth (in both height and body weight). Disease and malnutrition have a retarding effect on both, and they are often interlinked. While malnutrition increases susceptibility to infection, repeated episodes of infections, particularly diarrhoea, may leave a child weak and undernourished. The occurrence of both malnutrition and infections in infants and young children has been found to be related to breast-feeding (or rather the lack of it) as is the more rapid return of fecundity following child-birth in women not breast-feeding. In those not using any contraceptive methods, the decision not to breast-feed may mean a short birth interval between the current and the next child, which may in turn adversely affect the health of not only the mother but also of her children.

Nutritional aspects

In 1985, a WHO multinational study on breast-feeding concluded that "breast milk is the most economical food for young babies" (WHO, 1985). It also found that most mothers are able to produce enough milk to satisfy all the nutritional needs of young babies, but when a baby reaches a body weight of 7 kg, few mothers can meet those needs. It thus recommended that diet supplementation should begin only between four and six months after birth. Since breast milk changes with time in relation to the nutritional requirements of the infant and to the dietary intake of the mother, there is no one "standard" breast milk. However, all nutrients needed by the infant, including proteins, carbohydrates, minerals and trace elements, are present in breast milk. The knowledge accumulated over the past years about the composition of breast milk has enabled producers of formula milk to improve their products considerably from a nutritional point of view – so much so that different varieties of formula milk are available for infants of different ages.

With regards to the suitability of animal milk for infants, WHO recommends that they be diluted for very young infants as both cow's and buffalo's milk contain excessive fat, protein and solutes, which the infant may have problem digesting. However, the quality of animal milk can vary considerably depending on what and how much the animal eats. Moreover, in certain developing countries, commercially available animal milk is often already diluted (sometimes with unreliable water) and thus there is always the risk of over-dilution if mothers are advised to dilute milk. Similar risk of over-dilution also exists with formula milk.

The impact of breast-feeding on infant health is not as much in terms of the nutritional value of breast milk as the mechanism of breast-feeding which is least affected by the environmental load of infections. In poor hygienic environments, bacteria, parasites and viruses can easily be transmitted to infants through the process of feeding by bottle. In contrast, breast milk transmits the mother's antibodies against infection, as discussed below.

Protection from infections

The greatest advantage of breast milk over substitutes is that breast milk contains antibodies against bacterial and viral agents that cause diarrhoeal and other infections in the infant.

Data from developing countries indicate an increased risk of diarrhoea at the introduction of weaning foods and, controlling for other factors, among children not breast-fed as compared with those breast-fed. The inherent properties of breast milk, which – contrary to artificial feeding – involve no food preparation or storage, consequently, protect against enteric infection that would lead to diarrhoea. In addition, the secretory immunoglobulin A (SIgA) component of human milk contains antibodies against rotavirus, the major cause of diarrhoea, and against several other viruses. The "anti-infective" properties of breast milk are particularly important for infant and child health in tropical countries where bacteria can multiply more rapidly owing to warmer weather and for babies born to under-privileged mothers who have inadequate access to a clean water supply and waste disposal facilities and thus are surrounded by poor hygiene conditions.

The information on the relationship between the method of feeding and the incidence of diarrhoea episodes or other infections comes from a wide variety of sources, including hospital-based studies, case-control studies and retrospective surveys. At the national level, the Demographic and Health Surveys (DHS), which are on-going in selected developing countries since 1985, provide the most recent information on the breast-feeding status of the last child at the time of the interview and the occurrence of diarrhoeal episodes in the 24-hour and two-week periods prior to the survey. The Surveys' Country Reports published so far, however, do not present results on the occurrence of diarrhoea by breast-feeding status of the child, although it is expected that further in-depth studies would focus coverage on this topic.

The only study known to us which has used the DHS data comes from Thailand. Using data from the 1987 Thailand Demographic and Health Survey (TDHS), Bunnag *et al*. (1989) found that, among children less than two years old, the occurrence of diarrhoea in the previous 24 hours and during the two previous weeks was about three percentage points higher among children not breast-feeding than those breast-feeding (table 2). These differentials do not account for the effects due to correlated factors such as availability of safe drinking water, place of residence and mother's education. The adjustment for the urban-rural place of residence and mother's education brought out a stronger relationship between practice of feeding and diarrhoea showing that children not breast-feeding experienced a five-percentage-point higher risk of diarrhoea

Table 2 : Percentage of children — aged two years or younger — having diarrhoea in 24 hours and two weeks prior to survey, by breast-feeding status and rural-urban residence, Thailand, 1987

Breast-feeding status	% with diarrhoea in prior 24 hours			% with diarrhoea in prior two weeks		
	Total	Urban	Rural	Total	Urban	Rural
Total	8.6	9.3	5.4	22.4	24.0	14.9
Not being breast-fed	10.3	11.8	6.5	23.7	26.3	17.2
Still being breast-fed	7.7	8.2	3.7	21.6	22.9	11.3

Source: Bunnag *et al*. (1989).

than those breast-feeding (table 3). No additional reports are yet available using the DHS data for other countries to examine the relationship between the occurrence of diarrhoea and breast-feeding.

A case-control study of children under 36 months of age in Matlab district, Bangladesh, showed a 70 per cent reduction in the risk of severe cholera among breast-fed children (Clemens *et al*., 1990). Exclusive breast-feeding during infancy appeared to be associated with nearly absolute protection against cholera, and the relationship between breast-feeding and a reduced risk of diarrhoea was upheld even when potentially confounding demographic, socio-economic and nutritional variables were controlled.

Another study in India, which followed babies born in a hospital in Vellore (Tamil Nadu State), compared the growth and morbidity among exclusively breast-fed and formula-fed children (Unni and Richard, 1988). The weight and growth of breast-fed infants was much more adequate up to 10 weeks than those fed artificially. Episodes of diarrhoea were also much less frequent among exclusively breast-fed infants (table 4). In Indonesia, a study found about 5-8 times higher relative risk of diarrhoea among artificially fed infants of 4-12 months than among those who were breast-fed (Rohde, 1982).

Using hospital records of 9,622 infants delivered at a large hospital in Manila, the diarrhoeal illness rates were found to be 48, 13 and 0.9 per thousand for infants bottle-fed, partially breast-fed and exclusively breast-fed, respectively (Clavano, 1982). Some additional studies from the Asian and Pacific region supporting the general finding of better protection against diarrhoeal diseases and infections are cited in Jason *et al*. (1984), Feachem and Koblinski (1984), and Huffman and Combest (1988).

Table 3: Unadjusted and adjusted* percentages of children aged two years or younger having diarrhoea in prior two weeks, by selected characteristics, Thailand, 1987

Background characteristics	Unadjusted (%)	Adjusted (%)
Total	22.6	22.4
Place of residence		
Rural	24.0	23.8
Urban	14.9	15.8
Mother's Education		
0-3 years	29.8	29.6
4-6 years	22.6	22.5
Secondary or above	14.9	15.5
Breast-feeding status		
Not breast-feeding	23.7	25.7
Still breast-feeding	21.6	20.4

Source : Bunnag *et al.* (1989).

Note : * Adjusted percentages are based on multiple classification analysis (MCA).

Table 4: Percentage of infants having diarrhoea, by age and breast-feeding status, Vellore, India, 1983

Age (in weeks)	Breast-feeding	
	Exclusive	Artificial
	% with diarrhoea	
6	2 (221)*	24 (50)
10	1 (150)	13 (62)
14	0 (112)	8 (80)
18	4 (75)	21 (86)
22	5 (60)	33 (108)

Source : Unni and Richard (1988).

Note : * Number of infants is given in parentheses.

Whereas the evidence of the advantages of breast-feeding against infant morbidity and mortality is well documented for developing countries, it is sometimes debated if such effects are prevalent in developed countries where standards of nutrition and environmental hygiene are much higher and access to health services is far better (Bauchner *et al.*, 1986). Two recent studies from the United States (Wright *et al*., 1989) and Scotland (Howie *et al.*, 1990) show that the health benefits of breast-feeding are equally valid in developed countries. In the Pacific subregion, a study from New Zealand examined the relationship between the method of infant feeding and health during the first 16 weeks of life, by prospectively following a cohort of 1,210 children (Fergusson *et al*., 1978). In the first 16 weeks, formula-fed infants were five times more likely to have gastrointestinal symptoms than those exclusively breast-fed (table 5). The differentials were less marked for respiratory and other infections. There was, however, no significant relationship between type of feeding and mortality before 16 weeks. Although less marked than in developing countries, the advantages of breast-feeding against infections, especially gastrointestinal ones, are also found in developed countries. This also implies that the health benefits of breast-feeding are not due only to the avoidance of contaminated foods.

Birth-spacing and child survival

By extending the period of post-partum infertility, prolonged breast-feeding enhances the chances of child survival. It is now well established that short intervals between births are detrimental to the health of the mother and of the children born at both ends of the interval. Both pregnancy and lactation require supplementation of the mother's normal diet and a short interval does

Table 5: Percentage of infants with symptoms of common illness during the first 16 weeks of life, by method of feeding*, Christchurch, New Zealand

Method of feeding	Symptoms (%)			
	Respiratory	Gastro-intestinal	Rash	Number
Total	55.3	26.3	51.4	1210
Exclusively breast milk	51.5	6.8	56.8	132
Primarily breast milk	47.8	12.2	61.5	278
Primarily cow's milk	58.5	34.6	57.7	518
Exclusively formula-fed	58.5	34.0	53.2	282

Source: Fergusson *et al.* (1978).

Note: * Differences are statistically significant at the 0.05 or higher level.

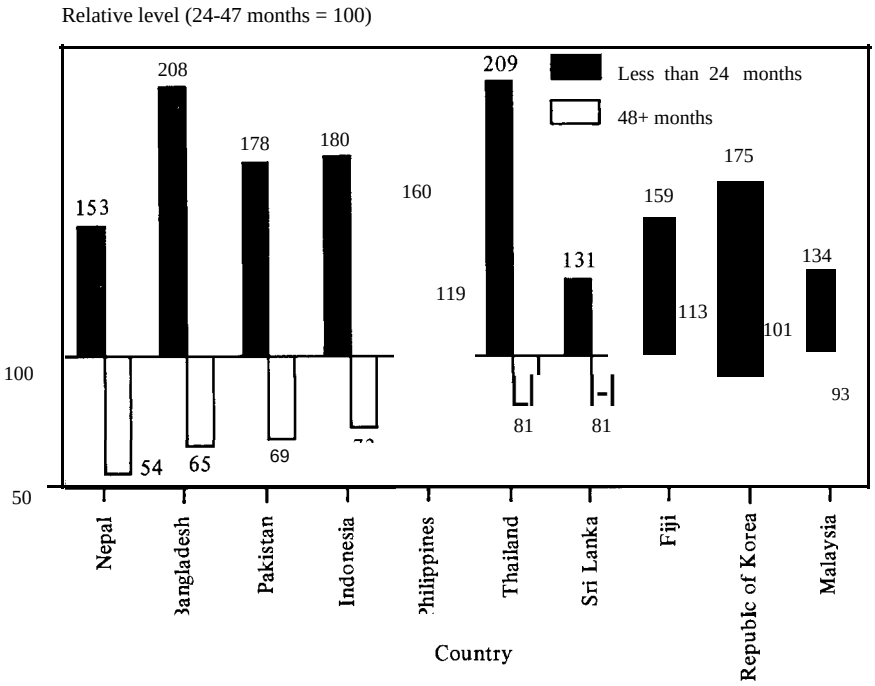
not give the mother sufficient time to recuperate from the birth and to replenish her stores of nutrients used during pregnancy. A continuously short cycle of pregnancy and lactation leads to a progressively higher risk of low birth-weight babies who have lower chances of survival in the early years. In addition, births of two children in quick succession pose constraints for the mother in caring for and rearing them.

Findings from the World Fertility Survey (WFS) have provided convincing evidence about the exceptionally high mortality rates among children born after a short birth interval. Children born at an unusually short period before the birth of another child are also exposed to high mortality (Rutstein, 1983). Based on the analysis of 29 developing countries which participated in the WFS Programme, Rutstein (1983) concluded that children born within 24 months following the preceding birth suffer 78 per cent excess infant morrality as compared with those born after a more normal interval of 24 to 47 months. The relative risk of dying before 12 months ($_1q_0$) for children born less than 24 months and after 48 months from the preceding birth, as compared with the more "normal" length of 24-47 months, is shown in figure 2 for 10 countries of the Asian and Pacific region participating in the WFS. In all countries, children born after a short birth interval are more likely to die than children born after a more normal length of time. The differences in survival chances are most marked for Bangladesh and Thailand where the level of infant mortality for children born during the 24-month period following a birth was twice that of children born after 24 to 47 months. High levels of mortality among children born after the short interval persist, even when analysis is restricted to children where the preceding sibling survived until the child's birth or at least two years.

In addition, higher levels of mortality are found up to age five in children born within 24 months from the time of the preceding birth as compared to those born after 24 months. In the 29 developing countries included in the analysis by Rutstein (1983), children born within a period of 24 months of the preceding birth suffered excess mortality of 42 per cent between age one and two years, relative to those born 24-47 months after the preceding birth. During the next three years of life, mortality was 34 per cent higher among those born within 24 months of the preceding birth.

Further work by Hobcraft *et al*. (1983) provided evidence of birth-spacing effects on infant and child mortality in a multivariate context by adjusting for the educational level of the mothers. These results suggest that delaying a child's birth by a minimum of two years could almost halve the risk of dying before the age of five. The results on birth-spacing effects, impressive as they are in their magnitude and persuasiveness, do not, however, provide direct proof of the advantages of breast-feeding. This is so because prolonged birth-spacing can

Figure 2: Relative levels of infant mortality by length of previous birth interval (24-47 months = 100) in selected Asian and Pacific countries



be achieved by breast-feeding, and by contraceptive use, or a combination of both. However, lactational infertility accounted for a greater reduction in marital fertility than contraceptive use among seven (Bangladesh, Indonesia, Nepal, Pakistan, Republic of Korea, Sri Lanka and Thailand) of the 10 countries for which results on infant mortality are shown in figure 2. In the other three countries, namely, Fiji, Malaysia and Philippines, the fertility-reducing effects of contraceptives were more substantial than that of breast-feeding (Cleland *et al.*, 1984). In countries of South Asia (Bangladesh, Nepal and Pakistan) breast-feeding was found to be the main mechanism for prolonged birth intervals and, therefore, it accounted for the indirect effects on infant and child survival through birth-spacing.

It should be noted, however, that the importance of breast-feeding for birth-spacing becomes more pronounced in countries with a low prevalence of contraceptive use and the relationship between prolonged breast-feeding and longer birth intervals is observed at the aggregate levels rather than for individual women.

Women who breast-feed their children for short periods are, other things being equal, more likely to experience short birth intervals, which consequently result in greater risks of dying for the newborn throughout infancy and as long as five years after birth.

The role of breast-feeding in the birth-spacing effects on infant and child survival was further examined for Nepal by Retherford *et al.* (1989) and for Malaysia by Butz *et al.* (1984) and Millman and Cooksey (1987). These studies considered a number of confounding social and demographic factors in a multivariate context. In Nepal, breast-feeding explained almost all the effects of the following birth interval on infant survival. Breast-feeding relative to not breast-feeding accounted for an 80 per cent reduction in mortality from birth to age 18 months. These large breast-feeding effects were attributed to poorer nutritional levels of infants after weaning than before, combined with water and food, which are frequently contaminated, and a general situation of inadequate sanitation and medical services.

Using data from the 1976 Malaysian Family Life Survey, Butz *et al.* (1984) found that breast-feeding had a significant protective effect that was greatest with full breast-feeding in the first month of life. Such factors as sanitation, maternal age, maternal education, birth weight and birth order were considered in the analysis in addition to the type of feeding. The possibility of breast-feeding termination due to the death of the infant was also taken into account. Using the same data, Millman and Cooksey (1987) attempted to control the confounding effects due to birth weight, mother's health status at birth, her age at birth, and her literacy level and urban-rural place of residence as well as birth order. Both studies found that adjusting for the effects of birthweight did not alter the large effects of breast-feeding and birth-spacing on infant mortality. Some of the birth-spacing effects on child survival were due to association with breast-feeding, but both the birth interval and breast-feeding had significantly independent effects on child survival as well.

Conclusions

The conclusions of this review are straightforward: breast-feeding offers advantages in terms of reduction in infant morbidity and mortality in both developing and developed countries of the Asian and Pacific region. In the developing countries of the region, where the general environmental load of infection is high owing to poor sanitation standards, breast-feeding plays a vital role in protecting infants and children from infections and death. For example, breast-feeding accounted for a "net" reduction of 80 per cent of infant mortality in Nepal and 70 per cent in Malaysia. In the case of Malaysia, the analysis controlled the potential biases due to varying proportions of low birth-weight babies and due to death terminating breast-feeding. In Bangladesh, an estimated 70 per cent reduction in the risk of infant deaths due to cholera was attributed to breast-feeding.

The indirect influence of breast-feeding in improving the survival chances of infants and children, by contributing to longer birth intervals due to lactational amenorrhoea, is also substantial. Children born less than two years after the birth of their next oldest sibling are twice as likely to die within five years of age as those born after four years. Since contraceptive prevalence remains low in most of these countries, lactational infertility contributes significantly to lower fertility and longer birth intervals, both of which have a direct impact on both maternal and child health.

The advantages of breast-feeding can be traced to a number of its unique properties, including its nutritional value, protection against contaminated food and water sources, and its contribution to better care associated with longer birth-spacing because of lactational amenorrhoea. Increasing urbanization or economic pressures on urban families, not to mention the easy availability and promotion of formula milk, may be causing breast-feeding to decline in developing countries. However, in most developing countries of the region, the investments needed for raising standards of sanitation and health services to those in developed countries are generally unavailable. Thus, it is extremely important to preserve traditional breast-feeding practices, especially in changing urban environments.

In the developed countries, on the other hand, the prevalence of breast-feeding is lower than in developing countries. In spite of this, infant mortality and morbidity are much lower in those countries, mainly because of very high standards of sanitation and accessibility to health services. Furthermore, the practice of contraception is high and any loss of benefits from lactational amenorrhoea is well made up by the use of contraceptives. Under these circumstances, the liberation offered by artificial feeding does not compromise the benefits of natural feeding. However, as studies from New Zealand, the United States and Scotland show, even when conditions are generally favourable for infant health and survival, breast-feeding can still contribute to improved health.

The important policy implication for developing countries of the region that emerges from this analysis is that while they contrive to improve sanitation standards as well as increase contraceptive prevalence, it is necessary to preserve and promote breast-feeding. The advantages of breast-feeding are enhanced further when economic and psychological costs for its substitution are considered — a subject that has not been covered in this article.

Annex: Methodological constraints

Studies on the association between breast-feeding and infant morbidity and mortality are of a non-experimental type, because randomized controlled trials, in which infants are randomly assigned to be fed either formula or breast milk, are ethically unacceptable. However, non-experimental studies based on

retrospective reports or prospective follow-up carry two main methodological constraints. First, in such studies the direction of causation remains obscure when detailed sequencing of events relating to breast-feeding and episodes of disease or death are not available. For example, a woman may stop breast-feeding her child when the child has diarrhoea, or the death of the infant can terminate breast-feeding. In such cases, morbidity or mortality affect breast-feeding rather than the opposite. Such constraints can be overcome by an accurate and detailed retrospective accounting of breast-feeding status and episodes of diseases or death, or by prospective follow-up of infants.

Second, there may be a "common cause" for breast-feeding and morbidity or mortality unaccounted in the analysis that may produce a spurious relationship between the two by increasing both the risk of morbidity and mortality and also reducing the probability of breast-feeding. Some of the common causes are the proportion of premature or low-weight births, congenital malformation, the health and socio-economic status of the mother. To the extent that the incidence of premature or low-weight births varies among "breast-feeding" and "not breast-feeding" groups, the rates of morbidity or mortality may be due more to these factors than to the infants' breast-feeding status. Socio-economic status, especially the educational level of mothers, has an important bearing on the caring and rearing of children as well as access to health services. Thus, the "true" or "net" advantages of breast-feeding for protecting against infant morbidity and mortality can be better ascertained when the effects of education are controlled.

Any review of evidence on breast-feeding effects across countries or over time faces some additional constraints. The data quality often varies by country and for different sub-groups in a country. Retrospective reports on duration of breast-feeding are especially prone to heaping biases as a result of digital preference (Shah, 1984) and the information about the infant who later died may be less accurate than for the one who survived. The quality of data on the age of the child may also be defective and this may vary by country and socio-economic sub-group. Another difficulty in comparing results from different studies surrounds the definition of breast-feeding and of outcome variables (morbidity or death). The effects of breast-feeding on birth-spacing and morbidity differ to the extent that it is supplemented by artificial milk. The age at which supplementation is introduced as well as the distinction between "full" and "partial" breast-feeding are important for a clearer examination of advantages attributed to breast-feeding. Studies do not always provide definitions of key variables and how these were measured.

The comparison of results from different studies is also affected by variation in study design. The single-round cross-sectional surveys with retrospective reports or status at the time of the interview yield information which is not always comparable with the information from case-control or

prospective studies. Studies on this subject also differ in terms of the sample of births included in the analysis of breast-feeding effects. For example, some studies consider all births in the five or ten year period preceding the survey while others consider last births or next-to-last births. Finally, the application of varying statistical techniques also hampers the comparability of results from different studies.

In view of the above, Bauchner *et al.* (1986) questioned the validity of the protective effects of breast-feeding for infections among infants. However, more careful analyses have established the "net" positive effects of breast-feeding for protecting infants against infections and excessive mortality. For example, Habicht *et al.* (1986) in their analysis of data for Peninsular Malaysia specifically considered the question of reversed causation from death precluding breast-feeding and biases due to confounding factors. They noted that after adjusting for these biases, unsupplemented breast-feeding appeared substantially more beneficial for infant survival than supplemented breast-feeding and the "net" effect of breast-feeding was estimated to have halved the level of infant mortality after the first week of life. Another study, based on a case-control design, investigated the relationship between infant-feeding patterns and mortality due to infectious diseases among children aged less than a year in two metropolitan areas in southern Brazil (Victoria *et al.*, 1987). After adjusting for such factors as age of the child, social status of the mother, birth-weight, type of housing, availability of piped water, birth-interval and maternal education, infants who were fed exclusively on formula milk (or foods) experienced risk of death due to diarrhoea that was 16 times higher relative to those who were exclusively breast-fed (table 6). Compared with

Table 6: Adjusted relative risk* of infant mortality due to infectious diseases by type of milk consumed, southern Brazil, 1984 -1985

Type of milk	Type of disease		
	Diarrhoea	Respiratory infections	Other infections
Breast only	1.0	1.0	1.0
Breast + formula	4.5	2.1	0.1
Breast + cow's	3.4	1.2	1.4
Formula only	16.3	3.9	2.3
Cow's only	11.6	3.3	2.6

Source: Victoria *et al.* (1987).

Note: * The risks are relative to exclusive breast-feeding (set equal to one) and are adjusted for age of the child, social status, birth weight, type of housing, availability of piped water, birth-interval and maternal education.

infants who were exclusively breast-fed, partial breast-feeding and feeding by formula only, or cow's milk, were associated with higher risk of death due to diarrhoea, respiratory and other infections.

The presentation of all methodological problems and their associated biases is beyond the scope of this article. The review of studies it contains, however, provides irrefutable evidence of the advantages of breast-feeding that was unaffected by these biases.

References

Anderson, J.E., J.S. Marks and T.-K. Park (1984). "Breast-feeding, birth interval, and infant health", *Pediatrics*, No. 74 (Supplement), pp. 695-701.

Bauchner, H., J.M. Leventhal and E.D. Shapiro (1986). "Studies of breast-feeding and infections; how good is the evidence?", *Journal of American Medical Association*, vol. 256, No. 7, pp. 887-892.

Bunnag, Aurapin, P. Sakuntanaga and K. Wongboonsin (1989). "Occurrence and correlates of diarrhoea among Thai children" in *Health and Population Studies Based on the 1987 Thailand Demographic and Health Survey*, (Bangkok, Institute of Population Studies, Chulalongkorn University).

Butz, W.P., J.-P. Habicht and J. Da Vanzo (1984). "Environmental factors in the relationship between breast-feeding and infant mortality: The role of sanitation and water in Malaysia", *American Journal of Epidemiology*, vol. 119, pp. 516-525.

Clavano, N.R. (1982). Mode of feeding and its effect on infant mortality and morbidity, *Journal of Tropical Pediatrics*, vol. 28, pp. 287-293.

Cleland, John, John B. Casterline, Susheela Singh and Hazel Ashurst (1984). "The effects of nuptiality, contraception and breast-feeding on fertility in developing countries", *International Family Planning Perspectives*, vol. 10, No. 3, pp. 86-93.

Clemens, John D, D.A. Sack, J.R. Harris, M.R. Khan, J. Chakraborty, S. Chowdhury, M.R. Rao, F.P.L. Van Loon, B.F. Stanton, M.D. Yunus, M.D. Ali, M. Ansaruzzaman, Ann-Mari Svennerholm and J. Holmgren (1990). "Breast-feeding and the risk of severe cholera in rural Bangladeshi children", *American Journal of Epidemiology*, vol. 131, No. 3, pp. 400-411.

Feachem, R.G. and M.A. Koblinski (1984). "Interventions for the control of diarrhoeal diseases among young children: promotion of breast-feeding", *Bulletin of the World Health Organization*, vol. 62, No. 2, pp. 271-291.

Fergusson, D.M., L.J. Horwood, F.T. Shannon and B. Taylor (1978). "Infant health and breast-feeding during the first 16 weeks of life", *Australian Pediatric Journal*, vol. 14, pp. 254-258.

Habicht, J.-P., J. Da Vanzo and W.P. Butz (1986). "Does breast-feeding really save lives or are apparent benefits due to biases?", *American Journal of Epidemiology*, vol. 123, No. 2, pp. 279-289.

Hobcraft, J., J.W. McDonald and S. Rutstein (1983). "Child-spacing effects on infant and early child mortality", *Population Index*, vol. 49, No. 4, pp. 585-618.

Houston, Mary J. (1986). "Breast-feeding, fertility and child health: a review of international issues", *Journal of Advanced Nursing*, vol. 11, pp. 35-40.

Howie, P.W., J.S. Forsyth, S.A. Ogston, A. Clark and C. Florey (1990). "Protective effect of breast-feeding against infection", *British Medical Journal*, vol. 300, pp. 11-16.

Huffman, S.L. and C. Combest (1988). *Breast-feeding: a prevention and treatment necessity for diarrhea*, (Washington, D.C., Center to Prevent Childhood Malnutrition).

Jason, J.M., P. Nieburg and J.S. Marks (1984). "Mortality and infectious diseases associated with infant-feeding practices in developing countries", *Pediatrics*, vol. 74 (Supplement), pp. 702-727.

Kovar, M.G., M.K. Serdula, J.S. Marks and D.W. Fraser (1984). "Review of the epidemiologic evidence for an association between infant feeding and infant health", *Pediatrics*, No. 74, pp. 615-638.

Millman, Sara R. and C. Elizabeth Cooksey (1987). "Birth weight and effects of birth-spacing and breast-feeding on infant mortality", *Studies in Family Planning*, vol. 18, No. 4, pp. 202-212.

Retherford, Robert D., Minja Kim Choe, Shyam Thapa and Bhakata B. Gubhaju (1989). "To what extent does breast-feeding explain birth-interval effects on early childhood mortality?", *Demography*, vol. 26, No. 3, pp. 439-451.

Rohde, J.E. (1982). "Mother's milk and the Indonesian economy: a major national resource", *Journal of Tropical Pediatrics*, vol. 28, No. 4, pp. 166-174.

Rutstein, Shea O. (1983). *Infant and child mortality: levels, trends and demographic differentials*, Comparative Studies Series No. 24, (Voorburg, Netherlands, International Statistical Institute).

Shah, Iqbal H. (1984). "Socio-economic differentials in breast-feeding", Chapter 8 in *Fertility in Pakistan: A Review of Findings from the Pakistan Fertility Survey*, Iqbal Alam (ed.), (Voorburg, Netherlands, International Statistical Institute).

Unni, J.C. and J. Richards (1988). "Growth and morbidity of breast-fed and artificially-fed infants in urban South Indian families", *Journal of Tropical Pediatrics*, No. 34, pp. 179-181.

Victoria, Cesar G., J.P. Vaughan, C. Lombardi, S.M.C. Fuchs, L.P. Gigante, P.G. Smith, L.C. Nobre, A.M.B. Teixeira, L.B. Moreira and F.C. Barros (1987). "Evidence for protection by breast-feeding against infant deaths from infectious diseases in Brazil", *The Lancet*, vol. 2, No. 8554, pp. 319-322.

World Health Organization and United Nations Children Fund (1981). *Infant and Young Children Feeding: Current Issues*, (Geneva, World Health Organization).

World Health Organization (1985). *The Quantity and Quality of Breast Milk: Report on the WHO Collaborative Study on Breast-feeding*, (Geneva, World Health Organization).

_____(1989). "Research on improving infant feeding practices to prevent diarrhoea or reduce its severity: Memorandum from a Johns Hopkins University/World Health Organization Meeting", *Bulletin of the World Health Organization*, vol. 67, No. 1, pp. 27-33.

_____(1990). Global estimates for health situation assessment and projections 1990, WHO Document WHO/HST/90.2, (Geneva, World Health Organization, April).

Wright, A.L., C.J. Holberg, F.D. Martinez, W.J. Morgan and L.M. Taussig (1989). "Breast-feeding and lower respiratory tract illness in the first year", *British Medical Journal*, vol. 299, pp. 946-949.

Breast-feeding and Return to Fertility: Clinical Evidence from Pakistan, Philippines and Thailand

Breast-feeding frequency alone is not a useful measure of breast-feeding stimulus in predicting the return of fertility (fecundity)

By Kathy I. Kennedy*

Breast-feeding is known to prevent women from becoming pregnant under certain circumstances. In recent years, reproductive physiologists have been studying the hypothalamic-pituitary-ovarian axis to learn more precisely how lactation postpones the return of "fertility," or fecundity. Family planning

* The author of this article is a Research Associate with Family Health International (FHI) in Research Triangle Park, North Carolina, United States. Support for this work was provided by FHI under a co-operative agreement with the U.S. Agency for International Development, The views expressed in this article do not necessarily reflect those of USAID. Reviews of this manuscript by Shyam Thapa, Nancy Williamson and Cynthia Visness are gratefully acknowledged. The investigators responsible for the primary research projects are Drs. Talat Kahn, Afroze Kazi, Boonsri Israngkura and Rowe Cadelina, and Ms. Gail Savina and Mrs. Monet Nakao. Their valuable contributions described within are gratefully acknowledged.

The frequency with which this young mother from one of Thailand's hill-tribes breast-feeds her baby may determine how soon she becomes fecund, and thus is an important fertility-regulating variable.

researchers are interested in knowing not only how breast-feeding inhibits ovulation, but how the return of fertility can be predicted during breast-feeding so that its natural contraceptive benefit can be relied upon with confidence.

"Fertility" in the lactating woman can be defined in various ways. Of course, a subsequent pregnancy during breast-feeding is considered definitive evidence of fertility. There are also various hormonal criteria for ovulation, and when sequential urine or serum samples are assayed for ovarian steroids and gonadotropins, a determination can be made about whether ovulation has occurred and whether progesterone production is sufficient to sustain a pregnancy.

In the absence of laboratory tests, the return of menses is a good proxy for the recovery of "fertility." Sometimes the first menses is preceded by ovulation and sometimes ovulation follows, but on balance, especially in large samples, menses can be considered a reasonable indication of fertility. It has been hypothesized that a woman's body requires some minimum amount of breast-feeding stimulus to suppress ovulation. The suckling of the baby exerts pressure on the nipple which creates a neural stimulus that is received at the hypothalamus. Two of the hypothalamic responses are increased beta endorphin secretion and decreased production of gonadotropin releasing hormone (GnRH), although the relationship between these two consequences is not clear. Exposed to little or no GnRH, the anterior pituitary is inhibited from secreting luteinizing hormone and accordingly, the ovary remains quiescent. Dopamine secretion is also inhibited by the suckling stimulus, to which the pituitary responds with increased prolactin production.

Prolactin and oxytocin (the pituitary hormones associated with milk production and the milk ejection reflex, respectively) are produced in peaks during episodes of breast-feeding. Prolactin gradually decreases to a basal level (albeit elevated above the norm for non-lactating women) until the next episode of breast-feeding, when the cycle repeats itself. Therefore, the basal level of prolaction is elevated when breast-feeding episodes are frequent. It is unknown whether prolactin returns a signal to the hypothalamus to suppress dopamine secretion, or whether prolactin plays a more direct role, inhibiting gonadotropin secretion or even ovarian activity (McNeilly, 1988, McNeilly, Glasier and Howie, 1985). Regardless of whether the production of prolactin (or oxytocin) is causally related to the suppression of fertility, the patterns of their production and secretion reflect the pulsatility of the neuro-endocrine stimulus produced by breast-feeding. This has led researchers to conclude that the frequency of breast-feeding episodes is an important characteristic of the breast-feeding stimulus, and accordingly, an important variable to measure.

It seems clear that the threshold of nipple stimulation (through breast-

feeding) that is required to inhibit ovulation is highly subject to individual variation. Women and their clinicians will testify that some mothers will not have menses and/or will be unable to conceive a desired pregnancy until after they have totally weaned the breast-feeding child. In such women, the inhibitory response to suckling is quite strong. In contrast, other mothers will ovulate, resulting in vaginal bleeding or conception, in response to relatively small decreases or even the absence of changes in suckling frequency (see table 1 section B). Indeed, even when the mother's hormone profile is known, it is difficult to predict when increasing levels of estrogen production will result in ovulation and the adequate luteinization required to maintain pregnancy.

Family Health International has undertaken several studies in Asia to better define the relationship between the breast-feeding stimulus and the return of fertility. At the outset, it was hoped that some aspect of breast-feeding behaviour could be found that would be observable to the breast-feeding mother and would also serve as an indicator of the end of natural infertility or the beginning of the resumption of pregnancy risk. Three prospective studies were conducted, and in all three, pregnancy and vaginal bleeding were the outcome variables indicative of fertility. In one study, in Bangkok, ovarian hormones were also measured so that ovulation could be detected. In all three studies, breast-feeding frequency was measured in an attempt to quantify the breast-feeding stimulus. This article provides an overview of the design and key findings of these studies and draws some conclusions about the reliability of breast-feeding as a "contraceptive."

Breast-feeding, menses and pregnancy in Pakistan

Pakistan's National Research Institute for Fertility Control conducted a longitudinal study of breast-feeding women in the city of Karachi (Khan *et al.*, 1989). Twenty-eight normal parturients who planned to breast-feed their babies and refrain from practising hormonal contraception were followed up weekly for one year, unless they became pregnant earlier. Senior female health visitors conducted the weekly home visits during which they asked the volunteers about the occurrence of any vaginal bleeding and the practice of contraception. The volunteers were given picture charts on which to mark the occurrence of each breast-feeding episode as well as the provision of infant supplements. Among the women studied, the average (median) time until the first post-partum bleeding episode (the proxy for fertility) was 4.6 months (mean = 5.9 months). The time of the first bleeding ranged from two to more than 12 months post-partum.

Table 1 section A shows the distribution of cases according to the time when the first vaginal bleeding occurred. The breast-feeding frequencies per day, per night and per 24-hour period are also given. When the volunteers are cate-

Table 1: Breast-feeding frequencies by time of first menses, pregnancy, or first ovulation

		N	Mean (range) of breast-feeding frequency		
			per day	per night	per 24 hours
A.	Month of first bleed (Karachi)*				
	l-3	9	6.2 (3-8)	3.9 (2-5)	10.1 (5-13)
	4-6	7	4.7 (2-7)	3.0 (1-5)	7.7 (3-11)
	7-9	5	6.8 (4-8)	3.6 (3-5)	10.4 (7-13)
	10-12	1	5.0 (5)	4.0 (4)	9.0 (9)
	Total	22	5.8 (2-8)	3.5 (l-5)	9.4 (3-13)
	No bleed; at conception (31/2 months)	1	3.0 (3)	2.0 (2)	5.0 (5)
	No bleed; at termination (5 months)	1	6.0 (6)	3.0 (3)	9.0 (9)
	No bleed; at termination (≥ 1 year)	4	5.5 (3-8)	3.8 (2-5)	9.3 (5-13)
B.	Month of conception (Karachi)*				
	l-3	0			
	4-6	5	3.4 (1-5)	2.6 (l-4)	6.0 (2-9)
	7-9	5	5.6 (0-12)	2.8 (0-4)	8.4 (0-16)
	10-12	0			
	Total	10	4.5 (0-12)	2.7 (0-4)	7.2 (0-16)
C.	Month of first ovulation (Bangkok)**				
	1-3	4	6.3 (5-8)	4.0 (3-5)	10.3 (9-13)
	4-6	5	6.8 (3-9)	4.6 (3-6)	11.4 (6-15)
	7-9	7	4.7 (0-8)	2.9 (0-5)	7.6 (0-13)
	10-12	2	4.5 (2-7)	4.0 (3-5)	8.5 (5-12)
	>12	1	3.0 (3)	5.0 (5)	8.0 (8)
	Total	19	5.5 (0-9)	3.8 (0-6)	9.3 (0-15)

Sources: * Khan, Kennedy, Kazi and Steiner (1989).
** Israngkura, Kennedy, Leelapatana and Cohen (1989).

gorized according to the time of the first bleeding, as in this table, the mean values indicate that there is no appreciable difference in breast-feeding frequency between those whose amenorrhea ended early, midway through the year or late. No trend can be seen in the mean breast-feeding frequencies according to the duration of lactational amenorrhea. On average, the breast-feeding frequency of those with amenorrhea greater than one year in duration was the same (about nine episodes per 24 hours) as for those with amenorrhea of less than a year's duration.

The averages indicate that some uniform breast-feeding frequency – some uniform level of nipple stimulation – will result in the return of fertility in some women and in continued suppression of fertility in others. Yet if frequent breast-feeding produces surges in the pituitary hormone levels, then it would seem that some minimum frequency of breast-feeding should exist above which no woman will experience the recovery of fertility.

The ranges of breast-feeding frequency in table 1 section A indicate that in this small sample, no woman who breast-fed her child more than 13 times per day had menses. This finding could be tested in a larger number of Pakistani women. However, this minimum frequency of breast-feeding is actually quite high. For Western women who tend to have long breast-feeding episodes, i.e. 20-30 minutes apiece rather than short (5-7 minute) breast-feeding episodes, to breast-feed 14 times per day would have a paralysing effect on the mother's life. However, 14 *brief* episodes would be feasible, especially if the mother and baby were constantly together. The problem then becomes one of practicality.

Will a woman who is caring for children, doing household chores and often earning outside income have the interest, opportunity or discipline to tally her breast-feeding frequency to more than 13 episodes every day? Some early studies of breast-feeding and ovulation were able to define the minimum frequency of breast-feeding required to maintain anovulation as six. (McNeilly *et al.*, 1983; McNeilly *et al.*, 1985; Andersen and Schioler, 1982). These studies were among Scottish and Danish women for whom a breast-feeding episode takes a half hour, with suckling for comfort as much as for nourishment. Although European women do not necessarily have more time on their hands than women in Asia and the Pacific, if the breast-feeding score that one needed to reach was only six (albeit prolonged) feedings, then it might be more feasible to rely on a "magic number" to keep one's fertility from returning.

The ranges in table 1 section A underscore the other unwieldy characteristic of breast-feeding frequency as it relates to fertility, namely that the amount of breast-feeding stimulation required to postpone fertility varies widely. Menses returned in some women while they breast-fed their babies three times per day; in other women, the figure was 13 times per day. This means that many

women who breast-feed below the minimum threshold of 14 episodes may still enjoy natural protection, some of them for extended periods of time. So again, encouraging women to adhere to a minimum number of breast-feeding episodes per 24-hour period loses its appeal.

However, the naturalistic observations in table 1 section A do not necessarily negate the importance of frequent breast-feeding. Table 1 section B describes the subset of about a third of the women in table 1 section A who became pregnant while participating in the study. Since table 1 section A represents the initial potential recovery of fertility and table 1 section B represents definitive evidence of fertility, then the fact that breast-feeding frequency was lower at conception than at the end of amenorrhea reflects the relative influence of breast-feeding frequency on fertility. Generally speaking, for this group, ovarian activity began when the average breast-feeding frequency was nine, but full fertility was realized only after the average frequency was reduced by another 20-25 per cent to seven episodes.

Breast-feeding and ovulation in Thailand

A study conducted at the Pramongkutklao College of Medicine in Bangkok used the same study design as the Karachi study, but in addition to using the occurrence of vaginal bleeding or pregnancy as relative indicators of fertility, it measured the occurrence of ovulation (Israngkura *et al.*, 1989). To do this, each volunteer collected a 12-hour overnight urine sample once a week. The sample was assayed for pregnanediol-3-a-glucuronide, a metabolite of progesterone. Since progesterone is produced as a consequence of ovulation, only very low levels of pregnanediol are ordinarily detected unless a woman has ovulated.

In this study, when the amount of pregnanediol reached the lower limit of the range of pregnanediol produced after normal ovulation, then the volunteer was said to have ovulated. Ovulation is not positive proof that a woman is capable of subsequent pregnancy; for example, there may still be too little hormonal support for proper luteinization, resulting in what may appear to be normal menses. A study in Baltimore (United States) and Manila found that 41 per cent of first ovulations are characterized by abnormally low pregnanediol excretion (Gray *et al.*, 1990). Evidence of ovulation should, however, be considered a more precise marker of fertility than menses.

Table 1 section C displays information from the 19 mothers breast-feeding their babies in the Bangkok study arranged according to the month of the first post-partum *ovulation* (not *menses* as in table 1 section A of the Karachi study). Once again the large variation in breast-feeding frequency at the time of the fertility marker (ovulation) can be observed. One woman

first ovulated at a breast-feeding frequency of 15 episodes per day while another ovulated only after her baby was fully weaned.

There is a weak negative association between the duration of anovulation and breast-feeding frequency. However, this is the opposite of what one would expect if high frequency postpones fertility. More likely this is actually a reflection of the general gradual decrease in breast-feeding frequency as the children within this cohort grow older.

In sum, the Bangkok study concurs with the conclusions drawn from the Karachi study about breast-feeding frequency, but with the advantage of using a more precise measure of the dependent variable.

Breast-feeding education and return to menses in the Philippines

The studies in Karachi, Bangkok and Manila were attempts to measure the breast-feeding stimulus and the corresponding physiologic responses in order to learn how breast-feeding influences fertility. An experimental approach to learning about this relationship would involve manipulating the independent variable (breast-feeding) to determine if a change in the response (say, menses) could be induced. This experimental approach was taken in a study conducted through Silliman University in Dumagete, the Philippines (Savina and Kennedy, 1989). Two comparable rural communities were selected. One was designated as the experimental community and the other the control. In the experimental community, a breast-feeding education programme was conducted with the purpose of promoting more frequent and intensive breast-feeding, to postpone weaning and to confront local myths that are contrary to sound breast-feeding practices. Health educators established small classes among 5-10 pregnant women. The classes were held monthly in mothers' homes, and individual counselling was held monthly as well. No such special education about infant feeding occurred in the control group.

The data analysis showed that the mothers in both groups had their first vaginal bleed at the same rate (at about six months post-partum). In addition, as seen in table 2, until the sixth month post-partum, the mothers in both groups breast-fed their babies with the same frequency (i.e. 12-13 times per day). It was concluded that the rural women in the control group were already breast-feeding as frequently as was practical or possible. The education programme was associated with some major improvements in infant feeding behaviour, such as the feeding of colostrum, elimination of bottle use and the maintenance of high breast-feeding frequencies after solid food was introduced. Yet breast-feeding frequency could not be improved (increased) in the first five months post-partum in this rural population who were breast-feeding in a more or less traditional way.[1/]

Table 2: Mean breast-feeding frequency by education group and month post-partum

	Breast-feeding education group		Control group	
	Frequency	**N**	**Frequency**	**N**
Month post-partum				
1	14.4	60	14.4	45
2	13.9	55	12.8	57
3	13.4	61	13.1	64
4	13.0	53	12.5	51
5	12.4	62	11.3	56
6**	13.3	40	11.0	41
7*	13.3	35	10.9	33
8*	12.5	34	10.7	34
9	12.0	29	10.8	38
10	12.5	21	11.2	27
11**	14.2	21	10.3	27
12*	12.9	19	9.5	21

Source: Savina and Kennedy (1989).

Notes: * The difference between the groups is significant at $p < .05$.
** The difference between the groups is significant at $p < .0l$.

These results do not refute the relationship between frequent and intensive breast-feeding and maximum protection from pregnancy. However, since a difference in breast-feeding frequency could not be created, neither does the study add experimental support to the premise. This study is currently being replicated in an urban area of the Philippines where there is more room for improvement in breast-feeding frequency.

Can breast-feeding be a reliable contraceptive?

The Asian studies described in this article are not the only ones to suggest that mothers should not depend on breast-feeding frequency alone as an index of protection from pregnancy (Elias *et al.,* 1986; Rivera *et al.,* 1988; Huffman *et al.,* 1987; Shaaban *et al.,* 1990; Gray *et al.,* 1990).

Ten years ago, the pioneering work on the return of ovulation prompted

the subsequent search for a frequency threshold, or an equation, or formula involving the breast-feeding stimulus that would characterize lactational infertility. Since the first studies suggested this pursuit, researchers have studied more diversity in breast-feeding behaviour, notably shorter episodes and longer durations of breast-feeding.

Larger numbers of subjects and varied locations on the globe also contributed to the relative diversity in human physiology that has now been seen.

None of these studies has yet adequately explained the diversity of responses to the breast-feeding stimulus. Some might argue that research has suffered from having too many different ways to quantify the breast-feeding variable. Indeed there are problems in defining nearly every aspect of breast-feeding, from what constitutes a breast-feeding episode to measuring the force of a baby's suck.[2/] There are also other characteristics of breast-feeding that are relevant to the suppression of fertility, such as the length of the interval between feedings or the proportion of all feedings that are breast-feedings (Gray *et al.,* 1990).

Researchers are currently exploring these and other aspects of breast-feeding behaviour that could help to refine the measurement of this independent variable. The newer studies also involve larger numbers of women to permit multivariable analysis with more power than the studies presented in this article.

Yet it would be clearly naive to think that the difficulty in more successfully defining the relationship between breast-feeding and fertility is simply a measurement problem. There is some diversity in every aspect of human anatomy and physiology. An analogy can be made in the area of reproductive physiology: in one study of normally cycling (menstruating) women, the amount of estrogen produced during the mid-cycle peak was 207 pg/ml with a standard deviation of 6.1 (Shaaban *et al.,* 1987). The amount of hormone secreted as well as the ability of the end organ to receive it are subject to individual variation. It would appear that further basic studies of the neuroendocrinology of lactation are needed. Perhaps the use of modern, non-invasive techniques can be a useful substitute for the histologic studies that may currently be needed.

Despite relatively modest success in defining the breast-feeding correlates of infertility, a great deal has been learned along the way. For example, there is a new appreciation of the nature of the relationship between menses and ovulation. It is known that if women breast-feeding their babies have their first vaginal bleeding episode before the baby is six months old, then that bleed is very likely to foreshadow ovulation rather than result from it. However, after the sixth month, there is an increasing likelihood that ovulation will

precede the first menses, and accordingly, the risk of pregnancy during amenorrhea increases. For example, the Hopkins/Fabella study in Baltimore and Manila found that 45 per cent of "first bleeds" are anovular if they occur in the first six months post-partum vs. 20 per cent anovular after the sixth month (Gray *et al.,* 1990).

Another area of improved understanding concerns the relationship between supplementation and ovulation (or fertility). Early studies showed that supplemental feeding of the baby was so closely related to the onset of ovulation that it might actually cause ovulation, presumably by causing the breast-feeding stimulus (e.g. frequency or duration) to decrease. Such is generally the case when a mother replaces a breast-feeding episode with a feeding of infant formula or milk (Howie *et al.*, 1981). However, subsequent studies showed that supplemental feeding does not necessarily reduce breast-feeding, such as when the child is gradually given very small amounts of family foods. Accordingly, supplementation does not always lead directly or quickly to ovulation. These simple, newly appreciated phenomena have contributed to a recent consensus on the use of breast-feeding as a family planning method. Known as the "Bellagio Consensus," the following conclusion is based on a review of 13 studies in eight countries:

> Breast-feeding provides more than 98 per cent protection from pregnancy during the first six months post-partum if the mother is "fully" or nearly fully breast-feeding and has not experienced vaginal bleeding after the 56th day post-partum. (Family Health International, 1988; Kennedy, Rivera and McNeilly, 1989).

The Asian studies reviewed in this article contributed to the pool of data upon which the Bellagio guidelines are based. In theory, the Bellagio Consensus represents a practical way to time the introduction of contraception and to maximize the health benefits of breast-feeding for the growing child. Studies are currently underway to determine the efficacy of the guidelines in large numbers of women, and to determine whether the "method" is feasible for real women to use in the context of their busy lives.

Footnotes

1. Although duration of amenorrhea could not be increased in this experiment, the positive changes in infant feeding practices were associated with better infant health from months 2 to 7, even after controlling for maternal age and education.
2. Researchers from around the world recognize the problems associated with the measurement of breast-feeding. The Interagency Group for Action on Breastfeeding in 1989 issued a report by M. Labbok and K. Krasovec entitled *Breastfeeding Definitions*, which presents a simplified framework for the definition of breastfeeding behaviour. By using this framework, the comparability of research and the conclusions based upon research can be improved.

References

Andersen, A.N., V. Schioler (1982). "Influence of Breastfeeding Pattern on Pituitary-Ovarian Axis of Women in an Industrialized Community", *American Journal of Obstetrics and Gynecology,* pp. 143-673.

Elias, M., J. Teas, J. Johnston and C. Bora (1986). "Nursing Practices and Lactational Amenorrhea", *Journal of Biosocial Science,* vol. 18, No. 1, pp. l-10.

Family Health International (1988). "Breastfeeding as a Family Planning Method", *The Lancet,* vol. 8621, pp. 1204-1205.

Howie, P.W., A.S. McNeilly, M.J. Houston, A. Cook and H. Boyle (1981). "Effect of Supplementary Food on Suckling Patterns and Ovarian Activity during Lactation", *British Medical Journal,* vol. 283, pp. 757-759.

Huffman, S., A. Chowdhury, H. Allen and L. Nahar (1987). "Suckling Patterns and Post-partum Amenorrhoea in Bangladesh", *Journal of Bisocial Science,* vol. 19, No. 2, pp. 171-179.

Israngkura, B., K.I. Kennedy, B. Leelapatan and H.S. Cohen (1989). "Breastfeeding and Return to Ovulation in Bangkok", *International Journal of Gynecology and Obstetrics,* vol. 30, pp. 335-342.

Gray, R.H., O.M. Campbell, R. Apelo, S.S. Eslami, H. Zacur, R.M. Ramos, J.C. Gehret, M.H. Labbok (1990). "Risk of Ovulation during Lactation", *The Lancet,* vol. 335, pp. 25-29.

Kennedy, K.I., R. Rivera, A.S. McNeilly (1989). "Consensus Statement on the Use of Breastfeeding as a Family Planning Method", *Contraception,* vol. 39, No. 5, pp. 477-496.

Khan T., K.I. Kennedy, A. Kazi and M. Steiner (1989). "A Study of Breastfeeding and the Return of Menses and Pregnancy in Karachi, Pakistan", *Contraception,* vol. 40, No. 3, pp. 365-376.

McNeilly, A.S., A. Glasier, P.W. Howie, M.J. Houston, A. Cook, H. Boyle (1983). "Pregnancy Associated with Breastfeeding", *Clinical Endocrinology,* vol. 19, p. 167.

McNeilly, A.S., A. Glasier and P.W. Howie (1985). "Endocrine Control of Lactational Infertility", in: *Maternal Nutrition and Lactational Infertility,* J. Dobbing (ed.), (New York, Raven Press), p. 177.

McNeilly, A.S. (1988). "Suckling and the Control of Gonadotropin Secretion", in: *The Physiology of Reproduction,* E. Knobil and J. Neil1 *et al.* (eds.), (New York, Raven Press Ltd), pp. 2323-2349.

Rivera, R., K.I. Kennedy, E. Ortiz, M. Barrera and P. Bhiwandiwala (1988). "Breastfeeding and the Return to Ovulation in Durango, Mexico", *Fertility and Sterility,* vol. 49, No. 5, pp. 780-787.

Savina, G. and K.I. Kennedy (1989). "The Effect of a Breast-feeding Education Program on Lactational Amenorrhea in the Philippines", *Studies in Family Planning,* vol. 20, No. 2, pp. 203-214.

Shaaban, M.M., G.H. Sayed and S.A. Ghaneimah (1987). "The Recovery of Ovarian Function during Breastfeeding", *Journal of Steroid Biochemistry,* vol. 27, Nos. 4-6, pp. 1043-1052.

Shaaban, M.M., K.I. Kennedy, G.H. Sayed, S.A. Ghaneimah and A.M. Abdel-Aleem (1990). "The Recovery of Fertility during Breastfeeding in Assiut, Egypt", *Journal of Biosocial Science,* vol. 22, pp. 19-32.

Breast-feeding Patterns and Correlates in Shaanxi, China

The duration of breast-feeding in Shaanxi province has increased while the age for giving supplemental food has declined

By Tu Ping*

Breast-feeding is almost universal and lengthy in China, especially in less developed areas (SSB, 1986; Tu, 1989a). Breast-feeding serves as an effective means of birth spacing in traditional Chinese society where the reproductive potential is enormous owing to early and universal marriage. It also provides protection against malnutrition and infectious diseases that is very important for child survival, especially in rural areas where access to modern medical facilities is quite limited and infant formulas are not available (Tu, 1989a).

* The author is an Assistant Professor, Institute of Population Research, Peking University, Beijing, 100871, China. This article was presented as a paper at the International Symposium on the In-depth Fertility Survey (IFS) of China, which was held at Beijing from 13 to 17 February 1990. The author would like to acknowledge with gratitude the permission of the State Statistical Bureau to use the IFS data and the helpful comments of Prof. H.J. Page. (Note: Following Chinese convention, the surname, Tu, comes before the given name.)

However, relatively few rigorous studies on breast-feeding patterns and correlates in contemporary China have been published. The purpose of this article is to present a detailed analysis of the current breast-feeding patterns and correlates in Shaanxi province, a less developed inland province which is the cradle of Chinese culture. It uses 1985 In-depth Fertility Survey (phase I) data collected by the State Statistical Bureau on Shaanxi province (Hebei province and Shanghai Municipality were also covered by the IFS). It also examines the change in breast-feeding practice after the introduction of the "one-child" per family policy.

The sample population

The current study focuses on breast-feeding patterns and correlates in Shaanxi, where infant mortality is relatively high and breast-feeding is still quite important for birth spacing and child survival. The In-depth Fertility Survey used a stratified multi-stage self-weighting sample and collected a complete reproductive history of and detailed background information on 4,084 ever-married women under age 50 in Shaanxi, with an overall response rate of 93.4 per cent (see SSB, 1986 for detailed information about the survey).

Shaanxi province, with a population of over 28 million, is situated in the middle reaches of the Yellow River in the central part of China. It consists of the Southern and Central Shaanxi Plains, and the Northern Shaanxi Plateau (State Council and SSB, 1983). The province had an industrial and agricultural output of about 680 yuan per capita in 1985[1/] (SSB, 1986). Over 99.5 per cent of Shaanxi's population belong to the Han ethnic group, and 79 per cent of its total population live in rural areas with a relatively low standard of living. The proportion of the population age 12 and over who have no schooling is 33 per cent (State Council and SSB, 1983).

The duration of breast-feeding in Shaanxi has increased while the age for giving supplemental food has declined. The median length of breast-feeding increased from 17.9 months in the period prior to 1960 to 22.8 months in the period 1980-1985, but the median age at introduction of supplemental food declined from 8.5 to 7.4 months.

The infant mortality rate dropped from over 100 per thousand in the period prior to 1962 to about 36 per thousand in the early 1980s (Tu, 1990). The median length of subsequent birth intervals estimated by the life-table method increased from 32 months in the period 1966-1969 to 63 months in 1979-1983, based on the period preliminary analysis of the In-depth Fertility Survey data. However, caution should be exercised in interpreting these estimates since births during the earlier period were selected on the basis of birth order and maternal age owing to the limitation of a retrospective survey.

The whole sample for Shaanxi consists of 11,438 live births. While the current study mainly uses births in Shaanxi during the period 1979-1983, since its main focus is on the current breast-feeding patterns and correlates in Shaanxi, the median length of breast-feeding for births occurring in selected periods before 1970 is also estimated for the purpose of making a comparison. The duration of breast-feeding is more likely to be accurately recalled for the more recent births. Births that occurred after 1983 are not included in the study because those children were not exposed to the risk of weaning long enough to provide much useful information. However, this may slightly bias the estimate upward.

During the period 1979-1983, there were 2,055 live births recorded by the survey, 988 females and 1,067 males giving a sex ratio at birth of 108.[2/] The sex ratio at birth increases with birth order, from 99.1 for parity 1 (N = 880) to 134.7 for parity 4 or above (N = 277). Owing to the small number of higher order births, it cannot be known whether the rise in sex ratio by parity is caused by random fluctuations or by the omission of higher order female births in the survey.

Breast-feeding of children is almost universal, the proportion never breast-fed being only 3.7 per cent. Figure 1 shows the distribution of the reported

Figure 1: Distribution of age at weaning

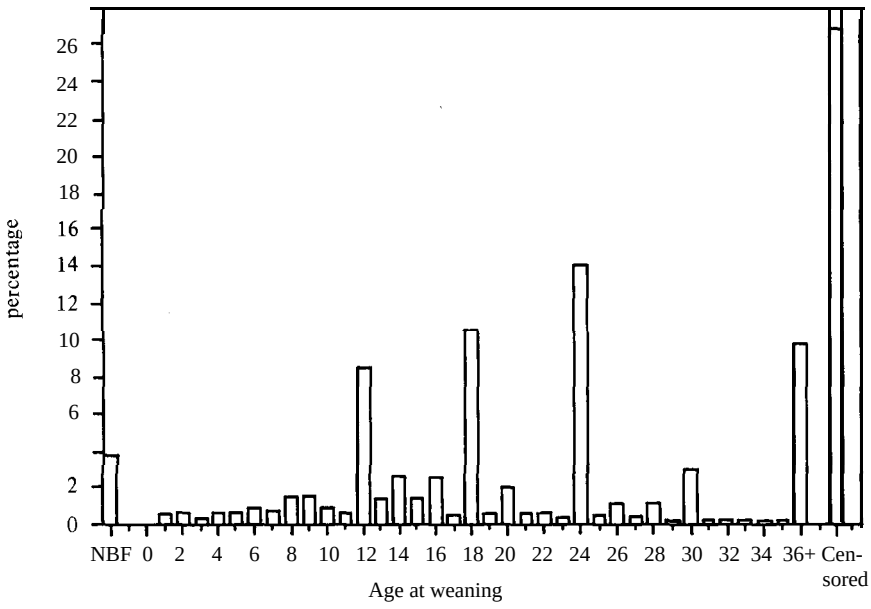
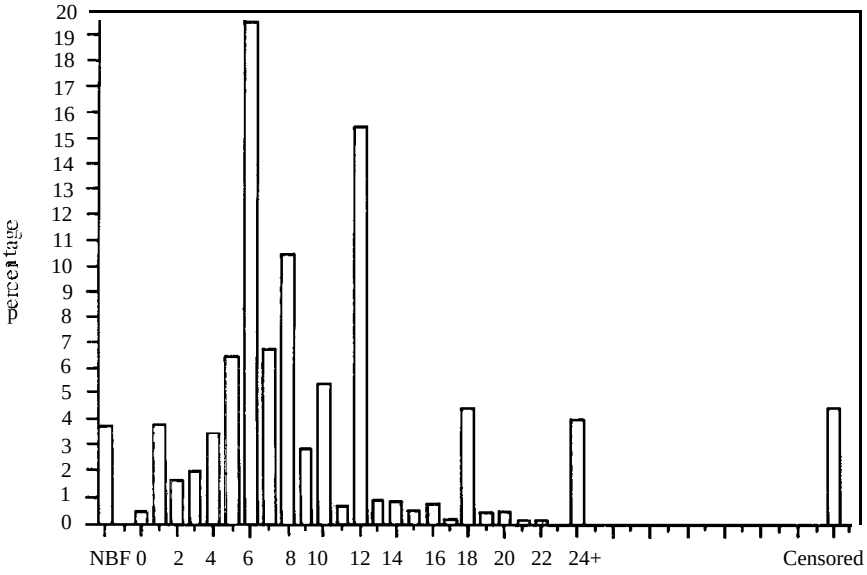


Figure 2: Distribution of age at introduction of supplemental food



age at weaning and figure 2 age at introduction of supplemental food. Many children are reported to be weaned at ages that are multiples of six months. This is due either to a digital preference or the fact that parents chose to wean their children at these conventional ages. The reported ages of the respondents, intervals from first marriage to first birth, and children's ages at death do not show any sign of age heaping, indicating that digital preference is not a problem in the survey.

About 3.5 per cent of the births are first order births. The number of births decreases rapidly after parity 2, but there are still a few (about 7 per cent) births of parity 5 or above in the sample. A very high proportion of the births are to mothers who had no schooling and have never worked outside the home. The proportion of births to a mother who has never worked outside the home is about 84 per cent mainly because most women in rural areas reported themselves as having never worked instead of having worked in agriculture. Over four-fifths of the children in Shaanxi live in rural areas, with over three-fourths of them living in a one-couple household.

Methodology

The dependent variables in this study are the duration of breast-feeding and the duration of unsupplemented breast-feeding which can be censored by either the date of the survey or the death of the child. Therefore, there is a proportion of children whose true duration of breast-feeding is unknown. Survival analysis techniques are appropriate for the analysis of data with censored observations. The actuarial life-table method (Cutler and Ederer, 1958) is used to estimate the survival functions of breast-feeding (BF) and unsupplemented breast-feeding (USBF) by selected covariates, and Cox's hazard

Table 1: Description of independent variables

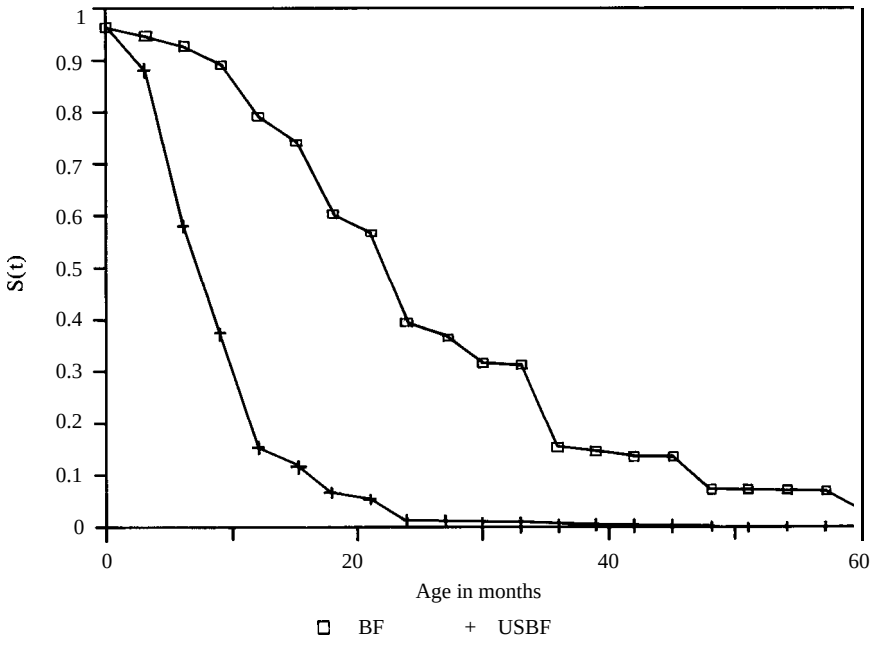
Variable	Definition	Comments
Characteristics of the child		
BO	birth order	categorical
SEX	sex of the child, 1 = male	dummy
BD	year of birth	
BTWIN	multiple births, 1 = yes	dummy
PS	whether has a previous sibling under age 3, 1 = yes	dummy
ANP(t)*	arrival of a next pregnancy one month prior to month(t)	
Parental characteristics		
MED	mother's education	categorical
MOC	mother's-occupation	categorical
MAD	mother's age at delivery	
CU	contraceptive use, 1 = yes	dummy
FED	father's education	categorical
FOC	father's occupation	categorical
FLH	father lives at home, 1 = yes	dummy
Characteristics of the household		
HT	household type	categorical
HS	household size	
Residence		
RES	urban residence, 1 = yes	dummy
REG	regions: Northern Shaanxi, Southern Shaanxi, Middle Shaanxi	

Note: * time-dependent covariates.

regression model with time-dependent covariates (Cox, 1972) is used to estimate simultaneously the effects of various covariates on the duration of breast-feeding.

The independent variables used in the study include selected characteristics of the child, parental and household characteristics, and residence (see table 1). Breast-feeding is often discontinued owing to a subsequent pregnancy, but a short duration of breast-feeding can also be the cause, not the consequence, of a short subsequent birth interval. Therefore, a time-dependent covariate ANP(t) indicating whether the next pregnancy has occurred one month prior to month(t) is included instead of the length of the subsequent birth interval to avoid reverse causality. In this way, ANP(t) will take on a value of 0 for those who are weaned before their mother's next pregnancy as long as they remain in the "risk" set. The preliminary analysis indicates that the relationship between the duration of breast-feeding and the sex of the child changes with birth order. Therefore, the interaction terms of sex with birth order are included. The interaction terms of selected covariates (ANP(t), SEX, PS, MED, HT, and RES) with 1n(t) are included to test the proportional hazard assumption (for details and abbreviations, see table 1).

Figure 3: Survival functions, S(t), of breast-feeding (BF) and unsupplemented breast-feeding (USBF)



Results

Univariate analysis

Over 96 per cent of the children in Shaanxi are breast-fed; the difference in the proportion of children ever breast-fed by sex is quite small (see figures 3 and 4). The estimated survival functions of breast-feeding (BF) and unsupplemented breast-feeding (USBF) by sex show that male children are breast-fed longer than female children ($p<0.0001$, based on the Mantel-Cox test), but there is no significant difference in age for giving supplemental food by sex ($p>0.05$). Therefore, at each age the proportion of exclusively breast-fed children is the same for both sexes, but the proportion of children breast-fed with supplementation (the difference between the survival function of BF and USBF) is higher for male children.

The estimated median lengths of breast-feeding by sex and birth order reveal that the median length of breast-feeding increases significantly with birth order ($p<0.0001$). The median length of breast-feeding increases much faster

Figure 4: Survival functions, S(t), of breast-feeding (BF) and unsupplemented breast-feeding (USBF) by sex

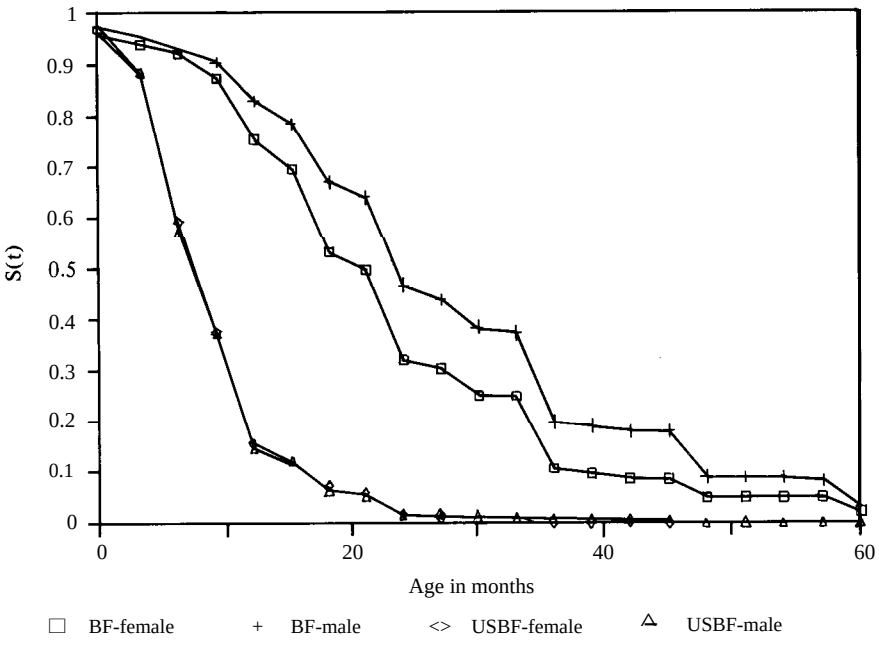


Table 2: Estimated median length of breast-feeding by birth order and sex

Birth order	1966-1969		1979-1983	
	Female	Male	Female	Male
1	17.7	17.9	17.0	18.5
2	18.1	21.4	22.3	29.5
3	21.5	21.6	23.7	34.1
4+	17.7	20.1	27.9	33.8
N	944	948	988	1067
p-value*	0.2132	0.0528	< 0.0001	< 0.0001

Note: * The mantel-Cox statistic was used to test the hypothesis that there is no difference in the distribution functions of breast-feeding by birth order.

with birth order if the child is male (see table 2). The estimated median lengths of breast-feeding by sex and birth order for children born during the period 1966-1969 show that the difference in the duration of breast-feeding by sex was very small and birth order had little influence on the duration of breast-feeding under the natural fertility regime before the implementation of the family planning programme in the early 1970s.

The change in the duration of breast-feeding during the period 1979-1982 is relatively small. However, the median length of breast-feeding increased from 22.3 months in 1982 to 28.0 months in 1983 when China's family planning campaign reached its peak (Hardee-Cleveland and Banister, 1988). Median age at the first introduction of supplemental food decreased steadily from 8.2 months in 1979 to 7.0 months in 1983 (see table 3).

The increase in the duration of breast-feeding may have been caused partly by the increase in the length of subsequent birth intervals brought about by the effective family planning campaign in the relative absence of profound socio-economic development in Shaanxi, especially in rural areas. As the length of subsequent birth interval increases, children are less likely to be weaned owing to a subsequent pregnancy.

With the diffusion of contraceptive knowledge, breast-feeding might also be used to prevent additional births under a controlled fertility regime when the family has already had more than one child, especially if the index child is a son. That is consistent with the comparison of the median duration of breast-feeding by birth order and sex between children born before the beginning of the family planning campaign in the early 1970s and after the introduction of the one-child policy in 1979.

Table 3: Estimated median length of breast-feeding (BF) and unsupplemented breast-feeding (USBF) by selected characteristics: 1979-1983

Variable	BF	USBF	Variable	BF	USBF
Sex			Mother's occupation		
Female	21.1	7.8*	Professional	11.6	5.2
Male	23.9	7.6	Service	15.3	5.1
	p< 0.001	p > 0.05	Industry	16.8	5.5
			Agriculture	20.3	7.6
Birth date			Never worked	23.3	8.1
1979	22.7	8.2		p< 0.001	p< 0.001
1980	22.4	8.1			
1981	21.6	7.7	Household type		
1982	22.3	7.7	Single mother	22.5	7.0
1983	28.0	7.0	Nuclear	22.7	7.7
	p< 0.001	p< 0.001	Extended	22.6	7.9
				p> 0.05	p> 0.05
Mother's education					
None	23.8	8.1	Residence		
Primary	23.4	8.1	City	16.7	5.5
Junior high school	19.3	7.4	Town	21.7	6.7
Senior high school	16.2	5.5	Countryside	23.3	8.1
	p< 0.001	p< 0.001		p< 0.001	p< 0.001
Total	22.7	7.7			

Note: * Based on the Mantel-Cox test. Abbreviations are given-in table 1.

Hazard analysis

The results based on hazard analysis show that a subsequent pregnancy is the most important covariate of breast-feeding behaviour (see table 4); the father's characteristics are unimportant. All the estimated regression coefficients for the father's characteristics listed in table 1 are very close to 0, and none of the regression coefficients for father's characteristics is statistically significant at the a= 0.10 level. Therefore, they are deleted from the final models. The coefficients of the interaction terms of SEX, PS, MED, HT and RES with 1n(t) are very close to 0, and they are deleted from the final models. The likelihood ratio test does not reject the hypothesis that the coefficients of these deleted terms are 0 at the a = 0.10 level.

The estimated regression coefficients confirm the findings based on the univariate analysis that the duration of breast-feeding increases with birth order, and male children are breast-fed longer than female children. The relative hazard of weaning for a male child, compared with a female child of the same parity, is 0.83 for the first child, 0.63 (0.76*0.83) for the second child, and

Table 4: Estimated regression coefficients: 1979-1983

Covariate	BF			USBF		
	B	**exp(*B*)**	**t**	**B**	**exp(*B*)**	**t**
Birth order						
1[a/]	–	–	–	–	–	–
2	-0.32	0.73	-3.07	-0.34	0.71	-3.83
3+	-0.69	0.50	-5.15	-0.39	0.68	-3.55
Sex	-0.19	0.83	-2.46	-0.01	0.99	-0.21
BO2*sex	-0.28	0.76	-2.25	-0.06	0.94	-0.62
BO3*sex	0.00	1.00	0.04	0.07	1.07	0.67
Birth date	-0.09	0.91	-4.37	0.07	1.07	5.04
BTWIN	0.34	1.40	1.14	0.52	1.70	2.53
PS	0.14	1.15	1.87	0.19	1.21	3.02
ANP(t)	2.69	14.76	13.75	1.41	4.10	4.51
ANP(t)*ln(t)	-0.51	0.60	-7.99	-0.42	0.66	-3.50
Mother's education						
None[a/]	–	–	–	–	–	–
Primary	0.08	1.08	1.28	0.07	1.07	1.33
Junior high school	0.14	1.15	1.73	-0.03	0.97	-0.43
Senior high school+	0.27	1.31	2.41	0.19	1.21	2.24
Mother's occupation						
Professional	1.00	2.72	5.87	0.29	1.34	2.04
Service	0.59	1.80	3.51	0.50	1.65	3.29
Industry	0.47	1.59	4.23	0.36	1.44	4.07
Agriculture	0.30	1.35	1.76	0.19	1.21	1.30
Never worked[a/]	–	–	–	–	–	–
Maternal age	0.00	1.00	0.20	0.00	1.00	0.54
Contraceptive	-0.17	0.85	-2.27	0.08	1.08	1.15
Household type						
Nuclear[a/]	–	–	–	–	–	–
Single mother	0.13	1.14	1.13	0.12	1.13	1.22
Extended	-0.29	0.75	-2.95	-0.05	0.95	-0.60
Household size	0.07	1.07	3.37	0.02	1.02	0.93
Residence	0.32	1.38	4.21	0.32	1.38	5.32
Region						
Middle Shaanxi[a/]	–	–	–	–	–	–
Northern Shaanxi	-0.01	0.99	-0.11	0.30	1.35	4.79
Southern Shaanxi	-0.16	0.85	-2.49	0.24	1.27	4.50

Notes: [a/] The reference group with relative hazard = 1.00. Abbreviation are given in table 1.

0.83 (0.83*1.0) for the higher order (3+) child. The interaction term of birth order with sex is statistically significant at the a = 0.05 level (two-tailed test) for the second birth (SEX*BO2), but not for the higher order birth (SEX*BO3). The hazard of introducing supplemental food decreases with birth order, but the difference by sex is not statistically significant ($p > 0.10$).

The start of a subsequent pregnancy is associated with a greatly increased hazard of weaning and introduction of supplemental food. The coefficient of the interaction term ANP(t) with 1n(t) is negative and statistically significant ($p < 0.01$) for both breast-feeding and unsupplemented breast-feeding, indicating that the relative hazard of weaning and introduction of supplemental food associated with the start of a subsequent pregnancy decreases with the duration of breast-feeding and that mothers who are still breast-feeding their children as the duration increases belong to a very select group. The presence of a sibling under age three when another child is born is associated with an increased hazard of weaning ($\exp(B) = 1.15$, $t = 1.87$) and the hazard of introducing supplemental food ($\exp(B) = 1.21$, $t = 3.02$).

Children born in the more recent period are breast-fed longer, but they are also given supplemental food earlier even when the effects of sex, birth order, and the start of a subsequent pregnancy are controlled. This indicates a genuine increase in the duration of breast-feeding but a decrease in the duration of unsupplemented breast-feeding. It also raises the suspicion that breast-feeding may have been used to prevent additional births in the more recent years.

In Shaanxi, mother's education has a much weaker effect on the duration of breast-feeding and age at the introduction of supplemental food than mother's occupation.

Only children born to women in the highest education group (senior high school or above) have a significantly higher hazard of weaning than those born to mothers who have no schooling ($\exp(B) = 1.31$, $t = 2.41$). It seems to suggest that the mother's education is a poor predictor of breast-feeding behaviour in Shaanxi where primary school or high school education makes little difference in one's socio-economic status, especially for the majority of women living in the rural areas; the proportion of women who have a college or university education is extremely small.

The mother's occupation is strongly associated with the duration of breast-feeding and the duration of unsupplemented breast-feeding even when the mother's education and all the other covariates included in the study are controlled. Children born to a mother who has a non-agricultural occupation are breast-fed for a significantly shorter period of time than children

born to a mother who is an agricultural worker or has never worked outside the home.

When parity is controlled, maternal age has no independent effect on the duration of breast-feeding and age at the introduction of supplemental food. Women who have used contraceptive methods tend to breast-feed their child *longer* even when the start of the subsequent pregnancy is controlled (exp(*B*) = 0.85, t = -2.27). But contraceptive use has no significant effect on age at the introduction of supplemental food (exp(*B*) = 1.08, t = 1.15). This again seems to indicate the link between the desire of having another child and the duration of breast-feeding.

Children in an extended household have a significantly lower hazard of weaning than children in a nuclear household (exp(*B*) = 0.75, t = -2.95), and children in a household headed by a single mother have a slightly higher hazard of weaning than children in a nuclear household (exp(*B*) = 1.14, t = 1 .13).[3/] Household size is positively correlated with the hazard of weaning and the hazard of introducing supplemental food. However, this may also be a by-product of reverse causality. Women who breast-feed their children for a shorter time are more likely to have shorter birth intervals and a larger family size.

As expected, breast-feeding is shorter and supplemental food is introduced earlier in the urban area. The relative hazards of weaning and introducing supplemental food associated with urban residence are 1.38 (t = 4.21) and 1.38 (t = 5.32) even when parental and household characteristics are controlled. There are also geographic variations in breast-feeding which are not explained by variables considered in the analysis. The duration of breast-feeding is the longest in Southern Shaanxi.

Conclusions

This study shows that breast-feeding is almost universal and very lengthy in Shaanxi, a less developed inland province of China. It shows that the duration of breast-feeding has increased, not decreased, for children of parity 2 or above in the years following the implementation of the family planning programme in the relative absence of profound socio-economic development in Shaanxi, although age at the first introduction of supplemental food has declined. The rapid increase in the length of subsequent birth intervals has been partly responsible for the increase in the duration of breast-feeding for the higher order child, especially if the child is a son. However, the increase in the duration of breast-feeding is still statistically significant even when birth order and the effects of weaning due to a subsequent pregnancy are controlled. It seems to suggest that breast-feeding has been used to prevent additional

births under the controlled fertility regime with the spread of contraceptive knowledge in Shaanxi. The results from the other areas covered by the survey show that the duration of breast-feeding has increased in Hebei province while it has declined in Shanghai Municipality, one of the most developed urban areas in China (SSB, 1986).

Under the natural fertility regime, the differences in the duration of breast-feeding by sex and birth order used to be insignificant in Shaanxi. They became significant under the controlled fertility regimes after the introduction of the one-child policy. The duration of breast-feeding and the length of subsequent birth intervals increase significantly with parity after 1979, especially if the child is a son. Age at the introduction of supplemental food also increases with birth order, but the difference by sex is not significant. That reflects a strong son preference in Shaanxi. Analyses of fertility behaviour based on data from the 1982 One-per-Thousand Fertility Survey (Arnold and Liu, 1986; Feeney *et al.*, 1985; Palmore *et al.*, 1985) and the In-depth Fertility Survey (Tu, 1989b) also show the existence of son preference in China.

The demographic characteristics have a strong influence on the duration of breast-feeding and age at introduction of supplemental food. The presence of other closely spaced siblings is negatively correlated with the duration of breast-feeding and age at introduction of supplemental food, reflecting the competition for mother's attention and care among the closely spaced siblings. The extremely significant effect of a subsequent pregnancy on the hazard of weaning also indicates that quite a few children in Shaanxi are breast-fed until the time of their mother's next pregnancy.

The duration of breast-feeding varies significantly with the mother's occupation. But the mother's education has no significant effect on breast-feeding, except among the highest education group when other covariates in the model are controlled. A regional variation in duration of breast-feeding and age at introduction of supplemental food exists, but it is not explained by the variables included in this analysis.

Footnotes

1. The official exchange rate in February 1990 was 4.73 yuan per U.S. dollar.
2. The sex ratio at birth is defined as the number of male children per 100 female children.
3. The survey inquired about the household structure at the survey date. The household type at the survey date may not be a very good indicator of the household type at the birth of each child since household structure changes over time. Misclassification of births tends to underestimate the difference in the duration of breast-feeding by household structure (attenuation bias).

References

Akin, J., *et al.* (1981). "The determinants of breastfeeding in Sri Lanka," *Demography*, vol. 18, pp. 287-307.

Akin, J., *et al.* (1986). "Breastfeeding patterns and determinants in the Near East: An analysis for four countries," *Population Studies*, vol. 40, pp, 247-261.

Arnold, F. and Z. Liu (1986) "Sex preference, fertility, and family planning in China," *Population and Development Review*, vol. 12, pp. 221-246.

Breslow, N. (1974). "Covariance analysis of censored survival data," *Biometrics*, vol. 30, pp. 89-99.

Coale, A.J. and S.L. Chen (1987). *Basic Data on Fertility in the Provinces of China, 1940-82.* Papers of the East-West Population Institute, Honolulu, Hawaii.

Cox, D.R. (1972). "Regression models and life tables," *Journal of the Royal Statistical Society Series* B, vol. 34, No. 2, pp. 187-220.

_____(1975). "Partial likelihood," *Biometrika*, vol. 62, pp. 269-276.

Cutler, S.J. and F. Ederer (1958). "Maximum utilization of the life table method in analyzing survival data," *Journal of Chronic Diseases*, vol. 8, pp. 699-713.

Dixon, W.J. (1985). *BMDP Statistical Software Manual*, (Berkeley, University of California Press).

Feeney, G., *et al.* (1985). "Parity progression measures of fertility in China," Paper presented at the International Symposium on China's One-Per-Thousand National Fertility Sampling Survey, 14-18 October, Beijing.

Hardee-Cleveland, K. and J. Banister (1988) "Fertility Policy and Implementation in China," *Population and Development Review*, vol. 14, pp. 245-286.

Jain, A.K. and J. Bongaarts (1981). "Breastfeeding: patterns, correlates, and fertility effect," *Studies in Family Planning*, vol. 12, pp. 79-99.

Kalbfleisch, J. and R. Prentice (1980). *The Statistical Analysis of Failure Time Data*, (New York, John Wiley).

Mantel, N. (1966). "Evaluation of survival data and two new rank order statistics arising in its consideration," *Cancer Chemotherapy Reports*, vol. 50, pp. 163-170.

Page, H.J., *et al.* (1982). "Illustrative analysis: Breastfeeding in Pakistan," *WFS Scientific Reports* No. 37, International Statistical Institute, Voorburg, Netherlands.

Palmore, J. *et al.* (1985). "Birth interval dynamics in the People's Republic of China," Paper presented at the International Symposium on China's One-Per-Thousand National Fertility Sampling Survey, 14-18 October, Beijing.

State Council and SSB (1983). *1982 Population Census of China (Results of Computer Tabulation)*, (Beijing, China Statistical Press).

SSB (1986). *China In-depth Fertility Survey (phase I): Principal Report*, (Beijing, The State Statistical Bureau).

Tu, P. (1989a). "The effects of breastfeeding and birth spacing on child survival," *Studies in Family Planning*, (6) 1989. ——— (1989b). "A preliminary analysis of birth spacing patterns in Shaanxi," Paper presented at the Third National Seminar on Population and Development, 23-25 December, Shenyang, China.

_____(1990). A comparative study of determinants of infant and child mortality between Shanghai and Shaanxi, *Population Science of China*, (1) 1990.

Breast - feeding and Weaning Practices in India

Indian women generally are unaware of the antibody and contraceptive properties of breast milk

By M.E. Khan*

Recently, considerable importance is being given to the study of breast-feeding practices in different settings in developing and developed countries. Breast-feeding is important, particularly in developing countries, because of its relationship with child health and birth spacing. It is well documented that mother's milk is the best food for the newborn child and it has a significant impact on reducing mortality in infants. Apart from these benefits, breast-

* The author of this article is General Manager of the Operations Research Group (ORG), Baroda, India. The views expressed in this article are those of the author and do not necessarily represent the views of ORG.

feeding also plays an equally important role in controlling fertility in developing countries.

Post-partum infecundity associated with the practice of breast-feeding is a major determinant of spacing between births, which results in a reduction in overall fertility levels. Recently however, it has been observed that, as some developing countries modernize, the practice of breast-feeding is declining.

This phenomenon is a matter of concern as it could cause considerable adverse consequences not only for child survival and development but also for fertility control programmes, particularly in less developed countries where use of contraception is still not common. This could be judged from the fact that in 1973 it was estimated that breast-feeding alone provided some 34 million couple-years of protection in developing countries (China excluded) compared with 27 million couple-years provided by government and privately sponsored family planning programmes (Ramachandran, 1987).

In India, although breast-feeding is still almost universal, particularly in rural areas, there are indications that in certain segments of the population, such as the educated and urban elites, the duration of breast-feeding is declining. Unfortunately, this trend is also slowly trickling down in some disadvantaged urban segments of the population such as slum dwellers.

Considering the importance of the subject however, it is surprising that the study of breast-feeding in India has remained neglected and no major attempt has been made to document breast-feeding practices in different settings, the influence of urbanization and modernization on feeding practices, or the linkages between fertility and lactation. The only exceptions are perhaps the multi-centre study by the World Health Organization (WHO, 1981) and some recent efforts by the Nutritional Foundation of India (Gopujkar *et al.*, 1984) and the Indian Council of Medical Research (ICMR). However, no national-level or comparable State-level data are available on the duration of breast-feeding and weaning practices. This article makes an attempt to review some available studies on the subject and draw some broad conclusions.

Prevalence of breast-feeding

All available studies indicate that the prevalence of breast-feeding in India is almost universal, both in rural and urban areas. For example, one of the earlier studies conducted by WHO in 1979/80 in Hyderabad revealed that around 96 per cent of the infants in major cities and 99 to 100 per cent of the babies in small towns and rural areas were breast-fed (WHO, 1981). Similarly, in a recent study carried out by the Nutrition Foundation of India in three major

States, namely Maharashtra, West Bengal and Tamil Nadu, 97 to 100 per cent of the infants were breast-fed (Gopujkar *et al.*, 1984). A major survey carried out by the Operations Research Group (ORG) in five States, namely Gujarat, Jammu and Kashmir, Uttar Pradesh, West Bengal and Tamil Nadu, also showed that breast-feeding in rural areas is universal (Khan and Prasad, 1986). Similar observations have been made in other States as well. Thus, the prevalence of breast-feeding is still universal both in rural and urban India.

Initiation of breast-feeding

It is highly desirable that the infant should begin to be breast-fed as soon as possible after birth, preferably within six hours of birth. The unique nutritional and antibody properties of colostrum and the disadvantages to those infants not fed with colostrum are now well recognized and documented. However, a review of the available literature on the timing of initiation of breast-feeding after birth reveals that generally initiation of breast-feeding after delivery is delayed considerably and in most cases the infants are deprived of colostrum.

As can be seen from table 1, generally the new-born are breast-fed for the first time only 48 to 72 hours after their birth. In a small proportion of cases, initiation of breast-feeding is reported after 24 hours or between 13 and 24 hours. However, in some of the tribal areas, breast-feeding is initiated within 6-12 hours (Mawar and Kumar, 1986). Initiation of early breast-feeding has also been reported from rural Himachal Pradesh (Bahl and Singh, 1982, Madhya Pradesh (Belavady *et al.*, 1959; Mudgal *et al.*, 1979) and urban and rural Gujarat (ORG, 1989; Khan and Basu, 1987).

The colostrum is discarded because of the general belief that it is “heavy” or “not good for the child”. As the colour of the initial breast milk is not pure white, it supports the perception that during the first l-2 days the mother’s milk is not pure and hence could harm the child.

A recent survey carried out by ORG among women workers in the organized sector (industries, offices and schools) surprisingly showed that in about 50 per cent of the cases the delay in the initiation of breast-feeding was at the advice of health personnel (Khan and Basu, 1987). This is perhaps due to the hospital practice of separating the mother and her infant during the first day or two after delivery.

In the same study, women employed in the unorganized sector (construction workers, agricultural labourers) reported that the main reasons for delaying the initiation of breast-feeding were the dictates of custom, or “advice from the elderly women of the family”.

Table 1: Percentage distribution of infants according to the age (in hours) when the first espisode of breast-feeding occurred: a review of findings

Author(s)	Area	Year of study	Size of sample	Age of infant at the time breast-feeding commenced: Less than 12 hours	13 to 24 hours	25 to 48 hours	48 to72 hours	72+ hours
Bahl	Rural Himachal Pradesh	NA	NA	0.8	84.0	13.4	1.3	–
Bahl & Singh	Rural Himachal Pradesh	1981	388	85.6	1.5	2.6	2.6	7.7
Belavady *et al.*	Madhya Pradesh	NA	NA	60.0	40.0	Percentage after more than 12 hours		
Gurudeva	Rewa, Madhya Pradesh	NA						
	Hospital delivered		74	–	60.8	14.9	16.2	8.1
	Home delivered		418	–	3.1	23.9	68.7	4.3
Kalra & Dayal	Agra & surrounding rural areas	NA						
	Urban		3245	3.0	9.0	16.2	61.8	10.0
	Rural		1230	–	1.0	2.2	70.6	26.6
Katiyar *et al.*	Varanasi district	NA						
	Urban		273	–	18.3	28.6	54.2	7.0
	Urban slum		284	–	–	6.3	74.7	19.0
	Rural		336	–	1.2	7.1	71.4	20.2
Madhavi, Rao & Mathur	Rural Andhra Pradesh	NA	106			Mostly after 36 hours		

Mehta, Pawar & Betkerur	Urban Gujarat	NA	400	–	98.0	2.0	–	–
Mudgal *et al.*	Rural Madhya Pradesh	1975-76	1000	94.5	5.8	0.7	–	–
Nalwa Prasad & Nath	New Delhi	1978	195	–	18.5	31.8	31.8	17.9
	New Delhi	NA	328	(---36.8-40.0---)		(------60.0 to 64.0-------)		
Suvarnadevi & Behera	South Orissa	NA	460	–	13.0	17.0	50.9	20.0
Gopujkar	Urban Maharashtra	1981	1820	(----- 3.4-----)		16.5	79.2	–
	Urban West Bengal	1983	1377	(----- 47.6-----)		17.7	33.5	–
	Urban Tamil Nadu	1983	1729	(----- 23.8-----)		15.5	60.2	–
Gopaldas	Gujarat Urban	NA	121	(-----11.5-----)		11.5	76.8	–
	Rural	NA	187	(-----15.5-----)		23.5	60.9	–
ORG	Gujarat Urban	1989	225		11.6	16.4	28.9	7.1
	Rural	1989	224	11:2	4.9	22.8	46.4	14.7
WHO	Andhra Pradesh							
	Urban	1978	3367	23.9	(----------76.1----------)			
	Rural	1978	1185	7.9	(----------92.1----------)			
Khan, Basu	Gujarat	1987	718	31.6	25.4	41.3	1.5	0.2

Sources: Bahl (1979); Bahl and Singh (1982); Belavady *et al.* (1959); Gurudeva *et al.* (1982); Kalra *et al.* (1982), Katiyar *et al.* (1981), Madhavi *et al.* (1972); Mehta *et al.* (1972), Mudgal *et al.* (1979); Nalwa (1981); Prasad and Nath (1976); Suvarnadevi and Behera (1980); Gopujkar (1984), Gopaldas (date not availabIe); ORG (1989); WHO (1978); Khan & Prasad (1987); Visaria (1988).

Notes: NA = not available.

Table 2: Percentage of infants receiving different pre-lacteal foods: review of findings

Study	Area	Beverages such as tea, boiled water	Honey, sugar, jaggery or glucose with plain water	Herbal concoctions prepared with water, *ghee* or castor oil	Cow or buffalo milk (diluted)	Commercial milk (formula)	Breast milk only
Bahl	Himachal Pradesh	–	5.0	–	–	–	95.0
Bhandari	Bhopal, Madhya Pradesh	0.4	40.8	42.5	0.8	–	15.6
Jaiswal	Aligarh, Uttar Pradesh	5.0	33.0	34.0	–	–	28.0
Kalra	Agra, Uttar Pradesh						
	Urban	6.2	69.2	24.6	–	–	–
	Rural	1.2	87.2	11.6	–	–	–
Katiyar	Varanasi, Uttar Pradesh						
	Urban	16.1	49.8	–	34.1	–	–
	Urban slum	26.4	27.5	–	46.1	–	–
	Rural	29.2	27.4	–	43.5	–	–
Madhavi	Andhra Pradesh	–	–	Mostly	–	–	–
Mehta	Surat, Gujarat	–	83.3	3.2	4.5	–	9.0
Nalwa	Delhi	–	41.0	26.1	19.0	–	13.3
Sharma*	Jammu						
	Urban	–	72.0	4.0	7.0	–	4.0
	Rural	–	67.0	–	4.0	–	5.0
Gopujkar	Maharashtra						
	Urban	16.2	51.8	–	28.1	4.4	3.1
	West Bengal						
	Urban	11.3	55.0	–	9.7	5.3	18.7
	Tamil Nadu						
	Urban	1.3	83.5	–	1.3	0.5	13.4
ORG	Gujarat						
	Urban	2.1	73.3	–	9.4	–	14.6
	Rural	0.4	93.2	–	1.7	–	4.1
Khan, Basu	Gujarat						
	Urban	16.1	99.0	1.6	13.9	1.1	7.1

Sources: Bahl (1979); Bhandari and Patel (1973); Jaiswal *et al.*, (1981); Kalra *et al.*, (1982); Katiyar *et al.*, (1981); Madhavi *et al.*, (1972); Mehta *et al.*, (1972); Nalwa (1981); Sharma and Lahari (1977); Gopujkar *et al.*, (1984); ORG (1989); Khan & Basu (1987) and Visaria (1988).

Note: * 13 per cent of urban and 22 per cent of rural respondents.

In developing countries, it is often argued that separation of the newborn baby from its mother and the feeding of the infant with breast-milk substitutes during the first crucial day is an important factor responsible for the failure of lactation. However, the data from India (as well as from other developing countries) suggest that successful lactation can be initiated even as late as 48-72 hours after delivery, if the necessary social support and encouragement are given.

Pre-lactation food

Table 2 presents various pre-lactal foods given to infants. As can be seen from the table, the pre-lactation foods includes beverages such as tea, boiled water, honey, sugar, jaggery (a course brown sugar made from palm sap) or glucose with plain water and diluted animal milk. The most common ones are water sweetened with honey, sugar or jaggery. In some cases *ghee* (clarified butter), castor oil and some herbal preparations are also used as pre-lactation foods for infants.

Not much information is available as to how these foods are administered or whether the water used for diluting the milk or making the sugar-water mixture is boiled. There is some evidence which indicates that often the mode of feeding is not hygienic. The diluted milk and sugar-water mixtures are fed into the mouth of the child with the help of a piece of cotton or a rag (Visaria, 1988).

These observations are corroborated by some of the recent ORG studies undertaken in Baroda slums as well as in the rural areas of Gujarat (ORG, 1989) and those undertaken by the Nutrition Foundation of India in Maharashtra and West Bengal (Gopujkar *et al.*, 1984) (see table 3). As can be

Table 3: Mode of feeding liquids during the pre-lactation period

	Gujarat[a/]		Maharasthra[b/]	West Bengal[b/]
	Rural	Urban	Urban	Urban
Spoon	11.1	29.3	48.3	81.3
Bottle	–	2.2	19.1	10.9
Cotton	74.9	48.1	–	–
Piece of cloth	8.2	3.9	–	–
Finger	3.9	3.3	–	–
Others	–	–	32.6	7.2
Could not answer	1.9	12.2	–	–

Notes: [a/] ORG (1989); [b/] Gopujkar *et al.* (1984).

seen from the table, the use of a spoon for pre-lactal feeding was quite common in Maharashtra and West Bengal. Interestingly, the use of cotton or a rag for feeding the infants was not reported in these states; however, it is possible that the investigators may have merged this information under the residual category "other", which is reported to be as high as 32.6 per cent in Maharashtra.

Duration of breast-feeding

Generally, it is considered desirable for infants to be exclusively breast-fed for at least the first four months after birth. Among lower socio-economic groups, prolonging the duration of "exclusive" breast-feeding up to six months may be advantageous in view of the problem of poor environmental sanitation and lack of safe water. However, beyond this point in time, the child must be provided with supplementary food, as the breast milk output then would not be adequate to provide the required nutrient intake for infants.

However, it has been observed that in India, particularly in rural areas, partly because of ignorance and partly because of poverty, women continue to breast-feed their children exclusively for up to eight months and in some cases even for 12 months. This delay in introducing supplementary food is one of the major causes of malnutrition among infants.

These observations are supported by a number of studies listed in table 4. As the table shows, except for urban areas of Maharashtra, Tamil Nadu and West Bengal, in all other cases the mean duration of exclusive breast-feeding is estimated to be more than six months, ranging from 6.7 months in Tamil Nadu to 10.8 months in Andhra Pradesh. In Andhra Pradesh, even in urban areas, the duration of exclusive breast-feeding was as high as 8.9 months. In Bihar, the corresponding figure was nine months. It may be important to point out that these States also have high levels of infant mortality.

It is important to note also that within the States the duration of exclusive breast-feeding varies considerably. For example, in rural Gujarat it varies from 8.2 months to 9.7 months, whereas in urban areas of Gujarat it was reported to be 7.7 months for women livings in slums to 4.9 months for women working in the organized sector (schools, industries, offices).

Table 4 also provides the total duration of lactation. As can be seen from the table, after introducing supplemental food, women generally continue to breast-feed their children for a prolonged period. Out of the eight Indian States for which data were available, in six States, namely Andhra Pradesh, Bihar, Maharashtra, West Bengal, Uttar Pradesh, and Jammu and Kashmir, the average total duration of breast-feeding was estimated to be about two years in rural areas. In the case of Gujarat and Tamil Nadu, the average duration ranged between 16 and 18 months.

Table 4: Duration of breast-feeding (months)

Area	Source	Year of study	Duration of exclusive breast-feeding	Total duration of breast-feeding
Andhra Pradesh				
Rural	Ramachandran	1982	10.8	26.9
Urban	Ramachandran	1982	8.9	21.2
Tamil Nadu				
Rural	Khan & Prasad	1984	6.7	16.1
Urban	Gopujkar *et al.*	1983	4.5	NA*
Bihar				
Rural	ORG	1989	9.0	24.1
Maharashtra				
Rural	ORG	1988	8.7	23.6
Urban	Gopujkar	1983	5.8	NA*
Gujarat				
Rural	Khan & Prasad	1984	8.2	16.2
Rural	Khan & Rao	1989	8.5	NA
Urban slum	Khan & Rao	1989	7.7	NA
Urban (working women)	Khan & Basu	1987	4.9	10.3
Rural	Khan & Basu	1987	9.7	18.7
West Bengal				
Rural	Khan, Prasad	1984	8.9	24.6
Urban	Gopujkar	1983	4.1	NA*
Uttar Pradesh				
Rural	Kumar & Sharma	1984	NA	23.8
Urban	Kumar & Sharma	1984	NA	20.5
Rural	Khan & Prasad	1984	8.9	23.9
Jammu & Kashmir				
Rural	Khan & Prasad	1989	8.5	23.5

Note: * The study shows, however, that, at the end of 12 months, only 21.2 per cent of the infants in Maharashtra, 12.2 per cent of those in West Bengal and 9.4 per cent of those in Tamil Nadu were completely weaned; NA = not available.

It should be pointed out that in the former group of States, all the States except for Maharashtra are economically and educationally quite backward, while both the States in the latter group are economically and educationally much better off. However, it is difficult to conclude that the total duration of lactation decreases with overall economic development and an increase in the general educational level. For example, educationally, Kerala is the most advanced State in India. Yet according to a recent study, the total duration of breast-feeding in Kerala is about 20.5 months. Similarly, in rural Maharashtra, which is both educationally and economically quite advanced, the total average lactational period is about 24 months.

The work status of women perhaps makes a major difference in the duration of breast-feeding as it demands leaving the infant at home during working hours. For example, for women employed in the organized sector in Gujarat, the duration of exclusive and total breast-feeding was only 4.9 and 10.3 months, respectively (Khan and Basu, 1987).

After probing, the women who had introduced supplementary food at an early stage (before completing a three-month period after delivery) or who had stopped breast-feeding quite early (six months after delivery) revealed that work was the main factor inhibiting prolonged breast-feeding. However, this was true only for the urban areas where the women could not bring their children to the work place. In places where women were able to take their children to the work place (e.g. a construction site) participation in the paid labour force did not make any significant difference in the total lactational period (Khan and Basu, 1989).

Frequency of breast-feeding

Frequency of breast-feeding plays a significant role in increasing the period of lactational amenorrhoea. It has been observed that the number of suckling episodes is a determinant of plasma prolactin levels (McNeilly *et al.*, 1980). Therefore, the greater number of suckling episodes could be one of the factors responsible for the observed differences in the duration of lactational amenorrhoea in different settings.

In India, when children are very young (0-3 months), generally they are fed on demand. For example, in small towns and rural areas of Andhra Pradesh, 90-98 per cent of the children were fed on demand (WHO, 1981). The corresponding percentages for urban areas of Maharashtra, West Bengal and Tamil Nadu were reported to be 83, 96 and 93, respectively (Gopujkar *et al.*, 1984). Similarly, almost 100 per cent of the lactating mothers in rural Gujarat and those working in the unorganized sector were feeding their children on demand (Khan and Basu, 1987).

The average number of suckling episodes per day for children aged 0-3 months was estimated to be 8.6 in Maharashtra, 9.5 in West Bengal and 5.4 in Tamil Nadu (Gopujkar, 1984). The average frequency of breast-feeding episodes in the three States was slightly less for children aged more than six months and was reported to be 8.0, 8.6 and 7.8 episodes per day, respectively. The corresponding average in the case of Andhra Pradesh (urban) was reported to be 6.1 episodes per day (WHO, 1981).

The available studies also indicate that, for children aged 3-6 months, while the frequency of suckling episodes does not decrease significantly among non-working women, it drops considerably among those working women who do not take their children to work. For example, one of the studies in Gujarat on women working in the organized sector shows that only 37 per cent of them were breast-feeding their children on demand, while the rest were breast-feeding them on average three to five times per day (Khan and Basu, 1987).

Breast-feeding during sleep is quite common and has been reported in a number of studies. The average number of feeding episodes was reported to be two to three times per night, or sometimes on demand.

Age at introduction of solid foods

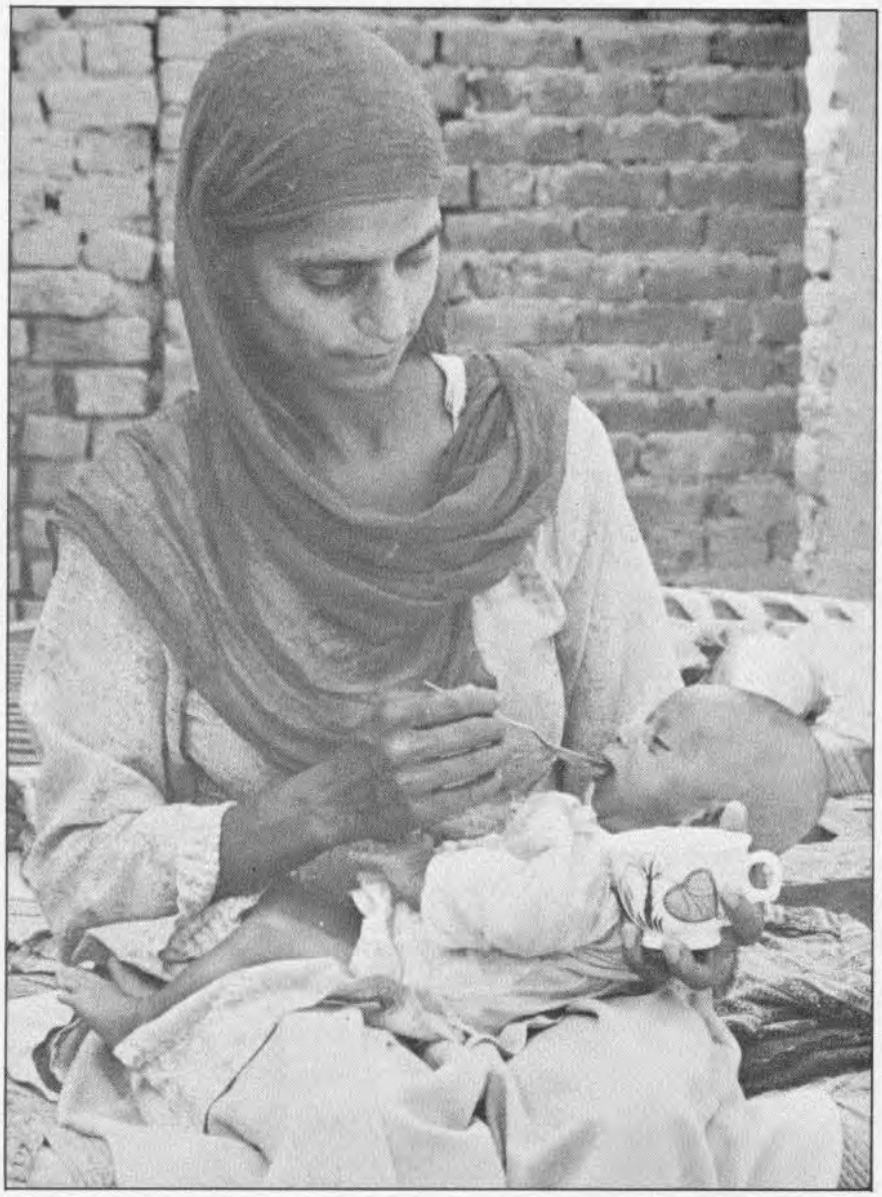
Table 5 presents the mean age of children at which they are introduced to solid supplemental food. It may be observed that the mean age varies considerably across the country. The earliest introduction of solid food was reported in West Bengal (6.9 months, urban. 8.5 months, rural) while in Poona (Maharashtra) and Hyderabad (Andhra Pradesh) it was introduced as late as 24 months. In Poona and Hyderabad, dependence on liquid or semi-solid foods such as animal milk, toddy (palm sap) rice *kanji* (porridge) and *jowar* (sorghum) porridge is more common.

The common solid preparations used for introducing children to other foods include rice, rice with milk and *ghee,* biscuits, *roti* (unleavened bread),

Table 5: Mean age at introduction of solid supplements

	Tamil Nadu		Andhra	New	Mahara-	West Bengal	
	Rural	Urban	Pradesh	Delhi	shtra	Rural	Urban
Mean	9.1	8.9	24.1	12.7	24.5	8.5	6.9
Standard deviation	5.4	0.7	8.7	5.8	7.7	2.8	3.6
Number	470	257	141	284	150	223	393

Source: ICMR, 1977



Although breast-feeding is almost universal in India, many mothers follow supplemental feeding practices at an early age of infants that are neither hygienic nor conducive to the proper growth of their children.

Table 6: Type of supplemental food (per cent) in Gujarat

	1987[a/]		1989[b/]	
	Rural	**Urban**	**Rural**	**Urban**
dalia (coarse-ground wheat)	1.1	6.5	–	–
Animal milk	25.3	76.3	74.8	38.5
Formula milk	0.6	17.1	–	4.9
Rice/*roti*	94.4	34.0	83.2	50.7
Fruits/juice	0.6	34.9	2.3	–
dal (lentils)	25.8	12.4	75.0	–
Biscuits and boiled eggs etc.	10.7	15.1	15.1	61.5
Tea/coffee	–	–	17.7	–
Milk products	–	–	11.2	–
Other	–	–	–	7.8

Source: [a/] Khan & Basu (1987); [b/] ORG data base

bread, boiled potatoes, mashed pulses, *dal* (lentils) and *jowar roti.* There are considerable variations in the ingredients used for foods given to children depending on regional food habits.

Some of the supplementary foods commonly used in Gujarat are presented in table 6. As can be seen from the table, animal milk, rice, *roti* and biscuits are some of the more common foods which are introduced to babies as supplementary foods. Formula milk and fruit juice are generally used in urban areas, mainly because of economic reasons.

Attitudes towards breast milk

In a recent study in Gujarat, an attempt was made to assess the perception of mothers towards breast milk (Khan and Basu, 1987). The study shows that 99 per cent of the women in urban areas and 89 per cent of those in rural areas believe that in comparing breast milk, commercial milk and animal milk, breast milk is best for the child. About 10 per cent of the rural respondents could not give an opinion regarding the milk most suitable for their child. A further probing showed that the main reasons for considering breast milk best for children were its nutritional (83.2 per cent) and antibody (20.5 per cent) properties. While very few women from rural areas mentioned about the antibodies in breast milk (i.e. 7.6 per cent), about one fifth (19.6 per cent) considered breast milk good because it “costs nothing”.

The respondents’ perception about breast milk and reasons for preferring it over commercial or animal milk was further probed by mentioning a number

Table 7 : Reasons women prefer breast milk over other types of milk (%)

	Working women	
	Urban	**Rural**
Easy and convenient		
Do not agree at all	2.9	0.6
Agree to some extent	5.7	2.7
Totally agree	91.4	80.0
Don't know	–	16.7
Enjoyable		
Do not agree at all	10.9	1.2
Agree to some extent	15.6	6.6
Totally agree	73.5	61.8
Don't know	–	30.4
Relaxation with the child		
Do not agree at all	34.1	0.3
Agree to some extent	18.2	2.1
Totally agree	47.7	83.6
Don't know	–	14.0
Strengthens emotional bond between mother and child		
Do not agree at all	1.6	–
Agree to some extent	3.1	62.7
Totally agree	95.3	35.5
Don't know	–	9.5
Costs nothing		
Do not agree at all	29.4	2.1
Agree to some extent	25.0	4.2
Total agree	45.6	84.2
Don't know	–	9.5
Hygienic and safe		
Do not agree at all	0.8	0.6
Agree to some extent	1.6	0.9
Totally agree	97.6	32.5
Don't know	–	66.0
No milk like breast milk		
Do not agree at all	–	–
Agree to some extent	0.8	–
Totally agree	99.2	68.0
Don't know	–	32.0

Table 7: ***(continued)***

	Working women	
	Urban	**Rural**
Disease protector		
Do not agree at all	–	0.9
Agree to some extent	3.1	1.8
Totally agree	96.6	32.5
Don't know	0.3	64.8
Delays pregnancy		
Do not agree at all	45.8	10.2
Agree to some extent	10.2	2.4
Totally agree	30.7	11.6
Don't know	13.3	75.8
Total N	384	335

Source: Khan & Basu (1987).

of properties/advantages of breast-feeding and asking them to express their views on a three-point attitudinal scale.

Their answers are presented in table 7. As can be seen from the table, a much larger proportion in urban than in rural areas were of the view that breast-feeding is preferred to feeding with other types of milk because it is easy to provide and convenient, enjoyable, strengthens the emotional bond between mother and child, is safer and more hygienic, and protects the child from various diseases. In rural areas, more women preferred breast-feeding because they considered it as a source of relaxation and also because it costs nothing. The majority of rural women were unaware that breast milk is safer and more hygienic the other types of milk and has antibody and contraceptive properties. It is also interesting to note that even in urban areas only about 30 per cent of the women believed that breast-feeding could delay pregnancy.

Breast-feeding and post-partum amenorrhoea

It is well documented that prolonged and intense breast-feeding increases the duration of post-partum amenorrhoea and provides some degree of protection against pregnancy even after the resumption of menstruation (WHO, 1981). The two factors which play a crucial role in determining the duration of infertility are duration of exclusive breast-feeding and total duration of lactation. Apart from these factors, the frequency of suckling per day and the

duration of each suckling episode also have a significant influence on post-partum amenorrhoea.

While there are a number of studies from other countries showing the linkages between breast-feeding and post-partum infertility, only a few such studies have been undertaken in India. One of them, which was carried out in Hyderabad, clearly indicated a direct link between duration of unsupplemented lactation and duration of lactational amenorrhoea (Ramachandran, 1984). The study also showed a direct relationship between duration of lactation and legnth of inter-pregnancy interval (table 8).

As can be seen from the table, when the duration of unsupplemented lactation increased from 2.5 to 5.3 months and then to 8.0 months, the duration of lactational amanorrhoea also increased from 7.6 months to 9.3 and 10.8 months, respectively. In a few cases where the duration of unsupplemented lactation was 24 months, the period of lactational amenorrhoea was reported to be 18.2 months. Similarly, the inter-pregnancy interval increased from 19 months to 26 months when duration of lactation was raised from 15.1 to 23.3 months.

Summary and conclusions

This article, which is based on the available literature, reveals that the practice of breast-feeding is almost universal in India. However, many of the breast-feeding and weaning practices being followed are not conducive to the proper growth of the child. The study shows that initiation of breast-feeding is generally delayed and that colostrum is discarded. The mode of pre-lactation

Table 8: Effects of introduction of supplemental food on duration of lactation, lactational amenorrhoea and interpregnancy interval (months)

Age at introduction of supplements*	Duration of unsupplemented lactation	Duration of lactational amenorrhoea	Duration of lactation	Duration of interpregnancy interval
0-3 (133)	2.3 ± 0.08	7.6 ± 0.62	15.1 ± 0.91	19.5 ± 1.23
4-9 (268)	5.3 ± 0.26	9.3 ± 0.51	17.9 ± 0.56	21.3 ± 0.88
7-9 (153)	8.0 ± 0.08	10.8 ± 0.72	20.2 ± 0.76	23.1 ± 1.36
10-12 (239)	11.8 ± 0.05	13.1 ± 0.54	23.3 ± 0.51	26.0 ± 0.90

Source: Ramachandran (1984).

Note: Values are mean + SEM; * Figures in parentheses indicate the number of post-partum periods in which lactation was successfully established.

feeding is generally unhygienic. Similarly, exclusive breast-feeding often continues for 8-9 months after delivery, often resulting in malnutrition of the children owing to inadequate feeding. Generally, breast-feeding is prolonged and on average is extended up to 24 months. Children are normally fed on demand and night feeding is common. The data show that women generally are unaware of the antibody and contraceptive properties of breast milk. This is true particularly in rural areas. The study also shows that duration of lactation is reduced to almost half, if the woman goes to work, leaving the child at home. Working status of the mother does not influence duration of breast-feeding if the child is taken to the work place.

References

Bhal, Lalita (1979). "Some Aspects of Infant Rearing Practices and Beliefs in Tribal Inhabitants of Himachal Pradesh", *Indian Pediatrics*, vol. 16, No. 4, pp. 337-441.

_____and Lakshman Singh (1982). "Some Aspects of Infant Rearing Practices and Beliefs in Rural Inhabitants of Himachal Pradesh", *Indian Pediatrices*, vol. 19, No. 11, pp. 921-925.

Belavady, B., S. Pasricha and K. Shanker (1959). "Studies of Lactation and Dietary Habit of Nilgiri Hill Tribes", *Indian Journal of Medical Research*, vol. 41, pp. 221-233.

Bhandari, N.R. and G.P. Patel (1973). "Dietary and Feeding Habits of Infants in Various Socio-economic Groups", *Indian Pediatrics*, vol. 10, No. 4, pp. 233-238.

Gopaldas, T. (1987). Behavioural Factors Influencing Child Feeding and Child Rearing Practices in Different Communities, (M.S. University, Baroda).

Gopujkar, P.V., S.N. Chaudhuri, M.A. Ramaswami, MS. Kore and C. Gopalan (1984). Infant-Feeding Practices with Special Reference to the Use of Commercial Infant Foods, *Scientific Report*, Nutrition Foundation of India.

Gurudeva, R.K., A.K. Gurgye, S.B. Singh, V.J. Rajpur and H.L. Tiwari (1982). "Infant Feeding Patterns in Rewa", *The Indian Journal of Pediatrics*, vol. 49, No. 401, pp. 815-818.

ICMR (1977). Studies on Weaning and Supplementary Foods, *Technical Report Series* No. 27, (Indian Council of Medical Research, New Delhi).

Jaiswal, D.P., A.A. Malik and S.N. Sinha (1981). "Study of Feeding Practices and Morbidity Pattern During First Year of Life", *Indian Pediatrics*, vol. 18, No. 10, pp. 735-741.

Kalra, Ajay, K. Kalra and R.S. Daya (1982). "Breast-Feeding Practices in Different Residential, Economic and Educational Groups", *Indian Pediatrics*, vol. 19, No. 5, pp. 419-426.

Katiyar, G.P., D.K. Agarwal, A.M. Tripathi and K.N. Agarwal (1981). "Feeding Practices in Varanasi District", *Indian Pediatrics*, vol. 18, No. 1, pp. 65-70.

Khan, M.E. and C.V.S. Prasad (1984). Use of Natural Family Planning Method in Selected Indian States - A case study of UP, Gujarat, Tamil Nadu, West Bengal and Jammu & Kashmir. Report submitted by ORG, Baroda to the Indian Council of Medical Research, New Delhi.

Khan, M.E. and J.K. Basu (1987). Breast-feeding Among Working Women in Organized and Unorganized Sector. Report submitted to ICMR, New Delhi, ORG, Baroda.

Khan, M.E. and Sandhya Rao (1989). Accessibility and Utilization of Family Welfare Services by Couples Below Poverty Line. Report submitted by ORG, Baroda to the Ministry of Health and Family Welfare, Government of India.

Madhavi, V., P.N. Rao and Y.C. Mathur (1972). "A Survey of Infant Feeding and Weaning Practices in the Village Fathepur-Hyderabad", *Indian Pediatrics*, vol. 9, No. 8, pp. 480-484.

McNeilly, A.S., P.W. Howie and M.J. Houstan (1990). "Relationship of Feeding Patterns, Prolactin and Resumption of Ovulation Post-partum", in *Research Frontier in Fertility Regulation*, G.I. Zatuchni, M.J. Labbok, J.J. Scerra (eds.), (Harper and Row, New York).

Mehta, M.J., R.G. Pawar and U.N. Belkerur (1972). Infant Feeding Habits in Surat City (South Gujarat), *Indian Pediatrics*, vol. 9, No. 6, pp. 291-293.

Mudgal, S., V.J. Rajput, M. Chansora and K.K. Kaual (1979). "Tribals of Madhya Pradesh – A Knowledge, Attitudes and Practice Survey of Infant Feeding Practices", *Indian Pediatrics*, vol. 16, No. 7, pp. 617-622.

Nalwa, A.S. (1981). "Social Factors Operating in Feeding Practice and Dietary Pattern of Under-Three", *Indian Pediatrics*, vol. 18, No. 7, pp. 453-460.

ORG (1989). Linkages Between Women's Work and Child Development, (Operations Research Group, Baroda).

Prasad K.R. and L.M. Nath (1976). "A Controlled Study of Socio-culturally Determined Child Feeding Habits in Relation to Protein-Calorie Malnutrition", *Indian Pediatrics*, vol. 13, No. 3, pp. 169-176.

Ramachandran, Prema (1984). "Integration between breast-feeding, weaning practices and mortality – A review", in *Proceeding of ICMR/Ford Foundation Workshop on Child Health, Nutrition and Family Planning*, (Indian Council of Medical Research, New Delhi).

_____(1987). "Breast-feeding and fertility: Socio-cultural factors", *International Journal of Gynaecology and Obstetrics*, vol. 25, Supplement No. 1.

Sharma, Dharam B. and U.C. Lahari (1977). "Some Aspects of Infant Rearing Practices and Beliefs in the Urban and Rural Areas of Jammu (Kashmir)", *Indian Pediatrics*, vol. 14, No. 6, pp. 511-518.

Suvarnadevi and P.L. Behera (1980). "A Study of Breast-feeding Practices in South Orissa", *Indian Pediatrics*, vol. 17, No. 9, pp. 753-756.

Visaria, Leela (1988). "Level, Trend and Determinants of Infant Mortality in India", in *Determinants of Infant Mortality in India*, Anrudh K. Jain and Pravin Visaria (eds.), (Sage Publications, New Delhi).

WHO (1981). *Contemporary Patterns of Breast-feeding*, Report on the WHO Collaborative Study on Breast-feeding, (World Health Organization, Geneva).

Initiation and Duration of Breast-feeding in Indonesia

The early introduction of supplemental food has an undesirable effect on risk of subsequent pregnancies and on infant and child morbidity and mortality

By M.B. Iskandar, C. Costello and Y. Nasution *

Breast-feeding plays an important and influential role in child survival and fertility, offering immunological protection to an infant against early morbidity and mortality, and contraceptive protection to a mother against closely spaced pregnancies. In developing countries, breast-fed infants experience substantially

* The authors of this article are Meiwita Budiharsana Iskandar, a member of the Faculty of Public Health, University of Indonesia and a research associate of the Center for Child Survival and the Center for Health Research of the University of Indonesia; Christine Costello, a consultant based at the Center for Child Survival; and Yusran Nasution, a computer programmer at the Center for Child Survival and the Center for Health Research. The analysis in this article was carried out with financial support provided by the National Family Planning Coordinating Board of Indonesia and the United States Agency for International Development, AID Project No. 497-0327. The authors gratefully acknowledge technical assistance provided by Chai Bin Park and Minja K. Choe of the East-West Center, Population Institute, Honolulu, Hawaii.

lower morbidity and mortality risks than infants who are not breast-fed, particularly in the first year of life (Retherford *et al.*, 1989; Pebley and Stupp, 1986; Palloni and Millman, 1986; Grant, 1984; Knodel and Kintner, 1977; Wray, 1977). A survey of 33 comparative studies of breast- and bottle-feeding in different parts of the world has concluded that the risk of death in infancy is three times higher for "mixed-fed" babies (both breast- and bottle-fed) and five times higher for babies who are exclusively bottle-fed (Grant, 1984) relative to exclusively breast-fed babies.

Breast-feeding also plays a very important role in contraceptive protection, offering perhaps up to one third more protection than all of the technological contraceptives in use in developing countries (Thapa, Short and Potts, 1988). In countries where contraceptive use is limited, breast-feeding is credited 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 been born in the absence of breast-feeding (Family Health International, 1989). Exclusive or nearly exclusive breast-feeding in the first six months among amenorrheic women is nearly 100 per cent effective in preventing pregnancy (Family Health International, 1989; USAID, 1989). Recent evidence suggests that duration of breast-feeding is declining in many parts of the developing world (Grant, 1984; P.I.P., 1981). The need for integration of breast-feeding promotion into family planning programmes, especially into the management of birth spacing, is now widely recognized (Hebert-Mayling and Huffman, 1981; Hull, 1981; Laukaran, 1981; Bear, 1981a and 1981b; Suyono and Thapa, in the note on pp. 151-157 this issue of the *Journal*.)

Among studies examining differentials in breast-feeding behaviour, differentials between urban and rural residence are consistently observed. In almost all studies for which data are available, rural women are more likely to breast-feed than urban women (Akin, 1981; Dow, 1977; Jain and Bongaarts, 1981; Kent, 1981; WHO, 1981; Mohiuddin, 1986; Mott, 1984). The differential in Indonesia is particularly notable. Of the 28 developing countries for which World Fertility Survey data are available, the difference between urban-metropolitan and rural breast-feeding duration is the largest in Indonesia (Joesoef *et al.*, 1988).

In addition to urban-rural residence, breast-feeding duration has been shown to be negatively correlated with maternal education and socio-economic status (Millman, 1981; Popkin, 1978; Mohiuddin, 1986; Mott, 1984; Othman, 1985). Other factors are also involved; for example, in Bangladesh, female children are breast-fed for periods about five months shorter than male children (Mohiuddin, 1986). Increasing levels of modernization and urbanization are also important contributors to the decline in breast-feeding duration, the impact being primarily upon younger women. Breast-feeding duration is positively

correlated with maternal age and parity (Smith, 1983). A recent study in China's urban neighbourhoods indicated that breast-feeding declined as women became involved in work outside the home, as they adopted a form of post-marital residence that separated them from other relatives, as income increased, and as influences from their rural origins decreased (Pasternak and Wang, 1985).

In Indonesia, nearly all women initiate breast-feeding. The Indonesian World Fertility Survey in 1976 found the percentage of women who breast-fed their babies initially was 97.1 per cent, with the average duration of breast-feeding lasting 25.4 months (CBS and WFS, 1978; WHO, 1982). The average duration of breast-feeding was 25.3 months in rural areas and 15.9 months in urban metropolitan areas (Smith, 1983). A study of the 1983 Indonesian Contraceptive Prevalence Survey demonstrated a median duration of breast-feeding ranging from 14.9 to 23.6 months among five metropolitan cities in Indonesia (Joesoef *et al.,* 1988).

The 1983 data revealed that the circumstances surrounding birth and mother's level of education were found to be important determinants of breast-feeding duration (Joesoef *et al.,* 1988). Nearly all women initiated breast-feeding shortly after delivery.

However, 20-25 per cent of women who delivered their babies at clinics had ceased breast-feeding by six months. Women who delivered at health clinics or who were assisted by modern professional birth attendants weaned 1.5 to 2.4 times faster than women who delivered at home or who were assisted by traditional birth attendants. Women with higher than elementary education weaned up to two times faster than women with less education (Joesoef *et al.,* 1988).

Studies in Central Java have demonstrated that age and parity are correlated positively with duration of breast-feeding (Winikoff *et al.,* n.d.). A relatively short duration of breast-feeding is observed among low-income working mothers, among whom only 85 per cent breast-feed initially. By six months post-partum, only 35 per cent are still breast-feeding (Soekirman, 1983).

In view of all these different practices, it becomes obvious that breast-feeding is affected by many factors which vary substantially between rural and urban areas, and across geographic regions in a country as diverse as Indonesia.

The purpose of this article is (a) to identify socio-economic characteristics distinguishing mothers who do and do not initiate breast-feeding; and (b) to identify covariates associated with the duration of breast-feeding in urban and rural areas of Indonesia. The analysis is based on data from the 1987 National Indonesian Contraceptive Prevalence Survey (NICPS).

Source of data and methodology

The 1987 NICPS is a five-year follow-up to the 1976 World Fertility Survey and the 1983 Contraceptive Prevalence Survey. The survey effort is part of the series of Demographic Health Surveys carried out in several countries throughout the world. The NICPS sample design reflects the regional classification used by the national family planning programme to provide demographic estimates for three major regions: Java-Bali, Outer Islands I and Outer Islands II. Overall, the survey encompassed 20 provinces out of the 27 provinces in Indonesia, excluding less than 7 per cent of the total population of Indonesia.[1/]

Data collection for the 1987 NICPS was conducted between September and December of 1987. The sample consisted of 14,141 households. During the field visits, 12,065 eligible women were found, of whom 11,884 ever-married women aged 15-49 years from 20 provinces were successfully interviewed.

The survey utilized two questionnaires, i.e. household and individual questionnaires. The household questionnaire was used to collect basic information on all usual residents of selected households. The individual questionnaire was directed to ever-married women aged 15-49. The individual questionnaire yielded a history of 9,913 live births within the five years preceding the survey, i.e. since 1 January 1982. Information on breast-feeding initiation and duration was collected in the history.

Four geographic classifications are used throughout this article: urban Java-Bali, rural Java-Bali, urban Outer Islands I and rural Outer Islands I. NICPS data in general are consistent and fit patterns established by the 1980 census and 1985 SUPAS (Intercensal Population Survey). In particular, data for Java-Bali and Outer Islands I seem reliable and representative. However, Outer Islands II results are contrary to expectations. For example, the area shows the highest educational attainment of women among all regions. The Central Bureau of Statistics has suggested that these results do not represent accurately the entire Outer Islands II region. Therefore, this article excludes analyses of Outer Islands II information, except in the calculations for all of Indonesia.

Breast-feeding analysis

In this article, the impact of 12 independent variables on the initiation and duration of breast-feeding is examined. The 12 independent variables are: (a) household economic level, (b) language, (c) place of delivery, (d) type of birth attendant, (e) mother's education, (f) mother's occupational experience, (g) spouse's education, (h) spouse's occupation, (i) mother's age at the time of the child's birth, (j) parity, (k) sex of child, and (1) "wantedness" of pregnancy. The multivariate analysis considers eight of those variables. Spouse's education

and occupational status exhibit patterns consistent with mother's education and occupational experience. Language is excluded because it is related to mother's level of education. Sex of child is excluded since it is found to have no significant influence on duration of breast-feeding.

The methods employed include cross-tabulations, life-table analysis and logistic regression analysis, using SAS and Epilog software. Life-table analysis was employed owing to the substantial proportion of children still being breast-fed at the time of the survey. Censored cases include those where a child was still breast-fed at the time of the survey, or those where a child died while still being breast-fed.

The analysis of factors influencing initiation of breast-feeding includes only children who survived eight or more days in order to separate influences contributing to infant mortality from those contributing to not initiating breast-feeding. A child's death within a week of birth suggests that a mother may not have been able to initiate breast-feeding owing to a child's illness, and that illness may also have been associated with the neonatal death.

Multivariate analysis to identify covariates of initiation and duration of breast-feeding was performed using logistic regression. This method was chosen since the relationship between covariates and breast-feeding duration is expected to vary over time, and owing to concerns over marked discontinuities in the breast-feeding duration data. NICPS breast-feeding duration data demonstrate marked heaping at 12 months, 18 months and 24 months. Such heaping is commonly due to errors in mothers' recall; however, it is also possible that mothers deliberately decided to discontinue breast-feeding at those points owing to local customs and prior identification of an age appropriate for weaning.

In the multivariate analysis of breast-feeding duration, four time-intervals are delineated in which the probability of continuing breast-feeding beyond the interval is analyzed: 0 to 6 months, 6 to 12 months, 12 to 18 months, and 18 to 24 months. Thus, in the 0- to 6-month interval, factors influencing whether a woman breast-fed her baby for six months or more among those who ever breast-fed their child(ren) are examined.

Likewise, in the 6- to 12-month interval, factors influencing whether a woman breast-feeds her child 12 months or more among those breast-feeding their child at least six months are examined. Observations censored during the interval, owing to the death of the child if the child was breast-feeding at the time of death and owing to the survey were deleted from the analysis of that interval. Sensitivity of the results to different time periods was assessed. Differing results are discussed where relevant.

Table 1: Factors considered in breast-feeding analysis and their distribution

Variable	Description	Java-Bali		Outer Islands I	
		Urban %	Rural %	Urban %	Rural %
Number of births	Births in five years preceeding survey (1982-1987)	2 582	3 753	1 020	1 392
Household economic level	High = Household has tile floor, or toilet with septic tank or has access to electricity, television, or motor vehicle	90.8	41.3	85.6	47.8
	Low = Access to none of the above five amenities	9.2	58.7	14.4	52.2
Language	Bahasa = Interview conducted in Bahasa Indonesia	68.1	12.0	74.6	49.4
	Other = Conducted in another local language	31.9	88.0	25.4	50.6
Place of delivery	Hospital = Delivered in hospital or health centre	57.1	12.9	59.9	9.0
	Home = Delivered in own or someone else's home	42.9	87.1	40.1	91.0
Attendant at birth	Midwife = Doctor, trained nurse/midwife at delivery	70.6	20.7	84.0	36.1
	TBA = Traditional birth attendant, relative, other	29.4	79.3	16.0	63.9
Mother's education	Sr. high = Senior high school or higher completed	19.5	5.6	22.9	4.0
	Jr. high = Junior high school completed	15.1	5.9	17.0	6.0
	Primary = Partial or completed primary school	55.3	65.1	52.7	65.7
	No school = No formal schooling completed	10.1	23.4	7.4	24.3
Mother's occupation	Ever work = Ever work for money since first marriage	39.8	56.6	34.1	45.1
	Never work = Never work for money since first marriage	60.2	43.4	65.9	54.9

Spouse's education	Sr. high = Senior high school or higher completed	35.1	11.6	40.8	10.2
	Jr. high = Junior high school completed	19.8	8.7	14.5	10.6
	Primary = Partial or completed primary school	41.2	65.6	40.7	67.0
	No school = No formal schooling completed	3.9	14.1	4.0	12.2
Spouse's occupation	Prof = Professional or clerical	20.9	8.3	27.7	7.1
	Sales = Sales or service	28.1	14.1	27.7	12.3
	Manual = Manual worker	45.0	25.3	38.6	15.0
	Agri. = Agriculture and others	6.0	52.3	6.0	65.6
Mother's age	< 30 = Less than 30 years at birth of child	76.3	74.8	73.6	70.7
	≥ 30 = 30 or more years at birth of child	23.7	25.2	26.4	29.3
Parity	1-2 = First or second birth	53.2	51.1	42.4	41.2
	3-4 = Third or fourth birth	27.1	28.6	32.2	27.2
	5 + = Fifth or higher order birth	19.7	20.3	25.4	31.6
Sex of infant	Boy	51.5	52.5	52.2	50.1
	Girl	48.5	47.5	47.8	49.9
Pregnancy wanted	Wanted = Wanted to have child at pregnancy	73.7	67.9	79.3	87.1
	Unwanted = Wanted to delay, or unwanted pregnancy	26.3	32.1	20.7	12.8

Notes: Spouse characteristics are for most recent spouse. Missing cases = 62 for spouse occupation; missing cases = 1,959 for pregnancy wanted. This and all other tables in this article are based on unweighted cases. Separation of cases into geographic units partially compensates for the lack of weighting, but not completely. Preliminary analysis by geographic unit employing weighting reveals median durations of breast-feeding within l-2 months of median durations reported in the following tables.

Findings

Sample characteristics

Table 1 presents the distribution of children born in the five years preceding the survey by background characteristics. Strong urban-rural differences emerge in the economic and educational characteristics of parents of these children. Over 85 per cent of urban children are born into households of a high socio-economic level compared with less than 50 per cent in rural areas. Educational attainment is also notably higher in urban areas: 35 to 40 per cent of urban mothers and nearly 50 per cent or more of urban spouses complete junior high school or a higher level of education. In rural areas, approximately 10 per cent of mothers and 20 per cent of spouses complete at least the junior high school level of education. The use of the national language, Bahasa Indonesia, compared with local languages, is more frequent in urban areas, which indicates increased exposure to education and the mass media. The occupational structure differs substantially in that over half of rural spouses but less than 10 per cent of urban spouses work in agriculture. Rural mothers are more likely to have worked for money since their first marriage than urban mothers. Differences between urban and rural areas by maternal age at birth, parity, or sex of infant are negligible.

Patterns of health care utilization also demonstrate marked differences between urban and rural areas. Over 70 per cent of urban women, but less than 40 per cent of rural women, are attended at birth by trained health personnel. Urban mothers are also more likely to deliver in a hospital or health centre, whereas rural mothers more commonly deliver at home. In both urban and rural areas, over two thirds of all infants were wanted at the time of pregnancy. Children were more often wanted at the time of pregnancy in Outer Islands I than in Java-Bali. Rural Java-Bali women, compared with urban women, were more likely to express a desire to have delayed their pregnancy or not to become pregnant. In the Outer Islands I, urban women were more likely to express that desire compared with rural women.

Breast-feeding practices

Nearly all infants born in Indonesia are breast-fed. Among 9,825 Indonesian children in the five-year history for whom breast-feeding information is available, 3.9 per cent were not breast-fed at all. Among children surviving at least a week, 3.2 per cent were not breast-fed.[2/] Children born in urban Java-Bali are least likely to be breast-fed, but even there, only 4.8 per cent of children surviving over a week were not breast-fed. In the other areas, the proportion not breast-fed ranges from 1.9 to 4.1 per cent.

In table 2, the proportion of children never breast-fed is given by selected

Table 2: Percent of children never breast-fed, by selected characteristics

Characteristic		Java-Bali		Outer Islands I	
		Urban %	Rural %	Urban %	Rural %
Household economic level	High	5.06*	2.45*	4.63*	4.44**
	Low	2.15	1.56	0.71	1.84
Language	Bahasa	4.82	2.05	4.34	3.51
	Other	4.73	1.91	3.17	2.62
Delivery	Hospital	4.50	3.73**	4.80	6.40**
	Home	5.20	1.65	3.01	2.15
Attendant	Midwife	4.81	3.76**	4.50	5.24**
	Traditional birth attendant	4.75	1.43	1.90	1.85
Mother's education	Sr. high	5.17*	4.85**	2.16	1.82
	Jr. high	6.81	2.70**	5.23	2.47
	Primary	4.40	1.79	3.81	3.47
	None	3.15	1.41	9.46	2.42
Mother's occupation	Ever worked	3.99	1.56*	4.69	2.62
	Never worked	5.32	2.41	3.78	3.47
Spouse's education	Sr. high	5.82	3.76**	2.19	2.82
	Jr. high	4.37	2.78**	8.22	6.43
	Primary	4.27	1.52	3.69	2.95
	None	3.09	1.76	12.82	1.22
Spouse's occupation	Prof.	4.18	1.99	1.81	3.09
	Sales	6.21	3.28	5.86	6.55
	Manual	4.26	2.19	4.55	2.00
	Agri.	4.73	1.43	3.39	2.69
Age at time of child's birth	< 30	4.40	1.76	3.38*	3.21
	≧ 30	6.05	2.44	6.08	2.79
Parity	1-2	4.67	2.37*	4.96	4.12*
	3-4	4.38	1.43	3.68	1.89
	5+	5.71	1.50	3.15	2.11
Sex of infant	Boy	5.25	1.68	3.28	2.80
	Girl	4.31	2.20	4.96	3.37
Pregnancy	Wanted	4.83	2.05	3.53*	3.34
	Unwanted	4.93	1.90	6.58	2.07
Total		4.79	1.93	4.09	3.09

Notes: ** = Significant at .05 level; * = Significant at .10 level; data based on children surviving eight or more days

characteristics for the four geographic areas. High household economic level is associated with a lower frequency of breast-feeding initiation in all four areas. Higher levels of maternal and paternal education are associated with a lower frequency of breast-feeding in Java-Bali only. The household economic effect is significant in rural Outer Islands I, and education effects are significant in rural Java-Bali (at the .05 level). Among all urban mothers, and among Outer Islands spouses, there is some indication that those with junior high or primary school education are less likely to breast-feed their babies than those in the most highly educated group. This middle-class tendency towards not breast-feeding is supported by observed occupational differentials among the spouses. In every area, middle status occupations are associated with higher proportions not initiating breast-feeding than observed in the professional class.

The most disturbing tendency observed in the table is that in both rural areas, usage of more modern health-care personnel or facilities for delivery is associated with a lower chance of initiating breast-feeding. Lower parity children in these areas are also less likely to be breast-fed. Remaining variables do not show significant effects.

Results from multivariate analysis, shown in table 3, give the odds ratio for never breast-feeding by maternal background characteristics. In that table, parity, age of mother at the birth of the child, and "wantedness" of a pregnancy

If a mother has the opportunity of being placed in a hospital where "rooming-in" has been instituted and where appropriate counselling and support are provided, she is likely to choose to breast-feed her child and continue to do so after discharge from the hospital. (Photo by S. Thapa)

Table 3: Adjusted odds ratios for never breast-feeding at birth, by selected characteristics

Characteristic	Java-Bali		Outer Islands I	
	Urban	Rural	Urban	Rural
Low household economic level	0.441*	0.903	0.540	0.629
Home delivery	1.659*	1.235	0.740	0.460
Traditional birth attendant at birth	1.177	0.661	1.099	0.643
Mother's education ≦ Primary school	0.664*	0.805	1.450	3.857*
Mother ever worked	0.889	0.774	1.033	0.986
Age at time of child's birth ≧ 30	1.181	1.946*	4.327**	1.515
Parity 3-4	1.027	0.394**	0.413*	0.533
Parity 5+	0.959	0.195**	0.214**	0.509
Unwanted pregnancy	1.465	2.843**	2.791**	2.206*

Notes: ** = Significant at .05 level; * = Significant at .10 level; Reference categories: High household economic level, Hospital/clinic delivery, Doctor/midwife attendant, Mother's education: junior High School +, Mother's occupation: never worked, Mother's age at time of child's birth< 30, Parity 1-2, Wanted pregnancy.

seem to exhibit fairly consistent effects across areas, but are only statistically significant in rural Java-Bali and urban Outer Islands I. Lower parity children are more likely not to be breast-fed than higher parity children in all areas except in urban Java-Bali. At each parity level, children of older women are more likely not to be breast-fed. The impact of an unwanted pregnancy is fairly strong relative to other effects. Unwanted children are more likely not to be breast-fed than wanted children.

Following the bivariate analysis, children from a high household economic level are more likely not to be breast-fed in each area. Maternal education shows mixed effects. In Java-Bali, more highly educated women are less likely to initiate breast-feeding, but in Outer Islands I, they are more likely. However, the education and economic effects are not significant at the 5 per cent level.

Once other variables are controlled, the use of modern health care facilities or trained attendants at birth does not exert a significant negative influence on breast-feeding initiation. In urban Java-Bali, a hospital or clinic delivery is associated with a higher chance of breast-feeding being initiated.

Duration of breast-feeding at specified points post-partum

Table 4 and the figure contrast urban-rural differences in the proportion of 1990; Gussler and Briesmeister, 1980).

Table 4: Proportion of children still breast-feeding at a specified time post-partum

Post-partum	Java-Bali		Outer Islands I	
(Months)	Urban	Rural	Urban	Rural
3	0.9150	0.9770	0.9284	0.9648
6	0.8730	0.9612	0.8518	0.9435
12	0.6443	0.8329	0.5752	0.7615
18	0.4475	0.6566	0.3533	0.5183
24	0.1854	0.3545	0.1362	0.2414
30	0.1282	0.2664	0.0924	0.1819
36	0.0772	0.1747	0.0844	0.1236

based on life-table analysis. The proportions breast-feeding decrease at different rates for each area. A greater contrast is observed between rural and urban areas than between Java-Bali and Outer Islands I. In general, children of rural Java-Bali women are most likely to be breast-feeding their babies at any point post-partum, followed by rural Outer Islands, urban Java-Bali and finally urban Outer Islands.

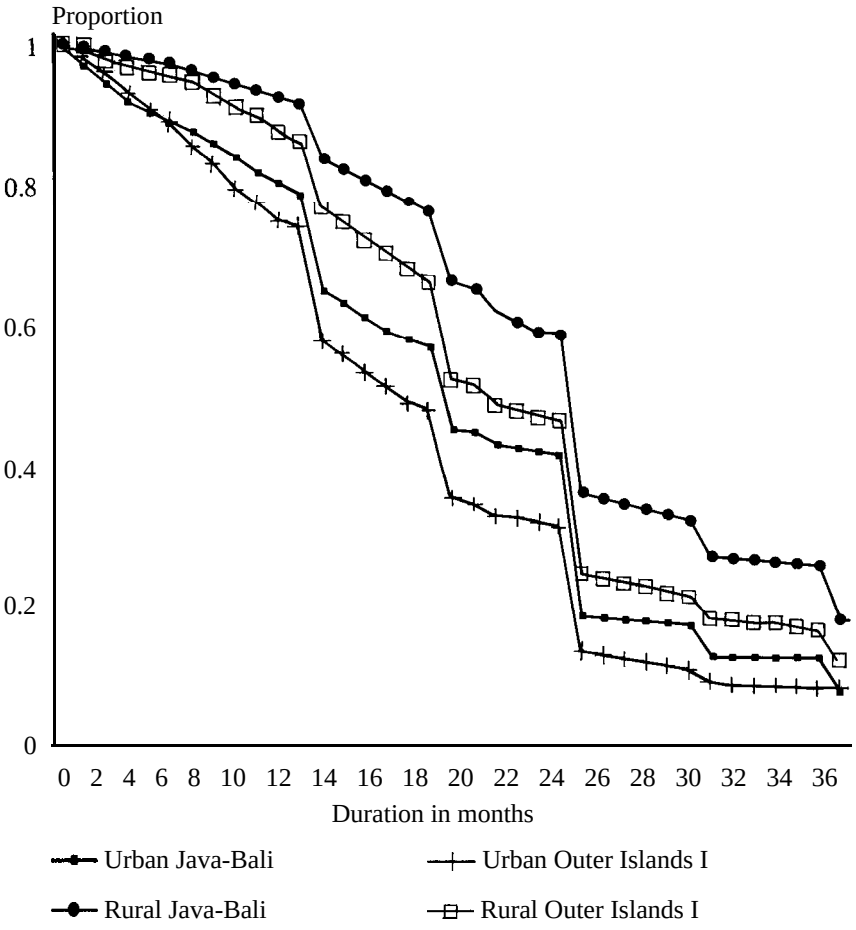
In the first six months, there is little difference between Java-Bali and Outer Islands I, but urban rural differences emerge earlier. After three months post-partum, around 97 per cent of children are still breast-feeding in rural areas, compared with only around 92 per cent in urban areas. Through six months post-partum, approximately 95 per cent of rural women are still breast-feeding, compared with approximately 86 per cent of those in urban areas. From six months to two years, steep parallel declines are observed in each of the four areas. By one year of age, the proportion still breast-feeding is at least 18 percentage points higher in rural areas than in urban areas, in both Java-Bali and Outer Islands I.

Median duration of breast-feeding by selected characteristics

In all of Indonesia, the median duration of breast-feeding is 17.3 months in urban areas, and 23.1 months in rural areas. In urban areas, 75 per cent of children are breast-fed for nearly a year, and 25 per cent for nearly two years. In rural areas, 75 per cent of children are breast-fed at least beyond a year, and 25 per cent are breast-fed for nearly 11/2 years.

The median duration of breast-feeding, and the seventy-fifth and twenty-fifth quartile points for each geographic group, by the selected covariates, are

Figure: Proportion breast-feeding in Java-Bali and Outer Islands I



given in tables 5a and 5b. Differentials between subgroups are observed for almost all of the characteristics tested.

Median durations of breast-feeding for Java-Bali are similar to that of the sample as a whole, with a difference of 5.8 months between urban and rural areas (17.6 months urban and 23.4 months rural). In urban areas, 75 per cent are breast-fed for 11 months, and 25 per cent for nearly two years. In rural areas, 75 per cent are breast-fed for 17 months, and 25 per cent for nearly three years.

Table 5a: Median (Md) and quartiles (Q) of breast-feeding duration in months, Java-Bali

Characteristic		Urban			Rural		
		Q75	Q50 (Md)	Q25	Q75	Q50 (Md)	Q25
Household economic level	High	11.2	17.5	23.7	14.6	23.1	29.3
	Low	11.9	22.3	29.6	17.4	23.5	35.5
Age at time of child's birth	<30	11.2	17.5	23.6	15.9	23.2	29.8
	≥30	11.2	17.9	25.6	17.9	23.7	35.9
Mother's occupation	Ever worked	11.4	17.7	23.7	17.2	23.3	29.6
	Never worked	11.0	17.3	23.6	16.9	23.4	35.4
Mother's education	Sr. high	5.1	11.9	23.3	11.3	17.9	23.6
	Jr. high	11.0	17.6	23.5	16.4	23.3	29.2
	Primary	11.6	17.8	23.8	17.3	23.4	35.1
	None	11.6	17.4	29.0	14.9	23.3	35.5
Spouse's education	Sr. high	7.6	14.7	23.4	12.1	19.7	23.8
	Jr. high	11.3	17.7	23.6	13.2	22.7	25.6
	Primary	11.8	17.9	24.0	17.3	23.5	35.3
	None	11.5	17.6	29.7	17.1	23.8	35.7
Spouse's occupation	Professional	8.5	14.8	23.5	13.3	23.0	26.6
	Sales	11.1	17.3	23.6	15.7	23.2	35.3
	Manual	11.5	17.9	23.8	16.1	23.3	29.6
	Agriculture	14.1	17.9	23.9	17.4	23.5	35.4
Delivery	Hospital	9.2	16.7	23.5	11.8	19.2	25.4
	Home	11.9	19.6	24.0	17.3	23.4	35.2
Attendant	Midwife	10.2	17.2	23.6	11.9	20.6	24.5
	Traditional birth attendant	12.8	21.7	29.0	17.3	23.5	34.3
Language	Bahasa	10.7	17.2	23.6	13.2	23.1	29.1
	Other	11.9	20.4	23.9	17.2	23.4	35.1
Parity	l-2	10.4	17.1	23.5	15.1	23.1	29.4
	3-4	11.4	19.2	23.8	17.3	23.5	35.2
	5+	11.9	22.4	29.5	17.7	23.6	35.8
Sex of infant	Boy	11.2	17.5	23.7	17.1	23.3	35.1
	Girl	11.2	17.6	23.7	17.0	23.4	35.0
Pregnancy	Wanted	11.1	17.4	23.6	15.9	23.2	29.9
	Unwanted	11.6	19.7	25.9	17.3	23.5	34.3
Java-Bali		11.2	17.6	23.7	17.0	23.4	35.1
Indonesia (All)		11.9	17.3	23.6	14.3	23.1	29.5

Table 5b: Median (Md) and quartiles (Q) of breast-feeding duration in months, Outer islands I

Characteristic		Urban			Rural		
		Q75	Q50 (Md)	Q25	Q75	Q50 (Md)	Q25
Household economic level	High	9.3	15.3	23.3	13.8	19.9	27.2
	Low	11.2	16.5	23.4	12.1	18.4	23.8
Age at time of child's birth	<30	9.4	14.7	23.2	12.1	17.9	23.8
	≥30	11.1	17.4	23.7	14.2	23.1	35.3
Mother's occupation	Ever worked	9.5	14.7	23.2	12.6	18.4	23.9
	Never worked	11.0	17.0	23.5	13.2	19.9	25.3
Mother's education	Sr. high	7.9	13.2	23.1	11.4	17.7	23.3
	Jr. high	8.8	17.1	23.4	11.2	17.4	23.4
	Primary	11.1	15.2	23.4	12.9	19.3	23.9
	None	9.7	17.4	29.1	13.2	23.4	35.3
Spouse's education	Sr. high	9.5	15.2	23.1	13.4	23.2	23.8
	Jr. high	9.7	17.4	23.5	11.3	17.3	23.6
	Primary	9.8	15.2	23.4	13.4	19.2	23.9
	None	11.0	11.9	27.1	12.8	20.2	33.5
Spouse's occupation	Professional	11.1	16.9	23.3	13.5	23.1	23.9
	Sales	7.9	13.5	23.3	11.4	17.4	23.6
	Manual	9.8	13.9	23.2	11.9	17.9	23.9
	Agriculture	11.7	19.6	29.6	13.5	19.9	25.6
Delivery	Hospital	7.8	13.9	23.2	11.6	17.6	23.6
	Home	11.2	17.2	23.5	12.8	19.4	24.1
Attendant	Midwife	8.8	14.3	23.2	11.7	17.6	23.7
	Traditional birth attendant	11.6	17.6	23.7	12.2	22.1	28.9
Language	Bahasa	8.8	13.4	23.1	11.9	17.7	23.8
	Other	11.6	17.7	23.9	13.9	23.1	29.5
Parity	l-2	7.6	13.1	18.4	11.8	17.7	23.7
	3-4	11.1	17.2	23.5	13.8	20.8	25.7
	5+	11.2	17.8	23.7	13.7	23.3	33.9
Sex of infant	Boy	11.7	15.6	23.4	12.7	18.3	24.7
	Girl	8.5	15.2	23.3	12.4	19.8	23.9
Pregnancy	Wanted	8.7	13.1	23.2	11.9	17.9	23.8
	Unwanted	11.1	17.3	23.6	13.2	23.3	35.9
Outer Islands I		9.7	15.4	23.3	12.5	19.4	23.9

A more detailed subgroup analysis of Java-Bali, based on survival curves for each covariate, indicates that, in both urban and rural areas, breast-feeding duration differs significantly (p value < .05) across categories for nearly every characteristic tested. The exceptions are sex of the infant, which does not exert a significant influence in either urban or rural areas, and mother's work status, which is important only in rural areas.

In both urban and rural areas of Java-Bali, economic, educational and spouse-occupational factors related to higher status are generally associated with a shorter duration of breast-feeding. Median breast-feeding duration is 3-5 months shorter in the highest status groups in urban areas, and 25 per cent of the members of higher education and occupational status groups stop breast-feeding their babies after 5-8 months. In rural areas, median durations that are 3-5 months shorter are observed among children of the most highly educated parents.

The use of modern health facilities or delivery attendants is associated with a shorter duration of breast-feeding in both urban and rural Java-Bali. In urban areas, 25 per cent of mothers using modern health facilities and personnel at delivery stop breast-feeding at 9-10 months in urban areas, and 50 per cent of them stop at 16-17 months. Durations among those who delivered their babies in a more traditional manner are 2-3 months longer.

In rural areas, the differential is larger, particularly at the quartile points. Median duration is 3-4 months shorter for those using modern facilities or attendants. At the seventy-fifth and twenty-fifth quartile points, durations are five and ten months shorter, respectively, for those using modern, compared with traditional, delivery facilities and personnel. Overall, however, among all groups, median breast-feeding durations are still one year or more.

Mothers who are younger at the time of birth of their babies, at lower parities, those breast-feeding children who were wanted at the time of pregnancy, and those who speak the local language, all demonstrate shorter durations of breast-feeding. In general, these differentials are not as pronounced as those for social class and modern birth facilities and attendant variables.

A substantial proportion of rural Java-Bali women breast-feed their babies for extended periods of time. For every characteristic analyzed, the more traditional subgroup consistently demonstrates that 25 per cent breast-feed them for nearly three years. This consistent pattern in not observed in urban areas.

In Outer Islands I, median durations are several months shorter than for

Java-Bali. The median duration for urban women is 15.4 months, and for rural women it is 19.4 months. Twenty-five per cent of children are breast-fed for almost two years in both rural and urban areas.

In Outer Islands I, differentials observed across characteristics in urban areas are consistently repeated in rural areas. In both areas, the breast-feeding survival curves differ significantly across categories of: (a) mother's age at time of child's birth, (b) father's occupational status, (c) clinical or home birth delivery, (d) modern or traditional birth attendants, (e) ability to speak Bahasa Indonesia, (f) parity and (g) "wantedness" of pregnancy. In rural areas, the maternal educational level is also significant.

In Outer Islands I, significant effects of factors measuring economic and social class are limited to spouse occupation differentials and maternal education in rural areas. In both urban and rural areas, middle levels of spouse's occupation are associated with shorter durations of breast-feeding, rather than upper class status as in Java-Bali. This middle-class tendency away from breast-feeding was also observed in proportions initiating breast-feeding. Higher levels of maternal education in rural areas is associated with shorter durations of breast-feeding, and no schooling with fairly prolonged durations.

For all of the remaining variables, the more "modern" group practises shorter durations of breast-feeding. Breast-feeding durations are shorter among those who use modern health facilities or personnel for delivery than those who deliver at home or with a traditional birth attendant. Those mothers who are younger, at lower parities and delivering wanted children tend to breast-feed their babies for shorter durations. Women able to speak the national language also demonstrate shorter durations.

Urban-rural differences in the duration of breast-feeding are significant in Indonesia, with rural women breast-feeding generally six months longer in Java-Bali and four months longer in Outer Islands I. The differences may be accounted for largely by the shorter breast-feeding duration among women using more modern health care for delivery, and among women of higher economic and occupational status, in combination with the large differences in the distribution of these women in rural and urban areas.

Covariates of the continuation of breast-feeding

Logistic regression analysis was performed over four time-periods using eight maternal variables as predictors. Table 6 presents adjusted odds ratios for continuing breast-feeding for 6, 12, 18 and 24 or more months among women who ever breast-fed their children, or who were breast-feeding them at 6, 12 and 18 months, respectively.

In urban Java-Bali, predominant influences on the probability of continuing breast-feeding are maternal educational level, the attendance at delivery by a traditional birth attendant and parity. Women of lower education are more likely to continue breast-feeding than women of higher education at six months or more, but thereafter the effect reverses. At 18 months, women of lower education are less likely to continue. Attendance by a traditional birth attendant compared with health personnel also exerts a positive influence on the continuation of breast-feeding at both 6 and 12 months. Women of higher parities are more likely to continue breast-feeding in both the first and second year than women of lower parities. Holding parity constant, however, reveals that older women are less likely to continue breast-feeding than younger women at six months. Each of these effects is supported in analyses of different time intervals. Effects of an unwanted pregnancy are also noted in analyses of 0-4 months and 4-8 months. Mothers of unwanted children are significantly less likely to continue breast-feeding to the fourth month and beyond, but are more likely to continue to the eighth month and beyond than mothers of wanted children.

Breast-feeding behaviour among rural Java-Bali women is different from each of the other areas studied. Only in this area is low household economic level associated with a significantly greater chance of continuing breast-feeding, particularly in the first year. Mothers who have ever worked for money are less likely to continue feeding at 18 months. Unlike in the other areas, the use of a traditional birth attendant does not exhibit a consistent positive impact on the continuation of breast-feeding. However, a home delivery does have a significant positive effect on breast-feeding continuation at both four and six months. In rural Java-Bali, older women are more likely than younger women to continue breast-feeding beyond 18 months, an observation strongly supported by analyses of different time intervals beyond eight months.

Women from urban Outer Islands I demonstrate a similar pattern of breast-feeding covariates as urban Java-Bali women. Attendance by a traditional birth attendant at delivery again asserts a positive impact on the continuation of breast-feeding, both at six months and 18 months. Women of higher parity also are more likely to continue breast-feeding, particularly those of parity 5 and higher, confirmed in analyses of other time intervals. At every parity level, however, older women are less likely to continue breast-feeding, notably at six and eight months post-partum.

In rural Outer Islands I, use of the traditional birth attendant, and mother's age at child's birth have the most prominent impacts on the continuation of breast-feeding. The positive impact of attendance at birth by a traditional birth attendant is notable at four months post-partum and continues through the second year. As in rural Java-Bali, older women are more likely to continue

Table 6: Adjusted odds ratios for continuing breast-feeding at specified months post-partum

Characteristic	≧6 months	≧12 months	≧18 months	>=24 months
		Java-Bali (Urban)		
Low household economic level	1.63	1.15	1.05	1.22
Home delivery	1.39	1.13	1.25	0.66*
Traditional birth attendant	1.96**	1.80**	1.24	1.24
Mother's education≦ Primary	2.09**	1.18	0.60**	0.99
Mother ever worked	0.79	0.77	0.95	0.92
Age at time of child's birth ≧30	0.72	0.52**	0.91	1.40
Parity 3-4	1.29	1.43*	1.66**	1.41
Parity 5+	2.43**	3.19**	1.41	1.03
Unwanted preganancy	0.89	0.99	0.99	1.42
		Java-Bali (Rural)		
Low household economic level	1.81**	1.62**	1.13	1.10
Home delivery	3.07**	1.40	1.16	1.24
Traditional birth attendant	0.58	1.51	1.20	1.35
Mother's education≦Primary	1.68	1.40	0.97	1.24
Mother ever worked	1.16	1.09	0.73**	1.17
Age at time of child's birth ≧30	0.88	1.61	1.55**	1.56**
Parity 3-4	1.55	0.98	1.23	1.01
Parity 5+	1.35	1.18	1.04	1.02
Unwanted pregnancy	0.94	1.00	1.06	1.18
		Outer Islands I (Urban)		
Low household economic level	1.74	0.89	0.97	0.89
Home delivery	1.08	0.95	0.93	1.34
Traditional birth attendant	3.57**	1.61	2.10**	0.62
Mother's educations ≦ Primary	1.01	0.99	0.93	1.36
Mother ever worked	0.69	1.33	1.29	1.52
Age at time of child's birth ≧30	0.49**	1.61	0.84	0.82
Parity 3-4	1.66**	1.26	1.63*	1.30
Parity 5+	2.86**	1.11	2.03**	1.85
Unwanted pregnancy	0.88	1.37	1.13	1.79
		Outer Islands I (Rural)		
Low household economic level	1.62	0.65*	0.79	0.75
Home delivery	1.11	0.82	1.15	0.88
Traditional birth attendant	0.91	1.52*	1.75**	1.51*
Mother's education≦Primary	0.69	1.92**	0.96	1.61
Mother ever worked	0.80	1.49*	1.08	0.99
Age at time of child's birth ≧30	0.47**	1.03	2.13**	2.77**
Parity 3-4	0.66	1.39	1.34	0.90
Parity 5+	0.87	1.64	0.73	0.64
Unwanted pregnancy	1.72	3.49**	0.68	2.11*

Notes: ** = Significant at .05 level; * = Significant at .10 level

breast-feeding in the second year, but they are also less likely to continue at six months. Women of lower educational level are more likely to continue breast-feeding beyond a year, compared with more highly educated ones. A child of an unwanted pregnancy is more likely to be breast-fed beyond a year, compared with those wanted. This effect is particularly large and also significant in an analysis of the 8- to 12-month interval.

Discussion and conclusions

Women in Indonesia have very positive attitudes towards breast-feeding. Almost all women initiate breast-feeding; only 3 to 4 per cent do not. Over 85 per cent of women continue breast-feeding their babies beyond six months, and over half of all women continue well into the second year. At least 25 per cent of the population breast-feed their children to nearly two years of age. Among the few children who are never breast-fed, lower social and economic status, and use of the traditional birth attendant are associated with a greater likelihood of breast-feeding in bivariate analyses. When all maternal factors are controlled, it is found that in rural Java-Bali and urban Outer Islands I, higher parity children are more likely to be breast-fed, and children of unwanted pregnancies less likely to be breast-fed.

Among the factors that influence duration of breast-feeding, the supportive role of the traditional birth attendant emerges as most important. In all areas except rural Java-Bali, women who deliver with a traditional birth attendant are more likely to continue breast-feeding their children. In rural Java-Bali, women who have a birth at home are more likely to do so. The positive effect that a traditional delivery setting has on breast-feeding continuation is predominant in Java-Bali in the first year post-partum, while in Outer Islands I, the effect carries through into the second year. Whether the effect is due to the influence of the traditional birth attendant, or other unmeasured background characteristics of women who use such an attendant is not clear. More frequent contact with a traditional birth attendant within the community may account for her continuing positive influence on breast-feeding long after delivery. Alternatively, the use of the attendant may signify a more traditional woman, who is willing to continue breast-feeding for longer periods of time.

The 1983 data on five metropolitan areas in Indonesia (Joesoef *et al.*, 1988) showed that only 75 to 80 per cent of women who use modern health facilities or a trained birth attendant still breast-feed at six months. The NICPS data, based on a broader urban sample, found a somewhat longer duration. Among urban women in Indonesia, 81 to 84 per cent of women who deliver in a hospital or clinic are still breast-feeding their babies at six months. Among rural women, the number doing so is 91 to 94 per cent. Median durations are

well over a year for each group, and closer to a year and a half or more in the Outer Islands.

In both urban areas, children of higher parity are breast-fed for longer periods than children of lower parity. In both rural areas, children born to older women are more likely to be breast-fed for longer periods than children born to younger mothers. In all areas except rural Java-Bali, older women are less likely to continue breast-feeding their babies in the earlier months post-partum, controlling for parity. Older women may be more likely to fear that they have insufficient milk, a major reason for early cessation of breast-feeding (Hull *et al.,* 1990; Gussler and Briesmeister, 1980).

Lower educational levels and lower economic status tend to be associated with a greater likelihood of continuing breast-feeding. These effects are more apparent in the bivariate analyses, where spouse characteristics were included, than in the multivariate analyses. In Java-Bali, education and economic class effects are consistent whether the variable is household economic status, maternal or spouse education, or spouse occupation. Shorter durations are observed among the upper classes. In Outer Islands I, a greater diversity of effects of these variables is apparent. Spouse occupational factors appear more important and should be included in future multivariate analyses. Generally, it appears that the middle status occupations of spouses are associated with less likelihood of initiating breast-feeding and have shorter durations of such feeding, than the other classes. The measure of maternal work status is not strongly associated with either breast-feeding initiation or continuation in any of the areas. The variable measures only whether a woman has worked for money since marriage. A more appropriate measure would reflect labour force participation in the post-partum period, which is more likely to be linked with breast-feeding behaviour.

The effects on an unwanted pregnancy in rural Outer Islands I fall in two directions. In the early months post-partum, the children of unwanted pregnancies are less likely to be breast-fed. However, at later periods, women having had an unwanted child are more likely to continue breast-feeding the child than those who wanted their child. Prolonged breast-feeding of infants from undesired pregnancies may be due to economic constraints (i.e. inadequate income for feeding the child), or to a desire to extend amenorrhea in the hope of delaying a return to fertility. (This hypothesis will be explored in further analyses of the NICPS data.)

Each of the factors associated with longer duration of breast-feeding appears to signify a division between the more traditional and modern groups in Indonesia. Use of traditional delivery practices, higher parity and age, lower

socio-economic status and education, inability to speak the national language, and rural residence are all associated with a more traditional life-style that is more conducive to prolonged breast-feeding. Among this same group, the economic resources for and access to easily prepared supplementary foods may be absent, thereby encouraging prolonged breast-feeding.

The duration of breast-feeding in Indonesia is fairly long, particularly in rural areas and among the more traditional groups of the population. Infant and child mortality among rural women and among less well educated women is still fairly high (Central Bureau of Statistics, 1989). The benefits of reduced morbidity and mortality and delayed fertility that could be gained from breast-feeding are probably diminished owing to practices of early feeding of infants. Exclusive breast-feeding, even in the earliest post-partum months, is relatively infrequent in Indonesia. Pre-lacteal foods are commonly given, and colostrum is often discarded (Indonesia Epidemiology Network, 1989; Proyek Pola Makanan and Manoff International, 1986; Winikoff *et al.*, n.d.). Therefore, infants are exposed very early to morbidity risks, and immunological protection from colostrum is reduced. The length of the anovulatory period may also be reduced, increasing the risk of an early subsequent pregnancy. While encouragement of breast-feeding among groups showing signs of decreasing duration is important, breast-feeding policy in the Indonesia context must also emphasize the importance of exclusive breast-feeding in order to bring about desired reductions in infant and child morbidity and mortality.

Footnotes

1. Outer Islands I consists of the provinces of Aceh, North Sumatra, West Sumatra, South Sumatra, Lampung, West and South Kalimantan, North and South Sulawesi, and West Nusa Tenggara. Outer Islands II consists of the provinces Riau, Bengkulu, Central Sulawesi and Sulawesi Tenggara. Excluded were areas with small populations: namely, Jambi, East Nusa Tenggara, East Timor, Central Kalimantan, East Kalimantan, Maluku and Irian Jaya.
2. Among the 9,648 children surviving eight days or more, 3.2 per cent were not breast-fed. Among children who died within the first seven days, 45.2 per cent were not breast-fed. The intention of this analysis is to examine socio-economic factors that influence the choice of breast-feeding. Therefore, only infants surviving eight days or more were included in the analysis.

References

Akin, J., *et al.*, (1981). "The Determinants of Breastfeeding in Sri Lanka". *Demography*, vol. 18, No. 3, pp. 287-308.

Baer, Edward C. (1981a). "Breastfeeding and Family Planning: Meaningful Integration of Services". *Studies in Family Planning*, vol. 12, No. 4, pp. 164-166.

_____(1981b). "Promoting Breastfeeding: A National Responsibility" *Studies in Family Planning*, vol. 12, No. 4, pp. 198-206

Central Bureau of Statistics and World Fertility Survey (1978). *Indonesia Fertility Survey 1976, Principal Report,* vol. 1.

Central Bureau of Statistics, National Family Planning Coordinating Board, and Demographic and Health Surveys, Institute for Resource Development/Westinghouse (1989). *National Indonesia Contraceptive Prevalence Survey 1987,* pp. 69-76.

Dow, T.E. (1977). "Breastfeeding and Abstinence among the Yoruba". *Studies in Family Planning,* vol. 8, No. 8, pp. 208-214.

Family Health International (1989). "Experts Say Breastfeeding is an Appropriate Alternative Method of Family Planning". *Progress Newsletter,* vol. 9, pp. 4-5.

Grant, James P. (1984). *Tne State of The World's Children 1984, UNICEF,* (United Kingdom, Oxford University Press).

Gussler, J.D. and L. Briesmeister (1980). "The Insufficient Milk Syndrome: A Biological Explanation", *Medical Anthropology,* vol. 4, pp. 45-74.

Hebert-Mayling S. and Sandra L. Huffman (1981). "The Contraceptive Effect of Breastfeeding", *Studies in Family Planning,* vol. 12, No. 4, pp. 125-133.

Hull, Valerie J. (1981). "The Effects of Hormonal Contraceptives on Lactation: Current Findings, Methodological Considerations and Future Priorities", *Studies in Family Planning,* vol. 12, No. 4, pp. 134-155.

Hull, Valerie J., Shyam Thapa and GulardiWiknjosastro (1989). "Breastfeeding and Health Professionals: A Study in Hospitals in Indonesia", *Social Science and Medicine,* No. 4, p. 355.

Hull, Valerie J., Shyam Thapa and Hadi Pratomo (1990). "Breastfeeding in the Modern Health Sector in Indonesia: The Mother's Perspective", *Social Science & Medicine,* vol. 30, No. 5, p. 625.

Indonesian Epidemiology Network (1989). "Complementing Family Planning with Breastfeeding to Improve Child and Maternal Health: A Comparative Case Study of a Rural and Urban Population of Indonesia. Major Findings from Baseline Data", Research Report, October.

Jam, A.K. and J. Bongaarts (1981). "Breastfeeding Patterns, Correlates and Fertility Effects", *Studies in Family Planning,* vol. 12, No. 3, pp. 19-99.

Joesoef, R.M., B. Utomo and G.L. Lewis (1988). "Breastfeeding Practices in Metropolitan Indonesia: Policy Considerations", *Journal of Tropical Pediatrics,* vol. 34, pp. 10-14.

Kent, M.M. (1981). "Breastfeeding in the Developing World: Current Patterns and Implications for Future Trends", *Reports on the World Fertility Survey,* No. 2.

Knodel, J. and H. Kintner (1977). "The Impact of Breastfeeding Patterns on the Biometric Analysis of Infant Mortality", *Demography,* vol. 14, No. 4, pp. 391-409.

Laukaran, Virginia H. (1981). "Contraceptive Choices for Lactating Women: Suggestions for Postpartum Family Planning", *Studies in Family Planning,* vol. 12, No. 4, pp. 156-163.

Millman, S. (1981). "Breastfeeding in Taiwan: Trend and Differentials, 1966-1980". *Presented at the 50th Annual Meeting of the Population Association of America* (26-28 March).

Mohiuddin, Anamed M. (1986). "Breastfeeding in Bangladesh", *Journal of Biosocial Science,* vol. 18, No. 4, pp. 425-434.

Mott, Susan H. (1984). "A Note on the Determinants of Breastfeeding Durations in an African Country", *Social Biology*, vol. 31, No. 3-4, pp. 279-289.

Othman, Aziz (1985). "The Contraceptive Role of Breastfeeding by Educational Attainment: An Assessment Based on Malaysian Fertility and Family Survey", *Malaysian Journal of Reproducrive Health*, vol. 3, No. 1, pp. 77-83.

Palloni, A. and S. Millman (1986). "Effects of Inter-birth Intervals and Breastfeeding on Infant and Childhood Mortality", *Population Studies*, No. 40, p. 215.

Pasternak, Boris and Ching Wang (1985). "Breastfeeding Decline in Urban China: An Exploratory Study", *Human Ecology*, vol. 13, No. 4, pp. 433-466.

Pebley, A.R. and P.W. Stupp (1986). "Reproductive Patterns and Child Mortality in Guatemala", *Demography*, No. 24, p. 43.

P.I.P. – The Johns Hopkins University (1981). "Breastfeeding, Fertility and Family Planning", *Population Reports Series J*, No. 24, p. 525.

Popkin, B.M. (1978). "Economic Determinants of Breastfeeding Behavior: The Case of Rural Households in Laguna, Philippines". In *Nutrition and Human Reproduction*, edited by W.H. Mosley, (New York, Plenum Press).

Proyek Pola Makanan Pendamping ASI, Directorate of Nutrition, Ministry of Health, and Manoff International Inc. (1986). "Weaning Practices Assessment for East Java and West Nusa Tenggara", Research Report, November.

Retherford, Robert D., Minja Kim Choe, Shyam Thapa and Bhakta B. Gubhaju (1989). "To What Extent Does Breastfeeding Explain Birth-Interval Effects on Early Childhood Mortality?", *Demography*, No. 3, p. 439.

Smith, Ferry B. (1983). "Breastfeeding Differentials", *World Fertility Survey Comparative Studies – Cross National Summaries*, No. 23 (Voorburg, Netherlands, International Statistical Institute).

Soekirman (1983). "The Effect of Maternal Employment on Nutritional Status of Infants from Low-Income Households in Central Java". Unpublished Dissertation, (Cornell University).

Suyono, Haryono and Shyam Thapa (1990). "Breast-feeding and the Family Planning Sector's Initiative in Indonesia", *Asia-Pacific Population Journal* (in this issue).

Thapa, Shyam, Roger V. Short and Malcolm Potts (1988). "Breastfeeding, Birth Spacing and Their Effects on Child Survival", *Nature*, No. 6192, p. 619.

USAID (1989). "Child Survival", *A Fourth Report to Congress on the USAID Program*, (Washington D.C., USAID), p. 25.

WHO (1981). 'Contemporary Patterns of Breastfeeding", *Report on the WHO Collaborative Study on Breastfeeding*, (Geneva, WHO).

_____(1982). Draft "Summary and Conclusions", *WHO/NAS Workshop on Breastfeeding and Fertility Regulation: Current Knowledge and Program Policy Implications*, (Geneva, Switzerland, 17-24 Feb.), p. 3.

Winikoff, Beverly *et al.*, (n.d.). *The Infant Feeding Study Semarang Site Report*, A report submitted to AID by The Population Council (Contract No. AID/DSAN-C-0211), pp. 36, 64.

Wray, J.D. (1977). "Maternal Nutrition, Breastfeeding and Infant Survival". A paper presented at the Conference on Nutrition and Reproduction, (Bethesda, Maryland), February.

Breast-feeding Trends and the Breast-feeding Promotion Programme in the Philippines

Declines in breast-feeding duration should interest family planners as well as health policy makers and nutritionists

By Nancy E. Williamson*

In the context of East and South-east Asia, the Philippines is an under-achieving country; living standards have not improved much in recent years. (Table 1 provides some relevant data about the Philippines.) In this setting, breast-feeding is especially important for child health and child nutrition as well as child spacing. The Philippines is one of several developing countries having comparable national data on breast-feeding trends for the past several decades.

* The author of this article is Director of Program Evaluation Division, Family Health International, Research Triangle Park, North Carolina, United States of America. A slightly different version of this article will appear in the *International Journal of Obstetrics and Gynaecology* (1990), Supplement 1.

Table 1: The Philippines (1988)

Population:	63 million
Projected population (year 2000):	85 million
Number of women aged 15-49:	14.5 million
Population growth rate:	2.8 per cent per year
Total fertility rate:	4.7 children
Geography :	7,100 islands
Percentage urban:	41 per cent
Percentage Catholic:	83 per cent
Infant mortality rate:	51 per thousand

Sources: Population Reference Bureau, World Population Data Sheet, 1988; Background Notes, State Department Bulletin on the Philippines, Bureau of Public Affairs, 1986.

This makes it possible to monitor declines in breast-feeding and identify groups changing the most. It is important to examine changes in the mean duration of breast-feeding as well as in the incidence of breast-feeding, defined as the percentage of infants still being breast-fed at different ages.

Trends in breast-feeding duration

Table 2 shows the trend in duration of breast-feeding in the Philippines, based on four national surveys. (Additional surveys were conducted in 1986 and 1988, but results are not yet available.) Between 1963 and 1982, breast-feeding duration declined by 16 per cent (from 14.5 months to 12.1 months).

By Western standards, 12 months is still a substantial duration. But the decline is of concern in the Philippines where most family incomes are low,

Table 2: Trend in duration of breast-feeding in the Philippines (in months)

1963-1967	1968-1972	1973-1977	1978-1982	1983-1988
14.5	13.7	12.9	12.1	*

Source: Casterline, John B., Corazon Raymundo and Josefina Cabigon, "Trends in Fertility in the Philippines: An Integrated Analysis of Four National Surveys," Final Report, Population Institute, University of the Philippines, Quezon City, 1990.

**Note:* A linear extrapolation of the trend would yield a value of 11.3 months for the period 1983-1988.

Table 3 : Duration of breast-feeding in the Philippines by socio-economic characteristics, 1973 and 1983

	1973	1983	Difference
Total sample (months)	11.8	12.0	+0.2
Residence			
Urban	10.8	11.2	+0.4
Rural	12.5	13.5	+1.0
Migration status			
Urban migrant	10.3	13.2	+2.9
Urban resident	11.4	10.0	-1.4
Region of residence			
Manila	8.7	8.1	-0.6
Luzon	12.1	12.7	+0.6
Visayas	12.8	14.1	+1.3
Mindanao	11.5	11.1	-0.4
Mother's education (years)			
None	10.1	11.8	+1.7
1-3	12.1	13.5	+1.4
4-6	13.1	13.4	+..3
7-9	10.5	13.6	+3.1
10+	8.0	9.5	1.5
Mother's paid employment			
None	12.1	12.1	0.0
Traditional	13.4	13.8	+0.4
Mixed	11.1	12.2	+1.1
Transitional	7.8	10.1	+2.3
Modern	8.4	7.5	-0.9
Father's annual income			
Low	14.1	13.8	-0.3
Medium	12.1	10.3	-1.8
High	11.4	8.5	-2.9

Source: Popkin, Barry M., John S. Akin, Wilhelm Flieger and Emelita L. Wong, "Socio-economic Change and Breastfeeding Trends: The Case of the Philippines", University of North Carolina, Chapel Hill, 1987.

child nutrition is often inadequate and the use of modern family planning methods is low compared with many other Asian countries. Breast-feeding, which suppresses ovulation, remains one of the major means of child spacing in the Philippines, especially in view of the fact that it is a predominantly Catholic country where family planning remains controversial.

As indicated in table 1, the total fertility rate (TFR) remains moderately high in the Philippines, i.e. 4.7. In the mid-1960s to mid 1970s, declines in fertility were due mainly to increased age of marriage for women and increased contraceptive use. Recently, age of marriage stabilized at 23-24 years of age and fertility declines are due to increased contraceptive use alone. However, since breast-feeding is declining (thus reducing the child spacing effects), about a quarter of the fertility decline from increased contraceptive use is being wiped out by declines in breast-feeding. (Casterline *et al.*, 1990). This suggests that declines in breast-feeding duration should interest family planners as well as health policy makers and nutritionists (Thapa *et al.*, 1988).

A recently published paper (Popkin *et al.*, 1989) gives durations of breast-feeding in the Philippines during the period 1973-1988 by urban/rural, migration status, region, mother's education, mother's paid employment and father's income (table 3). Women with the shortest durations lived in Manila, had 10+ years of education and had modern occupations. Children whose fathers had the highest incomes also had shorter breast-feeding durations. It is encouraging, however, that even among urban residents, breast-feeding duration averaged 10 months in 1983.

Table 4: Incidence of breastfeeding in the Philippines by age of infant, 1973 and 1983

Age in months	1973			1983		
	Urban	Rural	Total sample	Urban	Rural	Total sample
0	77	93	89	73	90	84
3	64	85	80	57	84	74
6	53	78	72	48	79	68
12	16	28	25	23	44	36
24	3	3	3	8	10	9

Source: Popkin, Barry M., John S. Akin, Wilhelm Flieger and Emelita L. Wang, "Breast-feeding Trends in the Philippines, 1973 and 1983," *American Journal of Public Health*, Jan, 1989, vol. 79, No. 1, pp. 32-35. (Data presented in figure 1 of that article).

Between 1973 and 1983, the biggest increases in breast-feeding duration were experienced by urban migrants, women with 7-9 years of education, and women in transitional (i.e., sales, clerical) occupations. The biggest decreases were for the highest income families.

Trends in incidence of breast-feeding

It is important to know the proportion of babies never breast-fed or breast-fed only a few months. Table 4 gives this information for urban and rural areas for 1973 and 1983 (Popkin *et al.*, 1989). In 1973, 89 per cent of infants were breast-fed at birth; this declined by 5 percentage points in 1983. Thus, by 1983, 10 per cent of rural infants and 27 per cent of urban infants were never breast-fed. This is worrisome, given the fact that few Filipino families can afford to purchase infant formula and many do not have the facilities for safe artificial feeding. Even if they did, their infants would not receive the immunological protection breast-feeding conveys.

Table 5 presents incidence of breast-feeding by characteristics of the mother (urban/rural, region, education and paid employment). In 1983 in Manila, 34 per cent of the infants were never breast-fed. A similar percentage (36 per cent) of infants born to mothers with modern occupations and a quarter of infants born to the best educated mothers were never breast-fed. Nonetheless, the biggest increases in incidence of breast-feeding between 1973 and 1983 were contributed by the best educated women and those with modern occupations.

Breast-feeding may decline further in the Philippines, if effective programmes are not carried out, because as the country modernizes, more people live in urban areas, more go beyond primary school and more women are employed in modern occupations. Thus, even if current breast-feeding patterns stay the same for each group but more women move into the modern sector, breast-feeding will decline overall. Table 6 shows the trends in the socio-economic characteristics of households for the period 1973-1983. For example, 75 per cent of women lived in rural areas in 1973 compared with 68 per cent in 1983; by 1988, as indicated in table 1, the population was 59 per cent rural.

Defining breast-feeding problems in the Philippines

Compared with Western countries and many Latin American countries, the breast-feeding situation in the Philippines is not a dire one. In this section, an attempt will be made to define what problems the Philippines does have regarding breast-feeding. They go beyond declines in duration and incidence and include the way in which women breast-feed, local beliefs, the role of milk companies and the lack of encouragement of breast-feeding in private health facilities.

Table 5 : Incidence of breast-feeding in the Philippines by characteristics of mother, 1973 and 1983

	1973 (%)	1983 (%)	Difference* (%)
Total sample	89	84	-5
Area of residence			
Urban	77	74	-4
Rural	93	89	-4
Region of residence			
Manila	76	66	-10
Luzon	88	85	-3
Visayas	92	80	-11
Mindanao	91	86	-5
Mother's education (years)			
None	93	94	0
l-3	92	91	-1
4-6	93	89	-3
7-9	87	83	-4
10+	67	74	+7
Mother's paid employment			
None	92	86	-6
Traditional	95	93	-2
Mixed	83	79	4
Transitional	86	73	-13
Modern	57	64	+6

Source: Same as for table 4.

**Note:* Difference is based on fgures that are not rounded off. Hence, subtracting the rounded off numbers in columns for 1973 and 1983 will not necessarily yield the number in the difference column.

Data have been analyzed only up to 1983; the impact of recent breast-feeding promotion activities cannot be determined. However, based on available national surveys, it is clear that the incidence and duration of breast-feeding have declined although not as precipitously as some breast-feeding promoters argue. In view of trends towards urbanization, better education and more modern occupations for women, further declines should be expected unless there are countervailing breast-feeding promotion activities.

Table 6: Trends in socio-economic characteristics of the Philippines, 1973 and 1983

	1973	1983
Residence (percentage)		
Metro Manila	7	11
Other urban	19	21
Rural	75	68
Mother's education (years)	6.0	7.6
Father's education (years)	6.1	7.6
Percentages of households with electricity	23	46
Mother's paid employment (percentage)		
None	77	81
Traditional	8	4
Mixed	10	9
Transitional	1	2
Modern	3	5

Source: Same as for table 3.

As previously noted, incidence is fairly high: 89 per cent of Filipino infants were breast-fed in 1983, but there is room for improvement since over a quarter of urban infants are not breast-fed.

How women breast-feed and local beliefs about breast-feeding are also very important. Women in the Philippines (as well as in neighbouring Asian countries) often believe that the colostrum is "dirty milk" to be discarded. Similarly, women may delay breast-feeding several days after birth. Even more serious is the practice of initiating supplements and non-nutritive liquids very early. This introduces contaminants and reduces the contraceptive effects of breast-feeding. Another problem is that mothers often stop breast-feeding an ill infant (including one with diarrhoea).

Research by Mayling Simpson-Hebert and her colleagues (1986, 1987) identified a number of local beliefs which undermine breast-feeding. For example, some women believe that a mother should not breast-feed when she is too hot, too cold, tired, sick or angry.

Many Filipinas work away from home and find it difficult to integrate breast-feeding into their schedules. Working mothers may not know much about milk expression and are probably not aware that expressed milk can be

safely stored for up to six hours at room temperature and up to 24 hours in a refrigerator (Population Council, undated).

Companies promoting and selling milk and infant formula are very influential in the Philippines. They advertise intensively and assist hospitals and health professionals with equipment, travel, support of meetings etc.

Finally, although the Department of Health has required "rooming-in" of babies with their mothers in all government-supported health facilities and then extended this policy to private facilities, private hospitals often do not encourage women to breast-feed. Some even have policies which discourage breast-feeding.

The Philippine breast-feeding promotion programme

Fortunately, in the past decade many Filipinos in both the public and private sectors have become concerned about breast-feeding promotion. Table 7 presents a chronology of recent events in breast-feeding promotion, including research activities. For a country considering a breast-feeding promotion programme, this chronology could provide a rough indication of some of the activities needed to institutionalize breast-feeding promotion.

Dr. Natividad Clavano served as a pioneer by instituting a strong hospital-based breast-feeding promotion programme in the city of Baguio in the 1970s and widely publicized her experience. More recently, one of the most significant events was the official adoption (and promulgation) of the Milk Code in October 1986. UNICEF provided leadership and financial assistance to the Philippine programme.

Central to breast-feeding promotion in the Philippines is the National Movement for the Promotion of Breast-feeding (NMPB). The NMPB is housed in the Department of Health and is chaired by the Undersecretary for Public Health Services. It is composed of 39 member agencies: 14 governmental organizations and 25 non-governmental agencies/institutions.

NMPB comprises an executive (or management) committee and three sub-committees: policy, research and IEC (information, education and communication). There are seven task forces under the Research and IEC sub-committees. NMPB receives support from UNICEF and has a small secretariat which handles administrative work. For many of its participants, NMPB is a "labour of love," yielding no financial rewards and little recognition. Recently, NMPB prepared a five-year plan for breast-feeding promotion and is currently seeking funds to implement the programme.

Table 7 : Chronology of the Philippine breast-feeding programme

1975-1978: Philippines participated in the World Health Organization multi-country study on breast-feeding patterns and a milk composition study.

Early 1980s: Beginning of regular interagency meetings on breast-feeding promotion, chaired initially by Dr. Amanda Valenzuela.

1980: Ministry of Health directed public health facilities to promote breast-feeding and reinforce the "rooming-in" policy.

1982: Ministry of Health directed public health facilities to remove commercial infant feeding displays and substitute ministry posters on breast-feeding.
Study conducted on infant formula marketing and health institution policies in Metro Manila (Mayling Simpson-Hebert).

1982-1984: Longitudinal study on decision-making regarding infant feeding practices (Mayling Simpson-Hebert *et al.*).

1983: National Movement for Promotion of Breast-feeding established.
Beginning of UNICEF support of breast-feeding programmes.
Conference on breast-feeding research held in Manila (outcome included a Population Forum issue on breast-feeding and an edited collection, "Breast-feeding and Fertility").

1983-1985: Data collection (first year of life) for longitudinal infant feeding study in Cebu.

1984: Beginning of Well-Start training of Filipino participants.
Preparation of book/slides for introducing breast-feeding into medical school curriculum.
Beginning of breast-feeding promotion messages in mass media.

1985: Ministry of Health directed private hospitals also to adopt rooming-in.

1986: Adoption of new Philippine Constitution with references to the right to health and the need for protection of working women by providing safe working conditions taking into account their maternal functions.

20 October 1986: Adoption of National Code of Marketing of Breast-milk Substitutes, Breast-milk Supplements and Other Related , Products.

1988: Beginning of second five years of UNICEF support for breast-feeding promotion as part of programme to strengthen health services for child survival and maternal care.
Publication of Annotated Bibliography: *Breast-feeding in the Philippines: 1956-1986.*
National Fertility Survey conducted.
Draft prepared of Five Year Plan (1988-1992) for Breast-feeding Promotion in the Philippines.

Remaining challenges

There have been a number of accomplishments of the Philippine breast-feeding programme as noted in table 7. Table 8 lists some of the remaining work. For example, now that rooming-in is required in governmental facilities, there is a need for education programmes for women so that they will continue healthful breast-feeding practices once they leave the hospital. Similarly, if the goal is to get virtually all women to at least initiate breast-feeding, the participation of private hospitals (and within these, the obstetrics and gynaecology services) will be essential.

Table 8: Challenges of the Philippine breast-feeding promotion programme

Health facilities

- Now that rooming-in has been established in governmental health facilities, the next step is to establish breast-feeding education to counteract undesirable practices (e.g. early supplementation).
- Ensure that sick newborn babies get breast-milk.
- Support breast-feeding promotion and rooming-in in private facilities.

IEC

- Build a sustained programme through the mass media.
- Discourage the advertising and promotion of artificial infant foods.
- Encourage breast-feeding mothers to postpone the introduction of supplements until 4-6 months.

Training

- Extend “well-start” training to more hospitals.
- Help family planning providers to meet the child-spacing needs of breast-feeding women.
- Train health professionals at all levels about good breast-feeding practices and the importance of breast-feeding promotion; special programmes might be conducted for obstetricians and gynaecologists.

Outreach

- Work with Catholic Church-related organizations and other networks to promote breast-feeding.
- Educate working women at their work sites on how to maintain breast-feeding.

Research needs

There has been considerable breast-feeding research in the Philippines. Abstracts have been prepared and published in 1988 under the auspices of NMPB and the Nutrition Foundation of the Philippines (see bibliography).

High priority research activities for the future include: (a) continued monitoring of trends and patterns of breast-feeding including analysis of the 1988 national survey; (b) evaluation of the impact of rooming-in programmes including whether rooming-in significantly affects breast-feeding practices after women leave the hospital, and evaluation of the financial costs and benefits of rooming-in for hospitals; (c) studies on the cost effectiveness of different strategies for increasing breast-feeding incidence and duration and changing breast-feeding beliefs and practices; (d) testing of strategies for helping working women to breast-feed; (e) research on obstacles to breast-feeding in private hospitals; and (f) studies on the timing and nature of initiation of contraception among breast-feeding women.

Conclusions

Over the past 20 years, breast-feeding duration has declined from about 14.5 months to 12 months. However, in the most recent period for which data are available (1973 and 1983), the mean breast-feeding duration has stabilized while the incidence has declined slightly. In urban areas, a quarter of new mothers do not initiate breast-feeding.

Although economic conditions in the Philippines have not improved as much as in other Asian countries, the population is gradually becoming more urban and better educated; also more people have modern occupations. These socio-economic trends are associated with decreased breast-feeding. Thus, the breast-feeding promotion programme must counteract socio-economic trends.

Fertility has decreased moderately in the past 2.5 years. In the early period, increasing age at marriage and increased use of contraceptives were responsible. More recently, only increased use of contraception has been responsible. Breast-feeding has continued to have a major impact on child spacing; however, the decline in breast-feeding has made it more difficult to reduce fertility.

Research indicates that breast-feeding contributes to child survival, child health and nutrition, and child spacing. Because breast-feeding as a means of child spacing encounters less opposition from the Catholic Church than other family planning methods, special efforts might be made in co-operation with Church organizations to promote breast-feeding.

References

Casterline, John B., Corazon Raymundo and Josefina Cabigon (1990). "Trends in Fertility in the Philippines: An Integrated Analysis of Four National Surveys," Draft Report, Brown University and the University of the Philippines Population Institute.

Popkin, Barry M., John S. Akin, Wilhelm Flieger and Emelita L. Wong (1987). "Socio-economic Change and Breastfeeding Trends: The Case of the Philippines," University of North Carolina, Chapel Hill, USA.

_____ (1989). "Breastfeeding Trends in the Philippines, 1973 and 1983," *American Journal of Public Health,* vol. 79, No. 1, January pp. 32-35.

Population Council, *Breastfeeding: A Nurses' Guide.* (Undated).

Simpson-Hebert, Mayling (1986). "Infant Feeding in Metro Manila: Infant Formula Marketing and Health Institution Policies", *RMAF Research Report, Vol. II* (Manila, Romon Magsaysay Award Foundation).

_____ and L.P. Makil (l987). "Family Planning, Breastfeeding, and Pregnancy Among Urban Filipino Women," *Fertility Determinants Research Notes,* No. 17, March.

Simpson-Hebert, Mayling, Elias N. Cresencio and Lorna P. Makil (1986). "Infant Feeding in Metro Manila: Infant Feeding Decisions, Infant Health and Family Planning Among Low Income Families," *RMAF Research Report, Vol. I* (Manila, Ramon Magsaysay Award Foundation).

Thapa, Shyam, Roger V. Short and Malcolm Potts (1988). "Breastfeeding, Birth Spacing and their Effects on Child Survival," *Nature,* vol. 335, No. 6192, pp. 679-682.

Selected bibliography

Chayovan, Napaporn, John Knodel and Kua Wongboonsin (1988). "Infant Feeding Practices in Thailand: An Update from the 1987 Demographic and Health Survey," *Studies in Family Planning,* vol. 21, No. 1, pp. 40-50.

Huffman, Sandra L. and Cheryl Combest (1988). "Promotion of Breastfeeding: Yes, It Works!," Center to Prevent Childhood Malnutrition, Bethesda, Maryland, April.

Inciong, Minerva (ed.) (1987). *Annotated Bibliography: Breastfeeding in the Philippines 1956-1986,* Nutrition Foundation of the Philippines.

International Nutrition Communication Service (1985). *A Retrospective and Prospective Look at International Breastfeeding Promotion Programs.* Sponsored by the U.S. Agency for International Development.

National Breastfeeding Program Five-Year Plan 1988-1992. Prepared by National Movement for Promotion of Breastfeeding, Department of Health (lead agency), Manila, Philippines, 1988.

Potts, Malcolm, Shyam Thapa and M.A. Herberson (eds.) (1985). "Breast-feeding and Fertility," *Journal of Biosocial Science Supplement No. 9.* (includes four papers on the Philippines.)

Williamson, Nancy E. (1987). "Breastfeeding Women and Family Planning Programs: Special Needs and Opportunities," *Asian and Pacific Population Forum,* vol. 1, No. 5, November.

Three Decades of Breast -feeding Trends in Singapore

The ethnic community to which a mother belongs has a strong influence on her choice of infant feeding method

By S. Chua, O.A.C. Viegas and S.S. Ratnam *

Despite the well-documented benefits of breast-feeding for both infant and mother, breast-feeding has, until recently, been given little support. World Health Organization data (WHO, 1981) support the conclusion that, as countries undergo socio-economic development, there is a tendency for the incidence of breast-feeding to decline (Kent, 1981). Many factors contribute to such changes in breast-feeding behaviour. Whilst urbanization and industrialization have been

* The authors of this article are S. Chua, MMed (O&G), MRCOG, Registrar; O.A.C. Viegas, MD, FRCOG, DA, Senior Lecturer; and S.S. Ratnam, MD, FRCOG, FRCS, FRCSE, Professor and Head of the Department of Obstetrics and Gynaecology, National University Hospital, Lowere Kent Ridge Road, Singapore 0511.

associated historically with declines in breast-feeding (and indeed still appear to be in certain developing countries), the proportion of mothers now returning to breast-feeding in some industrialized countries, e.g. Sweden and the United States of America, is increasing.

There have been sharp falls in the initiation and continuation of breast-feeding in Singapore since the early 1950s (Millis, 1955). In addition, markedly different patterns have been observed among both poor and well-to-do mothers (Counsilman and Viegas, 1985). It should be noted that the term "initiation" refers to mothers who breast-feed for 3-14 days. With regard to incidence, intermediate-term breast-feeding refers to mothers who breast-feed their babies for 15 days to six weeks; long-term breast-feeding refers to mothers who breast-feed for more than six weeks.

In 1985, 60 per cent of well-to-do mothers initiated breast-feeding (Counsilman *et al.,* 1986; Chua *et al.,* 1989). Of these, 15 per cent breast-fed for 3-14 days; 25 per cent, for 15 days to a maximum of 42 days (6 weeks), and 20 per cent were still breast-feeding at the end of 12 weeks. The remaining 40 per cent fed their babies solely by bottle, or attempted breast-feeding for only a day or two.

The proportion of mothers who initiate breast-feeding, as well as the proportion of short-, medium- and long-term breast-feeders among the well-to-do mothers, compare favourably with results in another study of poor mothers (Counsilman *et al.,* 1986) where it is estimated that only 36 per cent of subjects breast-fed their babies for three or more days. These findings concur with those from surveys carried out in the West, where the more affluent and better educated women are more likely than their less well educated counterparts to breast-feed (Brimblecombe *et al.,* 1977; Sloper *et al.,* 1975; Sacks *et al.,* 1976; WHO, 1984).

Differences between the two economic groups in Singapore are most probably due to increased affluence and education; for instance, 4 per cent of poor mothers (Counsilman *et al.,* 1986) and 25 per cent of well-to-do mothers (Counsilman *et al.,* 1986; Chua *et al.,* 1989) had more than 10 years of formal schooling. The proportion of breast-feeding mothers increases gradually with increases in the number of years of schooling and job skills.

The "opportunity cost" of breast-feeding has often been given as the reason for a decline in breast-feeding as more and more women join the salaried workforce as the country pursues further industrialization. Since many more of the less affluent mothers in Singapore (52 per cent) were unemployed compared with the well-to-do mothers (23 per cent), their greater preference for bottle-feeding could not be directly linked to a greater need for them to return to work soon after giving birth.

Table 1: Percentage of Singaporean mothers initiating breast-feeding, i.e. breast-feeding for 3-14 days

Year	Poor mothers (%)	Well-to-do mothers (%)
1951	90	85-90
1960	70	73
1971	51	28
1976	50	64
1978	49	68
1985	36	60

In both socio-economic groups, the attitude of the mother's husband and her family towards breast-feeding was found to affect significantly her choice of feeding method. Unexpectedly, few breast-feeding mothers identified medical personnel as major influences on their choice of a feeding method. In both studies, neither the presence of antenatal complications nor difficult labour, nor the mode of delivery had a large or significant effect on infant feeding behaviour .

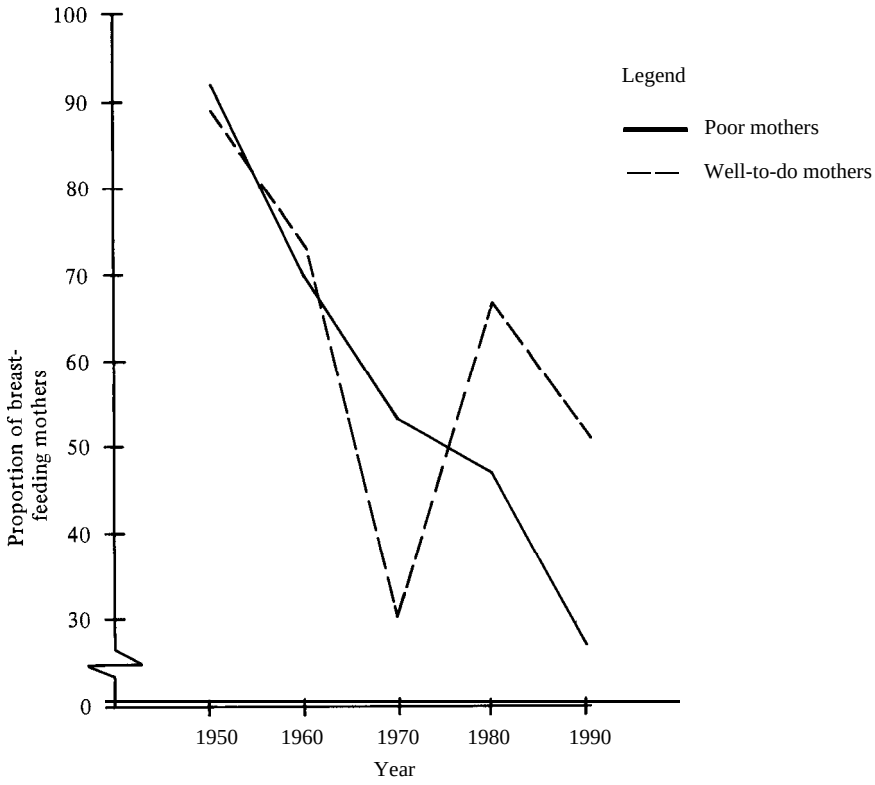
The data in tables 1 and 2 demonstrate a sharp decline in both the initiation as well as the duration of breast-feeding in Singapore over the past 36 years.

In 1951, over 80 per cent of infants were breast-fed for four or more weeks (Millis, 1955) but by 1978 only 37 per cent were being breast-fed (Chung, 1979). In 1985, 39 per cent of the well-to-do mothers elected to breast-feed their infants (Counsilman *et al.*, 1986; Chua *et al.*, 1989). Although the number is not a significant improvement on the 1978 amount, it is higher than the 36 per cent of poor mothers even beginning to breast-feed (table 2).

Table 2: Percentage of Singaporean mothers breast-feeding for one month or more

Year	Poor mothers (%)	Well-to-do mothers (%)
1951	85	80
1960	65	30
1971	43	10
1978	41	29
1985	–	39

Figure 1: Proportion of mothers initiating breast-feeding

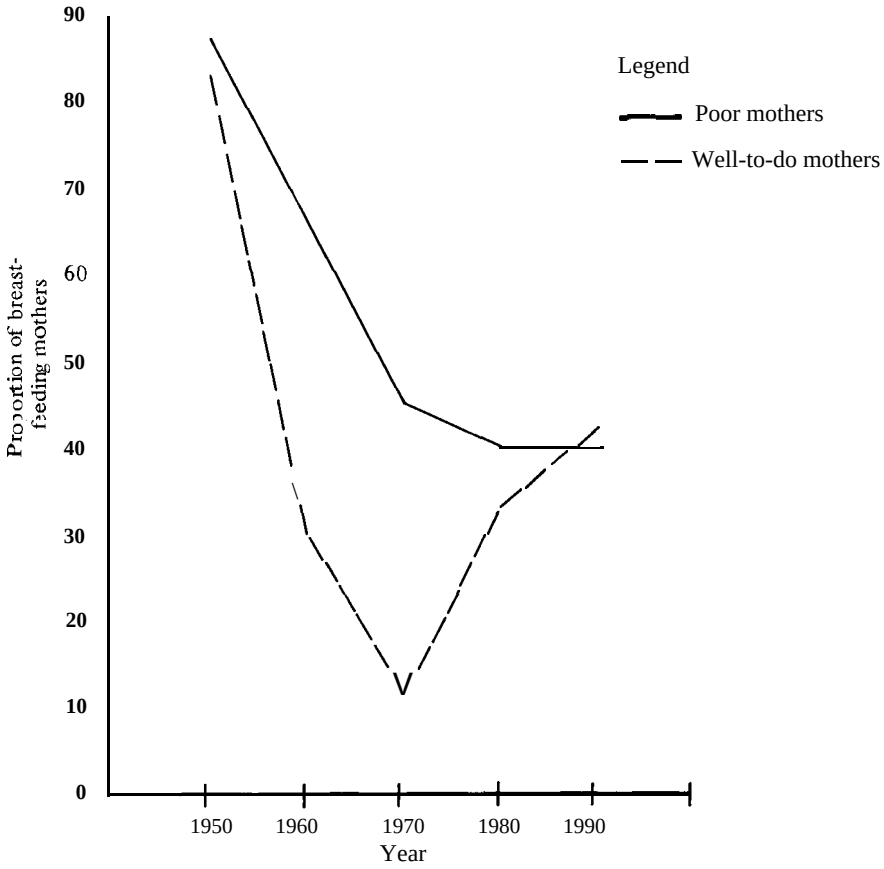


Source: Chua *et al.* (1989).

Sharp declines in the prevalence of breast-feeding have also been reported in other South-east Asian countries over the past three decades (Taam-Wong, 1985). A recent WHO study (WHO, 1981) shows a similar decline in other developing areas.

Figures 1 and 2 show the pattern of breast-feeding behaviour in Singapore over the last three decades. The general picture is one of decline in the incidence of breast-feeding. Differences between the well-to-do and poor groups were initially small. A steady decline in the initiation of breast-feeding among poor mothers from 1951 to 1971 was paralleled by an even sharper decline among well-to-do mothers. More recently, the difference has reversed owing to an

Figure 2: Proportion of mothers breast-feeding for one month or more



Source: Chua *et al.* (1989).

upward trend in the incidence of breast-feeding among well-to-do mothers. In the last decade, a larger proportion of well-to-do mothers has initiated and continued breast-feeding.

The changing pattern in the duration of breast-feeding over the 36-year period is quite interesting. Initially, the differences among the two groups were small, but during the period 1960-1970 they widened. However, in the 1980s, they have again narrowed (figure 2). Among the poor mothers, the proportion appears to be levelling off while it is increasing for well-to-do mothers.

Table 3: Percentage of Singaporean mothers in the three ethnic groups who initiated breast-feeding in 1985

	Poor mothers (%)	Well-to-do mothers (%)
Chinese	26	57
Indian	59	90
Malay	72	94

Source: Chua *et al.,* (1989).

These changes are not unique to Singapore; indeed, they have been seen in the industrialized countries of the West. They demonstrate just how prone to change breast-feeding patterns can be. The increasing availability of infant formulas, as well as changing life-styles, attitudes and family structure, all of which inevitably occur as more and more women work outside the home, seem to have been associated with a dramatic decline in breast-feeding in industrialized northern Europe and North America, especially during periods of strong economic growth. The decline which started in the 1950s continued through the next two decades. During this period, the prevalence of breast-feeding initiation fell to 30 per cent in most of northern and western Europe. The mean duration of breast-feeding was three months or less (WHO, 1982). In the United States, initiation rates of 26 per cent (WHO, 1984) were being recorded as late as 1973. Only since the early 1970s has there been any indication of a reversal of that trend, with the better educated women at the forefront of the return to breast-feeding.

Among Singapore's ethnic communities, the Singaporean Malays favour breast-feeding most, and the Chinese favour it the least (Counsilman *et al.,* 1986; Chua *et al.,* 1989; Counsilman *et al.,* 1986) (see table 3). These figures follow closely the patterns of breast-feeding that have been shown by the three ethnic communities over the past three decades (see table 4). They indicate that

Table 4: Percentage of Singaporean mothers in the three ethnic groups initiating breast-feeding, 1951-1985

Year	Chinese (%)	Malay (%)	Indian (%)
1951	85-90	–	95
1961	65	63	82
1978	42	100	81
1985	41	78	73

Table 5: Percentage of Singaporean mothers in the three ethnic communities who breast-fed their babies for one month or more, 195l-1985

Year	Chinese (%)	Malay (%)	Indian (%)
1951	75	–	91
1960	49	44	53
1978	20	73	62
1985	13	20	44

the ethnic community to which a Singaporean mother belongs has had, and continues to have, a strong influence on her choice of an infant feeding method. Ethnic differences are even more pronounced when one considers the percentages of mothers breast-feeding for one month or more (table 5). In addition, the lower economic status of Malay women has over the years moderated traditional practices such that the breast-feeding trends in this ethnic group are more erratic than amongst Chinese or Indian mothers.

Counsilman and Viegas (1985) believe that these patterns are the result of cultural differences and variations in modern and traditional beliefs and practices, some of which are healthful (e.g. religion, family support for the mother), and some of which are not (e.g. food taboos, misconceptions about the value and effects of breast-feeding).

In 1985, ethnic differences in breast-feeding methods could not be attributed to physical characteristics (e.g. weight, mode of delivery), health measures (e.g. number of past reproductive failures or antenatal complications), or even general environmental conditions such as family income (Chua *et al.*, 1989). Rather, it appeared to reflect cultural differences in the ability of the mothers to resist the "modern" trend towards bottle-feeding. Why Chinese in particular are influenced by these modern trends and behaviour patterns is not clear. It appears to lie behind deeply rooted cultural beliefs and attitudes; the Chinese have traditionally considered it degrading to have to breast-feed personally their babies. Only the poorest women in China used to breast-feed their own babies; well-to-do mothers almost invariably employed a wet nurse to do it. Ethnic Chinese throughout South-east Asia are poor breast-feeders (Haaga, 1986; Koh, 1981; Chen, 1978).

For Malay and Indian mothers, perhaps the most important traditional practice in their communities is support from relatives (Chung, 1979) in the form of help with children and supportive attitudes towards breast-feeding. For Malay and some Indian mothers, the influence of their religion may also be substantial; Islam commands mothers to breast-feed.

Medical personnel caring for women during their pregnancy are in a good position to encourage future mothers to breast-feed their babies. (Photo by Neill McKee)

Thirty-nine per cent of the Chinese mothers who bottle-fed their babies in 1985 (Chua *et al.,* 1986) did so for its supposed convenience. In this respect, they are probably no different than Western mothers (Sacks *et al.*, 1976; Sjolin *et al.*, 1977). Furthermore, Chinese mothers more often have erroneous beliefs about breast-feeding (e.g. that it ruins one's figure, that it is embarrassing to breast-feed in public, that artificial feeding formulas are better because they are more expensive). They are more likely to believe that breast-feeding has adverse effects on maternal health (Chung, 1979) or that the mothers themselves are too weak to breast-feed (Chua *et al.*, 1986). More Chinese avoided breast-feeding because they believe that foods necessary for healing and recovery after child-birth should be avoided during breast-feeding.

Poor and well-to-do mothers in Singapore currently differ substantially in infant feeding practices, with the more affluent and better educated woman at the forefront of the trend towards a return to breast-feeding. However, the initiation and, particularly, the duration of breast-feeding are still unacceptably low among both groups. It is estimated that fewer than one in ten infants in Singapore are breast-fed for more than three months (Counsilman *et al.*, 1986, Chua *et al.*, 1989). The difference between economic groups suggests that this proportion can be improved substantially through education, both of mothers and their families. Better education and job skills, as well as a supportive family have a favourable influence on the mother's breast-feeding attitudes. Perhaps medical personnel should also be encouraged to play a bigger role in influencing a mother's desire to breast-feed.

The health and well-being of mothers and their babies is of integral importance to family life, community development and national socio-economic progress. Given the critical role played by breast-feeding in infant nutrition and immunology, and its potential impact on fertility regulation, the promotion of breast-feeding must be considered a vital part of any child health programme, and therefore regarded as a major public health priority. A national campaign directed at both the public and health care personnel would be in order.

References

Brimblecombe, F.S.W. and D. Cullen (1977). "Influences on a mother's choice of method of infant feeding," *Public Health*, No. 91, pp. 117-126.

Chen, S.T. (1978). "Infant feeding practices in Malaysia," *Medical Journal of Malaysia*, No. 33, pp. 120-124.

Chua, S., O.A.C. Viegas, J.J. Counsilman and S.S. Ratnam (1989). "Breastfeeding trends in Singapore," *Social Science and Medicine*, No. 28, pp. 271-274.

Chung, S.Y. (1979). Breastfeeding behaviour in women attending a maternal and child health clinic in Singapore. MSc thesis, Department of Public Health, National University of Singapore.

Coles, E.C., S. Cotter and H.B. Valman (1978). "Increasing prevalence of breastfeeding," *British Medical Journal,* No. 22, p. 1122.

Counsilman, J.J. and O.A.C. Viegas (1985). "A review of recent patterns of infant feeding in Singapore," *Tropical Biomedicine,* No. 2, pp. 161-165.

Counsilman, J.J., S. Chua, O.A.C. Viegas (1986a). "Breastfeeding among well-to-do Singaporeans," *Journal of Tropical Paediatrics,* No. 32, pp. 313-316.

Counsilman, J.J., S.Y. Chan, H. Haiyon, N.A. Rahim, R. Salim, T.Y. Tai, M.L. Tan, Z. Zainy, O.A.C. Viegas (1986b). "Breastfeeding among poor Singaporeans," *Journal of Tropica1 Paediatrics,* No. 32, pp. 310-312.

Haaga, J.G. (1986). "Evidence of a reversal of the breastfeeding decline in Peninsular Malaysia," *American Journal of Public Health,* No. 76, pp. 245-251.

_____(1989). *The revival of breastfeeding in the United States, 1963-l981.* The RAND Corporation.

Kent, M.M. (1981). "Breastfeeding in the developing world: current patterns and implications for future trends," in: *Reports to the WFS,* No. 2. (Washington D.C., Population Reference Bureau).

Klackenberg G. and I. Klackenburg-Larrson (1968). "The development of children in a Swedish urban community. Prospective longitudinal study on breastfeeding and weaning: some social-psychological aspects." *Acta Paediatrica Scandinavica,* Supplement 187, pp. 94-104.

Koh, T.H. (1981). "Breastfeeding among Chinese in four countries," *Journal of Tropical Paediatrics,* No. 27, pp. 88-911.

Millis, J. (1955). "Some aspects of breastfeeding in Singapore," *Medical Journal of Malaysia,* No. 10, pp. 157-161.

Sacks, S.H., M. Brada, A.M. Hill, P. Barton and P.S.E.G. Harland (1976). "To breastfeed or not to breastfeed," *Practitioner,* No. 216, pp. 183-191.

Sjolin, S., Y. Hofvander and C. Hillervik (1977). "Factors related to early termination of breastfeeding," *Acta Paediatrica Scandinavica,* No. 66, pp. 505-511.

Sloper, K., L. McKean and J.D. Baum (1975). "Factors influencing breastfeeding", *Archives of Diseases in Children,* No. 50, pp. 165-170.

Taam-Wong, V. (1984). "Breastfeeding mothers in South East Asia," *Journal of Paediatrics, Obstetrics and Gynaecology,* pp. 13-18.

WHO (1981). *Contemporary patterns of breastfeeding.* Report on the WHO Collaborative Study on Breastfeeding, (Geneva, WHO).

_____(1982). The prevalence and duration of breastfeeding: a critical review of available information. WHO Statistics, Q. No. 2.

_____(1984). Inter-regional Workshop on breastfeeding and fertility: Proceedings and Report, (Geneva, WHO).

Wong, H.B. (1961). "Breastfeeding among paying class mothers in Singapore," *Journal of the Singapore Paediatrics Society,* No. 3, pp. 14-16.

_____ (1971). *Breastfeeding in Singapore,* (Singapore, Cow & Gate Ltd.)

_____ , K. Paramathypathy and N.B. Tham (1963). "Breastfeeding among lower income & others in Singapore," *Journal of the Singapore Paediatrics Society,* No. 5, pp. 89, 93.

Breast-feeding Trends, Patterns and Policies in Thailand

Socio-economic change is likely to continue to exert downward pressure on breast-feeding

By John Knodel, Napaporn Chayovan and Kua Wongboonsin*

Thailand is in a relatively advantageous position compared with most other countries in the region with respect to data to document trends and patterns of breast-feeding and related infant feeding practices. Relevant questions, even if

* The authors of this article are John Knodel, Professor of Sociology, University of Michigan – Ann Arbor; and Napaporn Chayovan, Associate Professor, and Kua Wongboonsin, Assistant Professor, both at the Institute of Population Studies, Chulalongkorn University, Bangkok. The authors would like to acknowledge with gratitude the comments and information provided by Tony Bennett, Deborah Billings, Hillary Page, Werasit Sittirai, Nancy Williamson and Janine Schooley. Funding from the Population Council through the DHS Further Analysis Awards Project, supported by the United States Agency for International Development, is also gratefully acknowledged.

not always strictly comparable, have been included in a series of nationally representative surveys conducted during the last two decades. The information provided by these surveys makes clear that a trend towards a decline in the duration of breast-feeding was underway during the decade of the 1970s, but that during the 1980s the decline halted. In addition, the proportion initiating breast-feeding was high throughout the two-decade period and appears to have recently increased to the point where, at the national level, it is now close to universal.

These changes in breast-feeding trends coincide with a variety of efforts, primarily undertaken or co-ordinated by the Ministry of Public Health, to promote breast-feeding and discourage the use of breast-milk substitutes. Substantial rural-urban, regional and educational differentials still exist with respect to the duration of breast-feeding, although initiation is common even among the groups that breast-feed for the shortest period of time. Solid foods and liquids, including but by no means limited to infant formula, are introduced into the infants' diet at very early ages so that the average duration of exclusive breast-feeding is very short despite the relatively long duration of breast-feeding in general.

This study is intended as a general summary and review of previously published findings.[1/] Particular emphasis is placed on the findings of the most recent survey, the 1987 Thailand Demographic and Health Survey (TDHS). In the TDHS, information was collected on the initiation and duration of breast-feeding for all live births occurring since January 1982 and thus represents the first time any national survey in Thailand collected information related to a specified period rather than only to the most recent child (or in one case, to the two most recent births). For several technical reasons, estimates of breast-feeding based on all births within a specified period are preferable to ones based only on the most recent birth or even the two most recent births.[2/] Details of the survey methodology and sample of the TDHS have been published elsewhere (Chayovan, Kamnuansilpa and Knodel, 1988).

Measurement and methods

Various approaches exist for the analysis of breast-feeding patterns (see e.g. Lesthaeghe and Page, 1980 and Page, Lesthaeghe and Shah, 1982). These include the current status approach, which examines information on the proportion currently breast-feeding among all women at successive durations since childbirth, and the prevalence-incidence approach, which estimates the mean duration of breast-feeding by simply dividing the number of currently breast-feeding mothers by the average number of births per month during the previous few years. Neither of these approaches, however, takes full advantage of the data typically available. In contrast, life-table methodology permits full utilization of the information on whether the child was ever breast-fed, whether the child

was currently being breast-fed, and at what age weaning occurred if breast-feeding had ceased. As a result, the life-table approach is able to provide more detailed information on the duration of breast-feeding than the other two approaches and is the main approach relied on in the present review.[3/]

Recent trends in breast-feeding

Similar to many other developing countries during recent decades, the duration of breast-feeding declined in Thailand during the 1970s as indicated by findings from four national surveys conducted between 1969 and 1979 (Knodel and Debavalya, 1980). While the decline appears to have been moderate, it was also pervasive, affecting both rural and urban mothers as well as mothers of different educational levels. More recent data, however, indicates that this earlier trend towards reduced breast-feeding has halted.

Before proceeding to a more detailed examination of recent trends in breast-feeding indicators as derived through life-table methodology, it is useful to examine evidence provided by the current status data, since comparable measures based on the other approaches are not available for the 1969-1970 Longitudinal Survey (LS1), the earliest national survey with data on breast-feeding. Table 1 shows the percentage of women currently breast-feeding their last-born child according to the number of months since giving birth for the three national surveys taken during the 1980s, the 1987 TDHS and the 1981 and 1984 Contraceptive Prevalence Surveys (CPS2 and CPS3), as well for the 1975 Survey of Fertility in Thailand (SOFT) in addition to LS1. The results are based on tabulations on the percentage currently breast-feeding according to monthly durations since the most recent birth. As a way of summary, they have been

Table 1: Standardized percentage of women currently breast-feeding their last born child, by months since the most recent birth

		Months since most recent birth	
Survey	**Year**	**0-11**	**12-23**
LS1	1969-70	87	69
SOFT	1975	80	65
CPS2	1981	76	46
CPS3	1984	78	45
TDHS	1987	81	45

Notes: Results for LS1 refer to pregnant women only. Results for LSl and CPS2 both exclude women whose last birth did not survive.

Table 2: Breast-feeding indicators based on the most recent birth, by rural-urban residence, for women with a surviving birth in the 24 months preceding the survey, Thailand 1981, 1984,1987

Breast-feeding indicator	National			Rural			Urban		
	CPS2 1981	CPS3 1984	TDHS 1987	CPS2 1981	CPS3 1984	TDHS 1987	CPS2 1981	CPS3 1984	TDHS 1987
Median duration (in months)	16.6	17.6	16.8	18.3	18.6	18.1	4.0	4.2	5.7
Proportion never breast-feeding	.091	.055	.032	.075	.040	.020	.167	.122	.089
Proportion breast-feeding at least:									
3 months	.819	.840	.862	.875	.906	.915	.565	.557	.620
6 months	.756	.794	.799	.824	.873	.865	.451	.457	.495
12 months	.660	.693	.713	.732	.784	.786	.338	.303	.380
18 months	.459	.484	.466	.520	.548	.510	.191	.210	.261

Notes: Results are derived through the life approach. The second and third Contraceptive Prevalence Surveys are indicated by CPS2 and CPS3 and the Thailand Demographic Health Survey by TDHS.

Sources: Results for CPS2 are from Knodel, Kamnuansilpa and Chamratrithirong, 1985. Results for CPS3 have been recalculated due to an error discovered in the original computations reported in previous published iesults.

grouped into two 12-month categories after applying equal weights' standardization. This procedure eliminates the influence of differences in the monthly distribution of births within the broader 12-month categories.[4/]

For each survey, the proportion currently being breast-fed is substantially less for women whose last birth occurred 12-23 months ago than for those whose most recent birth occurred less than a year ago, reflecting increases in the cumulative proportions of mothers who have weaned their child with increasing age of the child.[5/]The decline in breast-feeding that occurred during the 1970s is apparent from a comparison of LS1 and SOFT with the other three surveys and is particularly pronounced with respect to women whose most recent birth occurred 12-23 months prior to the survey. Thus, well over two thirds (69 per cent) of women who gave birth between 12 and 23 months prior to the interview were currently breast-feeding their most recent child in 1969-1970 compared with less than half according to the three surveys conducted during the 1980s. No consistent trend is evident, however, in the proportion currently breast-feeding according to either duration category when the three surveys taken during the 1980s are compared with each other. Thus, based on current status information, it appears that the decline in long-term breast-feeding has halted during the 1980s.

Table 2 compares a series of breast-feeding indicators, derived through the life-table approach, based on CPS2, CPS3 and TDHS.[6/] Results are presented at the national level as well as for the rural and urban sector separately. In CPS2, only women who had a surviving birth in the previous two years were asked about breast-feeding. In addition, in both CPS2 and CPS3, information about breast-feeding was collected only for the last birth. To facilitate comparison between the three surveys, results from all three surveys presented in table 2 are subject to the same restrictions, i.e. estimates are based on the most recent birth to women with a surviving birth in the 24 months preceding the survey.

As with current status data, breast-feeding indicators derived through the life-table approach as applied to the data described above suggest that the earlier decline in breast-feeding in Thailand stopped during the 1980s. The median duration of breast-feeding nationally hovers around 17 months with no consistent trend evident between the 1981 and 1987 surveys. This compares with a median duration of breast-feeding of 22.9 months derived from SOFT for 1975 (not shown) based on women who gave birth in the two years prior to the survey.[7/] At the national level, the initiation of breast-feeding increased during the 1980s to a point where breast-feeding appears to be close to universal. Only 3 per cent of women with a birth in the last two years indicated in the TDHS that they never breast-fed their children. Estimates of the national proportions breast-feeding their babies for at least three, six and 12 months rise slightly across the three successive surveys. The proportion

breast-feeding their children at least 18 months based on TDHS, however, while higher than the CPS2 estimate, is slightly lower than indicated by CPS3.[8/]

All three surveys reveal substantial rural-urban differentials in the extent of breast-feeding. Rural mothers breast-feed their children far longer than urban mothers and fewer rural mothers never breast-feed their children. In addition, some rural-ruban differences in trends are apparent. The median duration of breast-feeding among urban mothers during the 1980s increased from an average of four to almost six months while the median duration of breast-feeding for rural mothers changed only slightly, remaining at approximately a year and a half in all three surveys. For both rural and urban mothers, the proportion initiating breast-feeding increased as indicated by declines in the proportion never breast-feeding their children. The percentage of urban mothers not breast-feeding at all declined from 17 to 9 per cent and for rural mothers declined from 8 to 2 per cent.

In sum, results based on both the current status approach and life-table methodology present strong evidence that the earlier decline in breast-feeding in Thailand, apparent during the 1970s, has halted. The median duration has remained relatively stable for rural women during the 1980s and appears to have increased for urban women. Moreover, initiation of breast-feeding at the national level, while common even at the start of the 1980s, is now close to universal.

Differential breast-feeding patterns

Breast-feeding indicators based on the life-table approach based on data from TDHS are presented in table 3 according to various selected background characteristics. The full set of information on all children born during the 60 months preceding the survey, including those who died, is utilized. The results presented are thus child-based in that they are expressed per child.[9/] The overall median duration of breast-feeding is 14.9 months, noticeably shorter than the 16.8 months presented in the previous table. The reason for the difference lies in the different selection of cases on which each set of calculations is based. Restricting consideration to only the most recent surviving birth, as done in the previous table to ensure comparability across different surveys, tends to yield higher average durations of breast-feeding than do child-based estimates including children who died (Page, Lesthaeghe and Shah, 1982). Moreover, the two tables refer to different reference periods.

Overall, the life-table estimates based on children born within the five years preceding the survey indicate that only 6 per cent of children were never breast-fed, that over three quarters (77 per cent) of infants were breast-fed for at least six months, and that two-thirds (66 per cent) of infants were breast-fed at least for one year. Additional evidence from TDHS confirming that

Table 3: Child-based breast-feeding indicators, by selected background characteristics, based on children born in the 60 months preceding the survey, Thailand, 1987

	Median duration (in months)	Proportion never breast-feeding	Proportion breast-feeding at least 3 mo.	6 mo.	12mo.	18 mo.
National	14.9	.06	.84	.77	.66	.40
Years born before survey						
0-2	15.4	.05	.84	.77	.67	.42
3-4*	14.6	.07	.84	.77	.65	.39
Rural-urban residence						
Rural	16.1	.04	.89	.84	.73	.45
Urban total	4.8	.12	.60	.47	.33	.19
Provincial urban only	5.4	.13	.61	.49	.34	.19
Region						
Bangkok	4.5	.11	.59	.45	.32	.19
Other central	12.6	.08	.76	.69	.58	.31
North	13.0	.04	.86	.80	.61	.27
Northeast	18.7	.02	.95	.92	.83	.56
South	16.6	.07	.81	.73	.65	.47
Religion						
Buddhist	14.6	.06	.84	.71	.65	.39
Muslim	18.4	.08	.83	.11	.72	.55
Education of mother						
No schooling	15.6	.07	.85	.79	.71	.45
Primary	15.9	.04	.88	.83	.72	.44
Secondary	4.2	.15	.60	.44	.27	.15
Beyond secondary	2.5	.07	.46	.30	.18	.14
Residence and education of mother						
Rural						
Primary or less	17.0	.04	.91	.87	.76	.47
Secondary	6.6	.15	.69	.54	.36	.22
Beyond secondary	3.3	.04	.53	.35	.26	.20
Urban						
Primary or less	7.7	.12	.68	.56	.43	.25
Secondary	3.1	.15	.51	.33	.18	.07
Beyond secondary	1.9	.10	.38	.24	.12	.l0

Notes: Results are derived through the life table approach.

* Includes children born 60 months ago.

breast-feeding is not declining during recent years is provided by a comparison of breast-feeding indicators based on children born in the first three years prior to the survey with those born in the fourth and fifth prior year. The results indicate a slight increase in the duration of breast-feeding during this five-year period and a slight decrease in the proportion never breast-fed.

As in the previous table, child-based indicators also evidence substantial rural-urban differences in infant feeding practices. For rural children born in the five years preceding the survey, the median duration of breast-feeding was 16 months compared with slightly less than five months for urban children. Within the urban category, children born in provincial urban areas are breast-fed slightly longer than children born in Bangkok. Despite the sharp rural-urban differences in the duration of breast-feeding, the vast majority of urban children are breast-fed for at least a short period of time with only 12 per cent not being breast-fed at all. Almost three fourths of rural children compared with only one third of urban children are breast-fed at least a year.

Regional differentials in breast-feeding patterns are also evident. Children are breast-fed for the shortest durations in Bangkok, consistent with the urban pattern discussed above. Indeed, Bangkok children are breast-fed for one month less than provincial urban children, although the proportion who never breast-feed at all is slightly lower in Bangkok than in provincial urban areas. The median duration that a child is breast-fed is longest in the north-eastern part of the country, averaging over one and a half years, and shortest in the central region (excluding Bangkok) and the north, where children are breast-fed for a median duration of just over one year. Children in the southern region occupy an intermediate position.

Some differences are evident between the majority Buddhists, and Muslims who constitute a small minority of the population, and tend to be concentrated disproportionately in the southern region. Although Muslim children tend to be breast-fed for a longer duration than Buddhist children, there is almost no difference in the proportion of Buddhist and Muslim children who are breast-fed through at least the first six months.

Breast-feeding patterns are also associated with the educational attainment of the mother. A large majority of women in the reproductive ages in Thailand have a primary education and the vast majority of children represented in table 3 have mothers in that category. By and large, there is little difference between the breast-feeding patterns of children born to mothers with no schooling and those with primary education. However, children born to mothers with higher education are breast-fed for considerably shorter durations and, in the-case of children of mothers with secondary education, are less likely to be breast-fed at all than children of mothers in the other educational categories.

Given that educational attainment is closely associated with rural and urban residence, differentials in breast-feeding patterns according to mother's education are shown separately for rural and urban children. For both groups, reduced breast-feeding duration is associated with educational levels beyond primary schooling. Nevertheless, the vast majority of children, regardless of the educational attainment of the mother, or any of the other background characteristics shown in table 3, are breast-fed at least initially. The highest proportion of children for whom breast-feeding was not initiated are found among those whose mothers have a secondary education. Even in these cases, only 15 per cent were never breast-fed. Moreover, although a higher proportion of children whose mothers studied beyond the secondary level were breast-fed initially, the median duration of breast-feeding is shorter for those children than for those born to mothers with only a secondary education. Already by three months, a noticeably higher proportion of children whose mothers have a secondary education were currently being breast-fed than children whose mothers studied beyond the secondary level.

Full breast-feeding and supplemental food

In Thailand, it is common to introduce supplemental food in the diet quite early and thus the long durations of breast-feeding reported by Thai women typically include substantial periods of mixed feeding.[10/] Estimates of the duration of full breast-feeding are available only from the 1984 CPS3 and are summarized in table 4 (Knodel, Kamnuansilpa and Chamratrithirong, 1985).[11/] Owing to the very early age at which supplemental feeding begins, the duration of full breast-feeding is expressed in terms of weeks rather than months.

Nationally, the median duration of full breast-feeding is only slightly over four weeks and in urban areas under one week. Clearly, mixed feeding regimes are the usual pattern in Thailand, with food other than breast-milk introduced to the infant at a very early age. Regional differences are also apparent. The median of full breast-feeding exceeds 10 weeks in the northern part of the country, while it is little longer than a week in the north-eastern part. Unlike in the case of overall breast-feeding, education shows only a weak and inconsistent relationship with the duration of full breast-feeding within both rural and urban areas. Regardless of education, rural-urban residence, or even region, however, full breast-feeding is quite brief in any absolute sense for Thai mothers generally.

While information was not collected in the TDHS on how long after birth a child was first given supplemental foods, mothers of children born during the last five years prior to the survey and who were currently breast-feeding their child were asked if they had given various types of liquids, including plain water, or solid foods, to the child during the past day or night. Results are

Table 4: Full breast-feeding indicators, by rural-urban residence, region and education, Thailand, 1984

Variable	Full breast-feeding	
	Median duration (weeks)	Proportion breast-feeding at least 12 weeks
National level	4.08	.293
Residence		
Rural	4.35	.316
Urban	0.95	.187
Provincial	1.64	.248
Bangkok	.91	.146
Region		
Central		
Including Bangkok	2.26	.224
Excluding Bangkok	4.23	.270
North	10.25	.454
Northeast	1.34	.244
South	4.78	.336
Residence and education		
Rural		
< 4 years	5.60	.384
4 years	4.17	.309
≥5 years	4.64	.303
Urban		
≤4 years	1.05	.203
5-10 years	1.77	.228
≥11 years	0.78	.101

Notes: Durations are based on the life-table approach, for women with a birth in the 48 months preceding the interview. Calculations include mothers who did not breast-feed at all, by treating them as having a duration of zero weeks.

Source: Knodel, Kamnuansilpa and Chamratrithirong, 1985.

summarized in table 5. Although plain water has no nutritional value and thus is not appropriately thought of as a supplemental food, its provision is of interest as it can be a potential source of contaminants. TDHS indicates that plain water is almost universally provided to breast-fed children in Thailand regardless of how young the child is. Thus, even among children aged three

Table 5: Percentage given various types of liquids or foods, by age of child, among currently breast-fed children aged 0-23 months

	Age of child in months						
	0-3	**4-7**	**8-11**	**12-15**	**16-19**	**20-23**	**Total**
% given plain water	91	95	94	96	99	97	95
% given orange juice	18	32	21	17	18	17	21
% given powdered milk (formula)	16	11	4	5	6	8	9
% given cow's or goat's milk	3	1	2	3	7	2	3
% given other liquid	3	11	11	19	16	14	12
% given solid food	52	85	86	89	87	82	79
% given any food or liquid other than water	68	91	89	92	91	86	85

months or less, over 90 per cent were given plain water during the 24 hours prior to the interview. For older children, the proportion given plain water is even higher.

The TDHS results are also consistent with those from CPS3 in indicating that most children are given supplementary food at an early age. For example, the bottom line of table 5 indicates the extent to which some sort of supplemental food (solid or liquid but excluding water) is provided to currently breast-fed infants. Over two thirds of even the youngest age group are provided with at least some food or liquid and approximately nine out of ten breast-fed infants aged four months or older are provided with some supplemental food. Moreover, solid food is introduced fairly early. Slightly over half of the children three months of age or younger are given solid food along with breast-milk and the vast majority of breast-fed children four months or older receive solid food.

Although the TDHS questionnaire did not inquire about the specific types of solid food provided, such foods typically include premasticated rice or mashed bananas. The Ministry of Public Health, through its breast-feeding promotion programmes, recommends exclusive breast-feeding for the first three months and the successive introduction of a variety of supplemental foods in addition to breast-feeding starting during the fourth month of life. Thus, the frequency with which liquids and solid foods are given to breast-fed children is both a matter of custom and, in part, for the older children, promoted by public health policy.

Policies and programmes

As the previous review of evidence indicates, the decline in the duration of breast-feeding that characterized Thailand in the 1970s has come largely to a standstill in the 1980s. Moreover, an actual increase in the proportion

initiating breast-feeding appears to have occurred to the point where, at the national level, breast-feeding for at least a short period is almost universal and is very common even among groups that breast-feed their children the least. It is noteworthy that this shift in the trend in breast-feeding practices coincides with extensive efforts undertaken in Thailand by the Ministry of Public Health, as well as by several non-governmental organizations, to promote breast-feeding and to discourage the use of breast-milk substitutes, especially at early ages (Chatranon, 1988).

Systematic efforts to promote breast-feeding by the Ministry of Public Health began in 1979 when several seminars were held with health professionals and administrators on the topic. As an outcome, guidelines were developed for implementing a programme to promote breast-feeding, which continue to serve as the basis of such efforts in this regard until the present.[12/] An explicit mandate was incorporated into the Fifth National Economic and Social Development Plan (for 1982-1986) as well as in the Sixth Plan (for 1987-1991) to promote breast-feeding as a means to improve child health. In accordance with this mandate, the Division of Nutrition at the Ministry of Public Health launched annual month-long promotion campaigns starting in 1982. These campaigns involve activities at the provincial, the district and the village level and enlist the full range of media (radio, newspapers, magazines, television and public address systems) to provide information about breast-feeding to the public. All provincial radio stations also participate. In addition, posters and leaflets are circulated throughout the Government's widespread health care system. In addition, meetings are held to inform officials and workers at all levels in the health system about the campaign and their particular responsibilities. A major emphasis of the campaign is to encourage breast-feeding during the first year of infancy.

Also of significance are the steps taken to control the marketing of breast-milk substitutes and related products following the guidelines adopted by the World Health Assembly at Geneva in 1981. The Thai Government adopted a version of the code the same year. The infant formula industry in Bangkok apparently began to implement some provisions, such as those prohibiting mass media promotion, in anticipation of the code's adoption. Other promotional techniques, however, were substituted by the industry (Winikoff *et al.*, 1985). In 1984, the Ministry of Public Health, in collaboration with a number of other agencies and organizations, including WHO and UNICEF, negotiated with the infant formula companies to establish the current revised Thailand Code of Marketing of Breast-milk Substitutes. This new code substantially restricts the use of free breast-milk substitutes in hospitals and includes a ban on advertising infant formula and related products (including baby bottles and nipples) through the mass media or through exhibitions. Direct or indirect free distribution to pregnant women or mothers is also prohibited (Thailand,

Ministry of Public Health, 1984; Luanguthai and Khathong, 1988). Although few violations were observed during the first few years after the revised code was announced, there is new concern about its effectiveness and steps are being taken to seek ways to legislate the code (Chatranon, 1988).

Also of likely relevance are the many seminars, workshops and training sessions that have been held in Thailand over the last decade for health service providers and administrators in relation to the promotion of breast-feeding. In many cases, these were the result of co-operative efforts between the Ministry of Public Health and non-governmental organizations. This aspect of the programme included a series of seminars, which began in 1986, to promote breast-feeding in maternity wards. A large number of health personnel have been involved, and policies and practices followed in maternity wards are thought to have changed as a result, including increased rooming-in following childbirth to permit the mother to breast-feed her newborn child.

Systematic evaluations of these measures have not been carried out to determine if there is any direct link to actual changes in infant feeding practices. Nevertheless, their combined impact could quite plausibly explain the cessation of the breast-feeding decline and the increase in the initiation of breast-feeding observed in the trend data for the 1980s. Indirect evidence, presented in table 6 and showing trends in breast-feeding according to place of delivery, lends some support to this possibility. Given that many of the measures to promote breast-feeding have focused on health personnel and on practices in health facilities,

Table 6: Child-based breast-feeding indicators, by place of delivery and number of years born before the survey, based on children born in the 60 months preceding the survey, Thailand, 1987

Place of delivery and years born before survey	Median duration (in months)	Proportion never breast-feeding	Proportion breast-feeding at least 3 mo.	6 mo.	12 mo.	18 mo.
Hospital or other health facility						
0-2 years	12.9	.04	.78	.70	.58	.34
3-4 years*	12.5	.10	.77	.68	.56	.31
Total	12.7	.07	.78	.70	.57	.33
Home**						
0-2 years	18.7	.03	.93	.90	.82	.56
3-4 years*	17.8	.02	.93	.89	.79	.49
Total	18.2	.03	.93	.89	.80	.52

Notes: Results are derived through the life table approach.

* Includes children born 60 months ago.

** Includes a small number of cases coded as other.

particularly hospitals, it is interesting to compare breast-feeding trends for births that were delivered in a hospital or other health facility with those that occurred at home. Data from the TDHS permit such a comparison since a special question was added to the standard questionnaire to obtain information on the place of delivery of each birth in the last five years. Overall, 51 per cent of births during this period were delivered in hospitals, 11 per cent in health stations and virtually all the remainder at home.

As has been found in studies in Thailand and elsewhere, results (table 6) indicate that children delivered in hospitals and other health facilities are breast-fed less than those delivered at home (Knodel and Debavalya, 1980; Winikoff, Castle and Laukaran, 1988). While factors associated with the place of delivery itself may play some role, the fact that women who deliver in health facilities are more likely than those delivering at home to have characteristics that are negatively associated with breast-feeding (such as being urban and better educated) undoubtedly is an important reason responsible for the observed association. Of particular interest for the issue under consideration, however, is the fact that the proportion initiating breast-feeding increased during the period under observation for children delivered in hospitals while remaining virtually unchanged for home deliveries. Moreover, while the median duration of breast-feeding increases for both groups, increases in the proportion of children breast-feeding at least three months and at least six months are more evident for hospital and health facility deliveries than for home deliveries.

It will be interesting to observe whether the levelling off of the median duration of breast-feeding at a relatively high level and the nearly universal level of initiation that is currently evident will be maintained in the future. There are a number of social and economic forces operating in Thailand that have encouraged a reduction in breast-feeding and undoubtedly underlie the earlier decline. These include the rising level of education of women in the reproductive age groups, urbanization and increasing labour force activity among women outside of agriculture (Nag, 1983). Thus, compositional changes in the population can be expected to exert pressure on reducing breast-feeding even if infant feeding practices remain unchanged within each segment of the population. The steps implemented to promote breast-feeding during the 1980s appear to have succeeded in counteracting the impact of forces that would otherwise have led to a continuation of the trends observed during the 1970s. However, socio-economic change is likely to continue to exert downward pressure on breast-feeding. Thus, unless continued and sustained efforts are made, the measures taken to date may prove to have only temporarily stalled a longer term tendency among Thai women towards reduced breast-feeding of their children. For the time being, however, Thailand may well serve as an example of a third world country where a concerted effort to stem the decline in breast-feeding has succeeded.

Footnotes

1. Large sections of this article are adapted from Napaporn Chayovan, John Knodel and Kua Wongboonsin, "Infant Feeding Practices in Thailand: An Update from the 1987 Demographic and Health Survey," Studies in Family Planning, vol. 21, No. 1, January/February 1990.
2. For a full discussion of the issues involved, see Page, Lesthaeghe and Shah (1982).
3. Since the life-table approach incorporates information on reported age at weaning, unlike the other two approaches, it is influencecd by inaccuracies in these data such as those caused by the concentration (heaping) of responses at certain durations. A typical feature of retrospectively reported durations of breast-feeding, also common in Thai data, is that they are heaped at durations corresponding to half-years since some mothers round their answers.
4. LS1 involved separate rural and urban surveys conducted in 1969 and 1970, respectively. To obtain national results, the rural and urban survey results, as reported in Knodel and Debavalya, 1980, table 3, were combined by weighting the rural and urban results by a seven to one ratio. Results from LS1 are standardized through the procedure of equal weights, standardization applied to results tabulated by successive categories of four months' duration since last birth. Results from all other surveys are standardized through the procedure of equal weights' standardization applied to results tabulated by successive categories of single months' duration.
5. For all surveys, except LS1 and CPS2 for which only information on surviving children is available, the lower cumulative proportions of children surviving with successive durations since birth also contribute to this decline.
6. Life-table calculations in the present study include mothers who did not breast-feed their children at all by treating them as having a duration of zero months.
7. The SOFT results include non-surviving births. If they were excluded the median duration would be slightly higher.
8. To some extent the TDHS estimates are slightly exaggerated relative to those from CPS3 given somewhat greater heaping of responses at half-year durations in the TDHS. For example, it is likely that a somewhat higher proportion of women who weaned children at 10 or 11 months reported breast-feeding a full year in TDHS than in CPS3.
9. A conceptual distinction can be made in the analysis of breast-feeding with respect to whether interest in breast-feeding focuses on the woman's or the child's viewpoint. When the average duration is calculated per woman, each woman has equal weight. When durations are calculated per child, women with short birth intervals contribute more children within a given time span than women with long intervals. Since the duration of breast-feeding is usually positively correlated with length of the birth interval, average breast-feeding durations measured per woman are usually longer than if measured per child. In some settings these differences can be substantial (Page, Lesthaeghe and Shah, 1982). In the case of present-day Thailand, however, they are negligible most likely because, when contraceptive use is high as it is in Thailand, the duration of breast-feeding is no longer a primary determinant of the timing of a subsequent birth. For example, life-table calculations based on TDHS data for births in the last five years yield a median duration of breast-feeding of 14.98 months when woman-based and 14.93 months when child-based.
10. The term supplemental food is used here to connote food other than breast-milk. In cases where the mother never initiates breast-feeding or where such food is introduced

only after the child has been weaned, such foods are not truly supplemental as they are the only food being provided. The vast majority of mothers, however, do initiate breast-feeding and first give their children non-breast-milk foods prior to weaning. Thus, for convenience, the term supplemental food is used to cover all cases.

11. The results are based on the most recent birth during the 48-month period prior to the survey and hence are not strictly comparable with those on overall breast-feeding from the TDHS just discussed which are both presented based on all children born within a five-year period. Nevertheless, this is unlikely to have much effect on the comparison between the two.

12. The following discussion draws on information provided by the Nutrition Division of the Ministry of Public Health in the form of undated mimeographed material in Thai describing activities to promote breast-feeding, as well as in Chatranon, 1988.

References

Chatranon, Wirapong (1988). "Thailand's National Breast-feeding Programmes," Paper given at the Invitational Asian Regional Lactation Management Workshop, 30 June-3 July 1988. Denpasar, Bali, Indonesia.

Chayovan, Napaporn, Peerasit Kamnuansilpa and John Knodel (1988). *Thailand Demographic and Health Survey 1987*, (Bangkok, Institute of Population Studies, Chulalongkorn University).

Knodel, John and Nibhon Debavalya (1980). "Breast-feeding in Thailand: Trends and Differentials, 1969-79." *Studies in Family Planning*, vol. 11, No. 12 (December), pp. 355-377.

Knodel, John, Peerasit Kamnuansilpa, and Aphichat Chamratrithirong (1985). Infant Feeding Practices and Postpartum Amenorrhea in Thailand: Results from the 1984 Contraceptive Prevalence Survey, *Studies in Family Planning*, vol. 16, No. 6/l, pp. 302-311.

Lesthaeghe, R. and H.J. Page (1980). The Post-Partum Non-Susceptible Period: Development and Application of Model Schedules, *Population Studies*, vol. 34, No. 1, pp. 143-169.

Luanguthai, Patcharee and Thanong Khanthong (1988). "Government Blocks Free Flow of Free Milk", *The Nation*, 14 July 1988.

Nag, Moni (1983). "The Impact of Sociocultural Factors on Breast-feeding and Sexual Behavior." In R.A. Bulatao and R.D. Lee (eds.), *Determinants of Fertility in Developing Countries.* (Washington, DC, National Academy Press), pp. 134-162.

Page, H.J., R.J. Lesthaeghe and I.H. Shah (1982). "Illustrative Analysis: Breast-feeding in Pakistan." *WFS Scientific Reports*, No. 37 (December), (Voorburg, International Statistical Institute).

Thailand, Ministry of Public Health (1984). *Thailand Code of Marketing of Breast Milk Substitutes BE2527*, (in Thai), (Bangkok, Ministry of Public Health).

Winikoff, Beverly *et al.* (1985). *The Infant Feeding Study: Bangkok Site Report.* A report submitted to AID by the Population Council.

Winikoff, Beverly, M.A. Castle and V.H. Laukaran (eds.) (1988). *Feeding Infants in Four Societies*, (New York, Greenwood Press).

Breast-feeding and the Family Planning Sector's Initiative in Indonesia*

Breast-feeding averts an average of 28 per cent of the total potential fertility (fecundity) per woman of reproductive age in Indonesia, the fifth most populous country in the world. Contraception controls another 35 per cent, and age at marriage and other factors inhibit an additional 15 per cent of the total fecundity. Only about 22 per cent of the total fecundity is realized in actual births, representing a total fertility rate of about 3.4 per woman in 1987.[1/]

Breast-feeding has been found to protect babies against illness and weight loss in Indonesia (Launer, Habicht and Kardjati, 1990). Bottle-fed Indonesian infants have been reported to be 5 to 8 times more likely to have diarrhoea and respiratory diseases than breast-fed infants (Rhode, 1982; Suradi *et al.*, 1982). Moreover, malnutrition has also been found to be significantly higher among bottle-fed babies (Rhode, 1982; Munir *et al.*, 1982); improper preparation of infant formulas and management may be among the many reasons.

Besides the benefits associated with breast-feeding's contraceptive effects and improved infant health, breast-milk is also a major economic resource. The total net value of mother's milk to the Indonesian economy is estimated to be $US 520 million (Rhode, 1982). Of this, some $US 80 million is estimated to be attributable to fertility reduction and $40 million is estimated to be the value of health services that would have been needed to treat illness such as diarrhoea. The rest ($US400 million) is the net value of the milk itself.

* The authors of this note are Haryono Suyono, Chairman, National Family Planning Coordinating Board (BKKBN), Jakarta, Indonesia and Shyam Thapa, Senior Research Associate, Family Health International, North Carolina, United States.

Emerging patterns and trends

While most women in rural Indonesia breast-feed their infants for a long duration, in urban areas breast-feeding is generally abandoned or shortened. (See also the article on pp. 89-112 of this issue of the *Journal*.) In the mid-1970s, the average duration of breast-feeding in rural Indonesia was 24 months, while in urban areas it was 16 months (Joesoef, Utomo and Lewis, 1988). This gap between rural and urban populations was one of the largest compared with several other developing countries. In the urban populations, the duration of breast-feeding was considerably shorter among the more educated women or women working for salaries than among their less well educated, non-working counterparts. More importantly, breast-feeding was found to be consistently and significantly shorter among mothers who delivered their babies at hospitals or who were consulted and assisted by a modern birth attendant – a pattern also found in other developing countries (e.g., the Philippines).

During the decade of the 1980s, there appears to have been a revival of breast-feeding in Jakarta (Joesoef, Annest and Utomo, 1989). Interestingly, however, this revival has occurred among the mothers of lower socio-economic status, but not among those of higher socio-economic status. Clearly, more concentrated efforts aimed at promoting breast-feeding should be targeted at the latter group of women also. Nationally in Indonesia, there was no significant change between 1976 and 1987 in the reported duration of breast-feeding. While this is encouraging, it is not a matter for complacency.

The modern health sector

Even among those segments of the population in which breast-feeding has not declined, the optimum benefits of breast-feeding should be ensured. For example, although in Indonesia the perinatal health care providers' perceptions and attitudes towards breast-feeding are found to be very positive, there are many areas in which sound knowledge is lacking and, consequently, incorrect advice may be given to mothers regarding breast-feeding (Hull, Thapa and Wiknjosastro, 1989).

Similarly, although support for the concept of "rooming-in" (i.e., where a mother can breast-feed her baby on demand in hospitals) in Indonesia is found to be strong, many misconceptions prevail among health care providers and administrators (Hull, Thapa and Wiknjosastro, 1989). Even in those few hospitals that have a policy not to promote bottle-feeding, posters promoting infant formula and samples of bottle milk have been found.

At the same time, many women who intend to breast-feed, or who are already doing so, lack information about optimum feeding patterns and are unaware of how to solve problems that may arise (Hull, Thapa and Pratomo,

1990). Many others do not seek advice or guidance regarding optimum ways to breast-feed as part of neonatal health care. Further, most women giving birth at hospitals do not know about the advantages and availability of rooming-in.

Fortunately, recent research in Indonesia and in other developing countries suggests that breast-feeding behaviour responds readily to education, social encouragement, activities of women's self-help groups, and changes in medical attitudes and practices (Suradi *et al*, 1983; Trastotenojo and Hariyono, 1982; Djoenanda *et al.*, 1979; Procianoy *et al.*, 1983; Hardy *et al.*, 1982; Jones and West, 1986; Relucio-Clavano, 1981).

If women are given more information about rooming-in, which can alleviate their doubts and misconceptions, those giving birth at hospitals might consider rooming-in as a viable, safe option in early infant care. In situations where many women work, legislation protecting a woman's right to breast-feed is important, as are company policies that make it easy for women to breast-feed in the workplace.

Governments and policy makers should therefore strive to identify ways to promote and maintain the practice, especially in the modem health sector in developing countries. The modern health sector needs special attention because, ironically, it has often been linked to the decline of breast-feeding. At the same time, however, this sector is recognized as a potentially important resource for the support of breast-feeding as the method of choice for infant feeding.

Studies have shown that if a mother is placed in a hospital that offers the option of "rooming-in" and provides counselling, the mother is likely to choose to breast-feed and will continue to breast-feed for a considerably longer period after being discharged than will a mother placed in a conventional nursery with delivery and neonatal wards. These premises have helped generate national and international support for the promotion of breast-feeding as an integral part of child survival programmes in Indonesia.

The Government's policy

The Government of Indonesia has taken steps to promote breast-feeding. Breast-feeding promotion is now explicitly addressed in the country's development plans. Non-governmental agencies and organizations have also taken increasing interest. The non-governmental agency known as BK-PP-ASI has been established as the national co-ordinating body for the promotion of breast-feeding in Indonesia. In addition, international agencies have augmented the

momentum by supporting projects that promote breast-feeding. Several Indonesian doctors and nurses have been trained in the management of lactation programmes and counselling, as well as the development of breast-feeding programmes.

The initial phase of these efforts also included a "travelling" seminar, and workshops for health professionals in selected areas in the country. A pilot project for rooming-in, which was introduced in the early 1980s in a teaching hospital in Jakarta, has gradually been expanded to selected hospitals in other regions.

More recently, the possibility of revising the curricula of the medical schools has been discussed to include adequate attention to breast-feeding and rooming-in. An appropriate orientation to the role of breast-feeding for birth spacing and child health will help shape future practices in the modern health sector.

The family planning sector's initiative

The year 1989 marked the beginning of another important step towards the promotion of breast-feeding: the National Family Planning Coordinating Board (BKKBN) developed an explicit policy to promote breast-feeding by integrating it into the national family planning programme under the new initiative "Safe Motherhood and Child Survival."

This integration was based on the premise that family planning in Indonesia is neither a purely quantitative demographic matter nor a clinical matter of contraception, but it involves an endeavour to bring about changes invalue systems and norms. The family planning programme forms part of a national effort towards "nation-building" to fight poverty, backwardness and indifference. This is a strategy to institutionalize and popularize the small, happy and prosperous family norm, leading to the development of higher quality human resources.

Such integration represents a unique opportunity and a highly effective means of promoting breast-feeding. As of 1987, for example, 58 per cent of women of reproductive age who had ever been married (approximately 18 million) had received services from BKKBN. In 1987, about one-fifth (5.9 million) of the married women of childbearing age were visited by a family planning field worker at least once every six months (CBS, NFPCB and IRD, 1989). The proportion and number of women receiving services are expected to continue to rise.

Historically, the family planning programme has not given due recognition to breast-feeding. Moreover, the advice given to women regarding the use

of a contraceptive method may not have been in step with ensuring the continuation of breast-feeding. The programme lacked clear policy guidance regarding breast-feeding, as well as needed skills and training for the family planning counselors and providers. Thus, breast-feeding remained essentially a missing component in the overall programme.

The new national breast-feeding initiative is designed to rectify this situation. Family planning field workers, counselors and providers will be provided with training in skills needed for the promotion of breast-feeding. The benefits and importance of breast-feeding will be promoted through the mass media. More importantly, the complementary relationship between breast-feeding and contraception will be emphasized. BKKBN will also work with women's groups and government agencies to ensure that accurate information is widely disseminated, and will work towards formulating legislation to protect women's rights to breast-feed their babies.

Obviously, neither the contraceptive effect nor the practice of full breast-feeding may last beyond a few months following the birth of a child. However, proper birth-spacing can be achieved by a judicious combination of breast-feeding and modern forms of contraception.

Caution is always necessary to ensure that the adoption of a birth control method does not start so early that it will adversely affect breast-feeding. Appropriate timing will also avoid the "double contraceptive protection" provided by breast-feeding and contraception, Family planning providers should have the proper training to provide counselling and guidance to post-partum mothers. They have the potential to establish a firm foundation for continued breast-feeding and to contribute to the successful implementation of the national effort to promote breast-feeding in Indonesia.

The challenge

The initiative and approach taken by BKKBN may provide encouragement and serve as a model for many other family planning programmes around the world. The challenge lies not only in ensuring that women have an option to breast-feed their infants, but also that health care and family planning providers have the skills and training they need to counsel women about optimum breast-feeding practices.

Footnote

1. This was estimated by applying the model of the proximate determinants of fertility (Bongaarts and Potter, 1983) to the 1987 National Contraceptive Prevalence Survey of Indonesia (CBS, NFPCB and IRD, 1989).

References

Bongaarts, J. and R.G. Potter (1983). *Fertility, Biology and Behavior: An Analysis of the Proximate Determinants*, (New York, Academic Press).

CBS, NFPCB and IRD (1989). *National Contraceptive Prevalence Survey, 1987*, (Jakarta, Central Bureau of Statistics, National Family Planning Coordinating Board and Westinghouse Institute for Resource Development).

Djoeanda, P. *et al.* (1979). "A Rooming-in Programme for Mother and New Borns in Dr. Hasan Sadikin General Hospital," *Paediatrica Indonesiana*, vol. 19, pp. 35-39.

Hardy, E., *et al.* (1982). "Breast-feeding Promotion: Effect of an Educational Programme in Brazil, *Studies in Family Planning*, vol. 13, No. 3, pp. 79-86.

Hull, V., S. Thapa and H. Pratomo (1990). "Breast-feeding in the Modern Health Sector in Indonesia: The Mother's Perspective," *Social Science & Medicine*, vol. 30, No. 5, pp. 625-633.

Hull, V., S. Thapa and G. Wiknjosastro (1989). "Breast-feeding and Health Professionals: A Study in Hospitals in Indonesia," *Social Science & Medicine*, vol. 28, No. 4, pp. 355-364.

Joesoef, M.R., B. Utomo and G. Lewis (1988). "Breast-feeding Practices in Metropolitan Indonesia: Policy Considerations," *Journal of Tropical Pediatrics*, vol. 34, No. 6, pp. 270-274.

Joesoef, M.R., J.L. Annest and B. Utomo (1989). "A Recent Increase in Breast-feeding Duration in Jakarta," *American Journal of Public Health*, vol. 79, No. 1, pp. 36-38.

Jones, D., and R. West (1986). "Effect of a Lactation Nurse on the Success of Breast-feeding: A Randomized Controlled Trial," *Journal of Epidemiology and Community Health*, vol. 40, No. 1, pp. 45-49.

Launer, L.J., J.P. Habicht, and S. Kardjati (1990). "Breast-feeding Protects Infants in Indonesia Against Illness and Weight Loss due to Illness," *American Journal of Epidemiology*, vol. 131, No. 2, pp. 322-331.

Munir, M. *et al.* (1982). "Problems of Infant Practices: Implications for Immediate Action," in *Proceedings of Travelling Seminar on Recent Development in Breast-feeding.* (Semarang, Diponegoro University).

Procianoy. R. *et al.* (1983). "The Influence of Rooming-in on Breast-feeding," *Journal of Tropical Pediatrics*, vol. 29, No. 2, pp. 112-l14.

Relucio-Clavano, N. (1981). "The Results of a Change in Hospital Practices," *Assignment Children.* vol. 55/56, pp. 139-165.

Rohde. J.E. (1982). "Mother's Milk and the Indonesian Economy: A Major National Resource," *Journal of Tropical Pediatrics*, vol. 28, No. 4, pp. 166-174.

Suradi, R. *et al.* (1983). "Rooming-in in Dr. Cipto Mangun Kusumo Hospital, Jakarta, Indonesia," Paper presented at the Indonesian Society for Perinotology (PERINASIA) Conference, Jakarta.

Suradi, R. *et al.* (1982). "Country Presentation: Indonesia" Presented at the International Conference of Community Based Support Groups for Breast-feeding Mothers, Jamaica, 29 November – 3 December.

Trastotenojo, M. and R. Hariyono (1982). *Proceedings of Travelling Seminar on Recent Development in Breast-feeding*, (Semarang, Diponegoro University).

Breast-feeding: Patterns and Correlates in Nepal*

This note presents the prevalence and duration of breast-feeding in Nepal and discusses some of the socio-demographic factors influencing breast-feeding as well as the determinants of breast-feeding.

It is based on data from the Nepal Fertility and Family Planning Survey (NFFPS) 1986, which is the most recent nationally representative sample survey collecting information on birth and pregnancy history including breast-feeding, demographic and socio-economic background characteristics of respondents and their spouses, contraceptive knowledge, availability, accessibility, use and fertility motivation. A total of 3,774 currently married women aged 15-50 years from rural areas and 1,255 women from urban areas were interviewed (Nepal FP/MCH Project, 1987).

Information on the prevalence and duration of breast-feeding was collected for the last two live births. For those who did not breast-feed their babies at all, reasons for not doing so were sought in order to avoid truncation and selectivity bias. The analysis was restricted to women who had at least two live births; the duration of breast-feeding for the last closed interval was used as the dependent variable.

The results presented in this note may not be free from reporting biases, such as recall lapse and digital preference, because a large majority of the women reported duration of breast-feeding in multiples of six months: i.e. for 6, 12, 18, 24, 36 and 48 months. Altogether 81 per cent of the urban women and 76 per cent of the rural women reported durations in multiples of six months. However, there may also be cultural preferences or norms that require a child

* The author of this note is Jayanti Man Tuladhar, Chief of the Planning, Research and Evaluation Section of the Nepal Family Planning and Maternal Child Health Project, Ministry of Health, Kathmandu, Nepal. The author is grateful to the Project for its permission to use NFFPS data. The research was carried out while the author was a Visiting Research Fellow at the East-West Population Institute in Hawaii.

Table 1: Percentage distribution of all women and women who did not use contraception during the last closed birth interval, by selected demographic and social characteristics, 1986

Demographic and social characterisics	All women		Women not using contraception	
	Rural	Urban	Rural	Urban
Age of woman (years)				
15-19	0.7	1.7	0.7	1.9
20-24	14.1	14.0	14.1	14.5
25-29	21.6	21.2	21.8	21.2
30-34	21.3	22.9	21.2	22.2
35-39	19.7	18.5	19.7	17.7
40-44	14.5	11.2	14.4	11.4
45-49	8.1	10.4	8.1	11.0
Parity				
2-3	42.2	51.5	42.5	51.1
4-6	52.0	38.3	41.9	38.6
7+	15.8	10.2	15.6	10.3
Woman's education				
No schooling	95.4	72.6	95.7	75.2
Some schooling	4.6	27.4	4.3	24.8
Husband's education				
No schooling	65.7	38.9	66.1	41.5
Some schooling	34.3	61.1	33.8	58.5
Woman's work status outside of home				
Not working	95.1	92.7	95.0	92.9
Working	4.9	7.3	5.0	7.1
Geographical region				
Mountain	9.2	–	9.0	–
Hill	46.1	43.9	45.9	42.2
terai	44.8	56.1	45.1	57.8
Total	100.0	100.0	100.0	100.0
Number of women	2,760	919	2,701	834

to be breast-fed for 12 or 24 months. In the Nepalese context, it is common for a woman to express her preference to breast-feed for 1, 1.5 or 2 years. Therefore, the difference between the observed and expected percentage of women reporting the duration of breast-feeding in multiples of six months cannot be attributed entirely to digital preferences.

To study the influence of socio-demographic factors and determinants on breast-feeding, two demographic variables were selected, namely the woman's age and parity, along with four socio-economic variables, namely the woman's education, work status, place of residence and geographical region. The statistical techniques used for the analysis were multiple classification analysis and multiple regression analysis. Results are presented for two separate groups: all currently married women with two or more live births referred to as "all women" and all currently married women with two or more live births who did not use contraception during the last closed interval. The latter group is used to delineate the effect of contraceptive use.

Table 1 presents the percentage disbribution of all women and women who did not practise contraception, by selected demographic, social and demographic characteristics for rural and urban women. The data suggest that the composition of women differs somewhat in rural and urban areas with regard to selected characteristics. For example, 51 per cent of the urban women had 2-3 live births compared with only 42 per cent of women in rural areas; 27 per cent of all urban women have some schooling compared with only 5 per cent of rural women; and 56 per cent of all urban women are from the *terai* compared with only 45 per cent of the rural women.

Table 2: Percentage of women who did not breast-feed their penultimate child and average duration (months) of breast-feeding by status of contraceptive use during the last closed birth interval, 1986

	Rural	Urban
Percentage who did not breast-feed	4.0	2.1
Average duration of breast-feeding		
No method	24.7 (2699)	22.2 (828)
Method used	23.7 (59)	20.2 (84)
All	24.7 (2758)	22.1 (912)

Note: Numbers inside parentheses refer to number of women.

The duration of breast-feeding measured in mean months for the closed birth interval vary only slightly between rural and urban areas. The mean is almost 25 months in rural areas compared with 22 months in urban areas. Nearly all women living in both the urban and rural areas breast-fed their penultimate child; less than 5 per cent of the women did not breast-feed their child (table 2).

The prevalence of contraceptive use during the last closed interval is lower for the rural than urban women, i.e. about 2 per cent vs. 9 per cent. The average duration of breast-feeding is slightly lower among women who used contraception during the last closed interval than among those who did not; the difference is slightly larger among urban women compared with rural women.

Table 3 shows that there is hardly any correlation between demographic variables and the duration of breast-feeding, although the partial regression coefficients indicate that the net effects of age and parity are statistically significant. The value of R-squared indicates that woman's age and parity explain only about 5 per cent of the variation in the duration of breast-feeding among Nepalese women.

The analysis indicates that younger women tend to have a somewhat shorter duration of breast-feeding than older women (table 4), while women who have higher parity breast-feed their penultimate child for a slightly shorter period than women of lower parity.

Table 3: Summary of multiple regression analysis using duration of breast-feeding as the dependent variable for all women and for those who did not use contraception during the last closed birth interval, 1986

Demographic characteristics	All women	Women not using contraception
Correlation coefficient		
Age	0.154	0.158
Parity	-0.013	-0.016
Partial regression coefficient		
Intercept	17.91	17.57
Age	0.451*	0.461*
Parity	-1.086*	-1.124*
R-square	0.048	0.049

Note: * Indicates that effect is significant at the 1 per cent level.

Table 4: Effects of woman's age and parity on duration of breast-feeding, unadjusted and adjusted through multiple classification analysis, for the effects of other factors, for all women and for those who did not use contraception during the last closed birth interval

Demographic characteristics	Diviations from grand mean			
	All women[a/]		Women not using contraception [b/]	
	Unadjusted	Adjusted	Unadjusted	Adjusted
Age of woman*				
15-19	-3.3	-4.4	-3.4	-4.6
20-24	-3.9	-5.6	-4.1	-5.8
25-29	-1.0	-2.0	-1.1	-2.1
30-34	-0.1	-0.1	0.0	0.0
35-39	1.2	1.9	1.4	2.1
40-44	3.2	4.5	3.2	4.5
45-49	1.9	4.1	1.8	4.1
Parity**				
2-3	-0.2	1.6	-0.2	1.6
4-6	0.5	-0.2	0.6	-0.2
7+	-0.9	-4.3	-1.0	-4.5

Notes: * Effects of age are measured including other factors: namely parity, education, work status, place of residence and region.

** Effects of parity are measured including other factors: namely age, education, work status, place of residence and region.

a/ Grand mean = 24.0 months.

b/ Grand mean = 24.1 months.

The net effect of any one of the four socio-economic variables is the effect of that variable after controlling for the effects of other variables including the demographic variables, age and parity.

Unlike the demographic variables, the duration of breast-feeding varies little between categories of the socio-economic variables: namely woman's education, work-status, place of residence and geographical region. The maximum difference in adjusted deviations between categories is only two months (table 5).

Table 5: Effects of independent variables on duration of breast-feeding, unadjusted and adjusted through multiple classification analysis, for other independent variables and covariates, woman's age and parity, for all women and for those who did not use contraception during the last closed birth interval, 1986

Independent variables	Deviations from grand mean			
	All women[a/]		Women not using contraception[b/]	
	Unadjusted	Adjusted	Unadjusted	Adjusted
Education of woman				
No schooling	0.4	0.2	0.3	0.2
Some schooling	-3.3	-2.1	-3.1	-2.0
Work status				
Not working	-0.0	-0.1	-0.3	-0.8
Working	0.2	1.1	0.5	1.4
Place of residence				
Rural	0.7	0.6	0.6	0.5
Urban	-2.0	-1.7	-1.9	-1.7
Geographical region				
Mountains	2.4	1.6	2.4	1.7
Hills	0.9	0.7	0.8	0.7
terai	-1.2	-0.9	-1.1	-0.9

Notes: a/ Grand mean = 24.0 months.
b/ Grand mean = 24.1 months.

Table 6 presents the effects of all demographic and socio-economic variables on the duration of breast-feeding. Results of the multiple regression analysis presented in table 6 are based on a simple additive model which does not include interaction terms; it indicates that the percentage of variation in the duration of breast-feeding explained by five factors (age, parity, education, place of residence and geographical region) is about 6 per cent. Except for the partial regression coefficient for work status, which is not statistically significant, the coefficients for all other factors are statistically significant, although their effects are marginal.

It may be concluded that the prevalence of breast-feeding in Nepal is

Table 6: Summary of multiple regression analysis using the duration (months) of breast-feeding as the dependent variable for all women and for those not using contraception during the last closed birth interval, 1986

Independent variables	All women	Women not using contraception
Intercept	14.4	14.2
Age	0.44*	0.45*
Parity	-1.11*	-1.15*
Residence	-2.36*	-2.24*
Region	1.72*	1.70*
Education	-2.41*	-2.18*
Work status	1.46	1.17
R-square	0.055	0.056

Note: * Indicates that effect is significant at the 1 per cent level.

almost universal; only a little less than 5 per cent of the married women surveyed did not breast-feed their penultimate child. The average duration of breast-feeding is almost 25 months for rural women and 22 months for urban women. Among women who used contraception during the last closed birth interval, the duration of breast-feeding is somewhat shorter than those who did not use contraception during that period.

Reference

Nepal FP/MCH Project (1987). Nepal Fertility and Family Planning Survey Report 1986, Ministry of Health, Kathmandu, Nepal.