

**Nutrition and Population Links – Breastfeeding, Family Planning and
Child Health – Nutrition Policy Discussion Paper No. 11**

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ADMINISTRATIVE COMMITTEE ON COORDINATION – SUBCOMMITTEE ON NUTRITION

ACC/SCN SYMPOSIUM REPORT
NUTRITION POLICY DISCUSSION PAPER NO. 11

Papers from the ACC/SCN 18th Session Symposium

May 1992

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United Nations – Administrative Committee on Coordination – Subcommittee on Nutrition (ACC/SCN)

The ACC/SCN is the focal point for harmonizing the policies and activities in nutrition of the United Nations system. The Administrative Committee on Coordination (ACC), which is comprised of the heads of the UN Agencies, recommended the establishment of the Subcommittee on Nutrition in 1977, following the World Food Conference (with particular reference to Resolution V on food and nutrition). This was approved by the Economic and Social Council of the UN (ECOSOC). The role of the SCN is to serve as a coordinating mechanism, for exchange of information and technical guidance, and to act dynamically to help the UN respond to nutritional problems.

The UN members of the SCN are FAO, IAEA, IFAD, ILO, UN, UNDP, UNEP, UNESCO, UNFPA, UNHCR, UNICEF, UNRISD, UNU, WFC, WFP, WHO and the World Bank. From the outset, representatives of bilateral donor agencies have participated actively in SCN activities. The SCN is assisted by the Advisory Group on Nutrition (AGN), with six to eight experienced individuals drawn from relevant disciplines and with wide geographical representation. The Secretariat is hosted by WHO in Geneva.

The SCN undertakes a range of activities to meet its mandate. Annual meetings have representation from the concerned UN agencies, from 10 to 20 donor agencies, the AGN, as well as invitees on specific topics; these meetings begin with symposia on topics of current importance for policy. The SCN brings certain such matters to the attention of the ACC. The SCN sponsors working groups on inter-sectoral and sector-specific topics.

Ten-year programmes to address two major deficiencies, vitamin A and iodine, have been launched.

The SCN compiles and disseminates information on nutrition, reflecting the shared views of the agencies concerned. Regular reports on the world nutrition situation are issued, and flows of external resources to address nutrition problems are assessed. State-of-the-Art papers are produced to summarize current knowledge on selected topics. As decided by the Subcommittee, initiatives are taken to promote coordinated activities – inter-agency programmes, meetings, publications – aimed at reducing malnutrition, primarily in developing countries.

Acknowledgements

We are very grateful to the following individuals who actively participated – either as presenters of papers or as discussants – in the symposium on 'Nutrition and Population' in February 1991 at UNFPA headquarters: Soledad Diaz, Barry Edmonston, Charlotte Gardiner, Sandra Huffman, Miriam Labbok, Reynaldo Martorell, Kathleen Merchant, Barry Popkin, Prema Ramachandran, Roger Short and Beverly Winikoff.

We would also like to thank UNFPA for hosting the symposium, particularly Dr Nafis Sadik, Executive Director of UNFPA, who opened the meeting, Dr M. Sabwa who helped organise it, and Ms. K. Trone who so ably chaired it.

We are also indebted to Jane Hedley, Viki Elliott and Heleen Koenen for valuable assistance in assembling the report, and formatting graphics from the original papers.

Stuart Gillespie
John Mason
ACC/SCN

Foreword

For those who specialize in nutrition or family planning, perhaps this Report may not provide much information they didn't already know. Still, they may forget an important objective of the Symposia sponsored by SCN preceding its annual Sessions is to examine in depth nutrition relevant issues and identify policy and programme implications. This is what makes this Report particularly interesting for the practitioners of the an, besides the richness of information – historical and current – that it contains.

The fact remains that, at the community level, family planning services are quite separate from nutrition and health interventions despite their reinforcing effects. It is another reflection of the trend towards segmental primary health care which we have witnessed in the last ten years. What the field does, is usually what the centre decides and provides – thus the major constraints for an integrated approach of nutrition and fertility relate to policies and programmes. The Report provides all the arguments for linking nutrition – specifically breastfeeding – and family planning programmes because both are beneficial for the mother and the child, increasing the cost-effectiveness of each. Exclusive breastfeeding during the first four to six months of life is highly recommended to ensure normal growth and development of the infant. It should be maintained as long as possible, while supplementary feeding should start at six months approximately.

For the mother, breastfeeding has both economic and health benefits. It induces lactational amenorrhoea which allows births to be spaced, thus reducing the likelihood of mothers becoming nutritionally depleted through the demands of frequent pregnancies. At the macro-level, it contributes to the control of population growth, thus lessening strain on environmental and productive resources. This report includes papers which explore these inter-relationships in depth, in many cases providing compelling new evidence for their beneficial links.

Dr Abraham Horwitz
Chairman, ACC/SCN

Introduction to Symposium

Dr Nafis Sadik, Executive Director of the United Nations Population Fund at the 18th Session of the ACC/SCN, New York, 25 February 1991

Both scientific evidence and programme experience demonstrate the mutually reinforcing effects of nutrition, breastfeeding, child survival, maternal health and fertility. Maternal and child health services, nutrition and family planning programmes are ideal partners in promoting and protecting the health and well-being of the whole family. Better health and improved social status of women assist the survival, growth and development of children. Improved child survival and better health of women, in turn, strengthen the demand for family planning.

Adequate nutrition, preferably by breastfeeding, is critical for growth, development and immunization in the early months of life by providing essential nutrients and early immunities and by lowering the risk of anaemia, diarrhoeal disease and acute respiratory infections.

It is equally important to emphasize that balanced diet and birth spacing are crucial for women's health. Women's nutritional status affects not only pregnancy outcome and birth weight, but also fertility, lactation, productivity and morbidity. A mother who is well fed and practices modern family planning is unlikely to suffer from the "maternal depletion syndrome". Because she is healthy and she has few children to take care of, her body has enough time to fully recover after each pregnancy. Good nutrition and family planning and better socio-economic conditions protect women and their daughters from the cycle of low birth weight and small adult stature in which they run higher risks at all stages of their reproductive life.

UNFPA believes that breastfeeding is an essential component of programmes of maternal and child health and family planning. Adequate nutrition of infants starts with the health and nutritional status of their mothers. It is most disconcerting therefore to find that the caloric intake of 45% of lactating women is below the required level and that 50% of pregnant women are anaemic.

If they are to choose breastfeeding freely, women need adequate food and health care; they need a reasonable workload and working conditions; and they need social support. They also need the means and information to enable them to space their pregnancies, so that they can continue to breastfeed and have sufficient time to recover from pregnancy and delivery.

They need at least two years of efficient protection against pregnancy. Full and exclusive breastfeeding can help delay the return of fertility for about four to six months. After that, modern contraception is required. It is therefore extremely important that the mother is introduced to family planning at about the fourth month after delivery. This should be considered a normal part of a continuous process which also includes monitoring nutritional status and food intake during pregnancy and lactation; their impact on recovery of fertility; and the nutritional effect of exclusive breastfeeding on the mother and the baby.

The world's population, now approaching 5.4 billion, will reach 6.4 billion by the year 2001. By and large, the biggest increases will come in the poorest countries, those by definition least equipped to meet the needs of the new arrivals and invest in their future. Rapid population growth in poor and rural areas of Africa, Asia and Latin America is damaging the natural environment and reducing its productive capability.

Combined with uneven population distribution and urbanization, unequal land distribution and shrinking land holdings, rapid population growth undermines attempts to improve food production beyond subsistence levels and increase *per capita* food production and consumption.

Between 1979/81 and 1986/87 cereal production per person actually declined in 51 developing countries and rose in only 43, out of the 94 countries for which FAO data are available. In Africa, 25 countries out of 43 experienced a drop in *per capita* cereal production, and the region as a whole produced 27% less food for each person than it did in 1970. Latin America's performance is also disappointing: 17 countries out of 23 suffered a drop. Developing countries' cereal imports in 1969/71 were only 20 million metric tons. By 1983/85 they had risen to 69 million metric tons and are projected to total 112 million metric tons by the year 2000.

In short, because food production has not kept pace with growing numbers and growing needs, nearly one billion people do not get enough to eat to lead fully productive lives, over 400 million are chronically malnourished, and every year 11 million children under the age of five die from hunger or hunger-related diseases.

Women are central to the whole process of development. Women are not only life givers and care providers; they are food producers, income generators and agents of change. With this in mind, it is important to consider gender inequalities that women, and particular girls, experience not only in health care and education, but also in nutrition and food intake.

Sex bias in health and nutrition has been documented in several recent analyses in Asia, Africa and the Middle East. Between 20% and 45% of women of child-bearing age in the developing world do not eat the WHO-recommended amount of 2,250 calories a day under normal circumstances, let alone the extra 285 a day they need when they are pregnant. In Thailand, for example, the average woman gets only 1,900 calories a day; in the Philippines the average is 1,745 – despite their constant heavy workload, and the back-breaking additional work at peak times of the farmer's year.

Research in Gambia found that women there lost an average of 1.4 kilograms in the last three months of pregnancy. Anaemia associated with poor nutrition affects as many as two-thirds of Asian women, half of all women in Africa, one sixth of Latin American women, and 60% of women worldwide. Heavy manual work combined with poor nutrition in mothers results in low-birth-weight babies and an inferior supply of breast milk.

In most developing countries today, the girl child gets less food, she is breastfed for a shorter period of time than the boy and she is weaned earlier. Girls are less likely than boys to receive medical attention. Childbirth in adolescence puts their lives at risk and adversely affects their health, nutritional status, education and employment opportunities. Girls and women generally enjoy fewer rights and opportunities than boys and men in the same socio-economic group, and encounter more cultural, social and legal obstacles.

I would like to urge this Session to reflect specially on women's unequal social and economic status and how it interacts with their low nutritional status and that of their children.

The food crisis has three main components. First, lifestyles, incomes and social organization determine levels of consumption. Second, the technologies in use determine the extent to which human activities damage or sustain the environment, and the amount of waste associated with any level of consumption. These two factors determine the impact per person.

The third factor, population, is the multiplier that fixes the total impact. Inequality enters as a fourth factor, for example, when most land is in large holdings and the poor are forced into artificially small or marginal areas. Poverty is involved when it prevents the adoption of more costly new technologies that could halt or slow down environmental degradation. Population is always part of the equation. For any given type of technology, for any given level of consumption or waste, for any given level of poverty or inequality, the more people there are, the greater is the impact on the environment and, in turn, on food production capacity.

We have the knowledge, technology, resources and good will to solve the food crisis. What we need now is to give these issues the priority and resources they deserve. With an integrated strategy and common efforts, we can improve the health and well-being of women and children, and safeguard the future for generations still to come.

ACC/SCN Statement on Nutrition and Population

"There are extensive concerns regarding the topic of nutrition and population. A deeper understanding of the dynamic inter-relationships between population growth, food production, environmental sustainability and urbanization will become increasingly important in the future. In this symposium, the primary focus was on nutrition and fertility.

"Breastfeeding provides one link between nutrition and family planning with mutually beneficial effects at the level of the individual mother and child. Exclusive breastfeeding for 4–6 months is advised. Lactational amenorrhoea, prolonged by breastfeeding, is of great benefit through increasing birth intervals. There is an opportunity at this time for counselling on modern family planning method, in particular those deemed most appropriate for lactating women.

"At an individual level, the health and nutritional status of the mother (particularly the adolescent mother) is a fundamental concern, in terms of her nutritional resources, reproductive and productive roles and family planning needs. Increasing the length of birth intervals will reduce the likelihood of cumulative reproductive stress in the mother and improve her ability to benefit from birth spacing and maternal health through more

adequate feeding and care practices.

“These are major reasons why family planning and nutrition services and information should be integrated. Programmatic considerations as to how to bring this about, in terms of policy formulation, programme planning, training and the support of community level initiatives present several challenges. These include the following:

- appropriate training of health and family planning workers; the motivation to support and counsel women should emerge from common goals;

- reconciling programmatic priorities of agencies that differ in their support for the concept and practice of integrated breastfeeding and family planning strategies;

- recognition of constraints on exclusive breastfeeding due to competing demands on women’s time, misinformation and other factors, hence the need for appropriate programmatic support to enable women to practice breastfeeding;

- resource mobilization to provide relevant information, education and communications to promote the practice of breastfeeding and the adoption of contraceptives, including research on beliefs and obstacles to family planning and infant feeding.”

CHAPTER 1: Summary of Proceedings

John Mason and Mahshid Lotfi, ACC/SCN, Geneva

Population growth has vital consequences for nutrition – ranging for instance from more mouths to feed from finite resources, to environmental degradation from intensive and inappropriate land use to meet nutritional needs. The food–people–resources balance, now and in the future, is a critical determinant of the quality of life. At the same time, programmes in family planning, health and nutrition are widely pursued to improve maternal and child health, with expected longer–term demographic effects.

The ACC/SCN decided to hold its annual symposium for 1991 on “Nutrition and Population”. Following views of the SCN’s Advisory Group on Nutrition, it was decided to focus on questions of direct relevance to programmes. This in turn came to concentrate on the triangle of breastfeeding, birth spacing, and infant nutrition and maternal health. The importance of macro–level issues of food–population–resources remain well–recognized, but such a crucial topic required more time and resources than were available. Considerations relating to programmes were felt to be more immediately applicable by the UN and donor agencies.

The Symposium on “Nutrition and Population” was hosted by UNFPA at their Headquarters in New York, in February 1991. The Symposium was chaired by Ms K. Trone, Head of the UNFPA Regional Office for Latin America. Three papers were presented. Dr Sandra Huffman, Center to Prevent Childhood Malnutrition, Bethesda, presented a paper on “Nutrition and Family Planning Linkages: What More Can Be Done?” Issues on “Breastfeeding, Fertility and Population Growth” were introduced by Professor Roger Short, Monash University, Melbourne. The effects of repeated cycles of reproduction were discussed in a paper on “Reproductive Stress and Women’s Nutrition”, by Professor Reynaldo Martorell, (at the time of Stanford University and now at Cornell, USA) and Dr Kathleen Merchant (Cornell). Dr Prema Ramachandran submitted a paper entitled “Nutrition and its Influence on the Mother–Child Dyad” but unfortunately could not attend the Symposium. Discussants for the papers included Dr Charlotte Gardiner, Director of Maternal and Child Health (Ghana), Professor Barry Popkin, Carolina

Population Center (USA), Dr Soledad Diaz, Institute of Reproductive Medicine (Chile), Dr Miriam Labbok, Georgetown University (USA), Dr Beverly Winikoff, Population Council (USA), and Dr Barry Edmonston, Urban Institute (USA), later. The Symposium papers, discussions and related literature form the basis for this article.

Breastfeeding, Birth Spacing and Nutrition

Breastfeeding exclusively for four to six months from birth is of well-known importance for infants' nutrition. Breastfeeding delays the return of fertility in the mother, thus contributing to longer birth intervals. Birth spacing allows continuation of breastfeeding for the child's benefit and has other advantages to mother and child. Better nutrition promotes infant and child survival, which in turn tends to increase birth intervals. And all these processes benefit the health and well-being of the mother. This is illustrated in Figure 1.

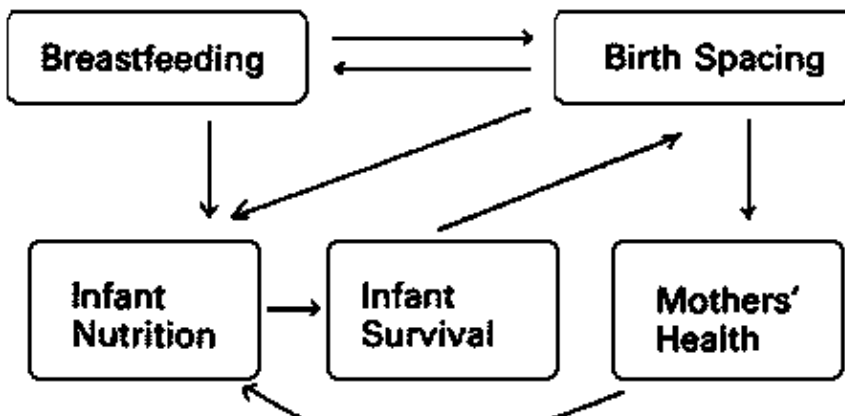
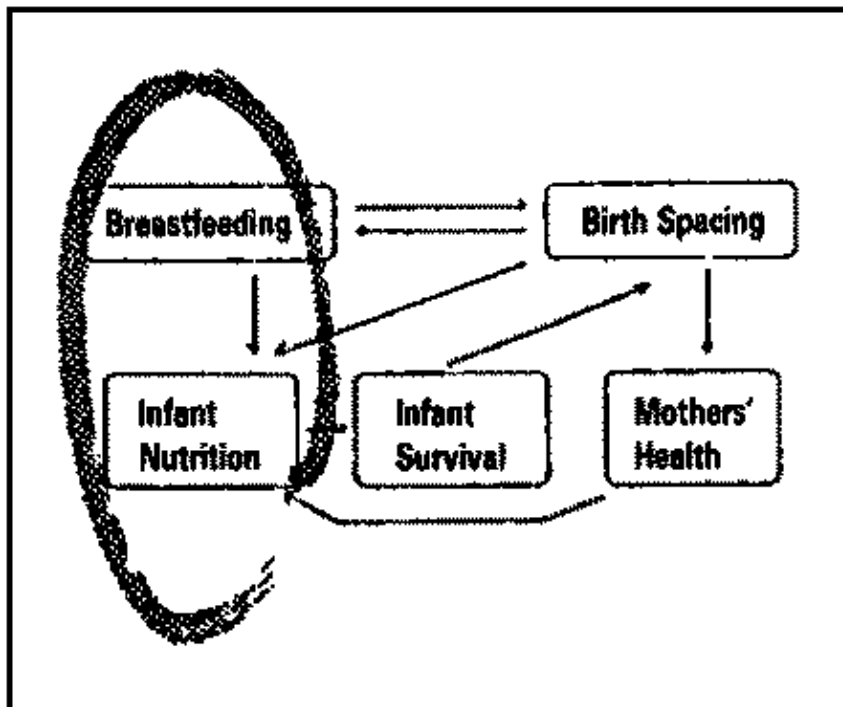


Fig. 1. Interactions of breastfeeding, birth spacing and nutrition.

The interactions are finely-tuned, developed as part of human evolution. They are worth understanding – some only recently worked out and still being researched – and are discussed in more detail below. A practical message emerged from the Symposium, at which the different disciplines present found (to their slight surprise) they were talking much the same language about the same conclusions from different starting points: support to breastfeeding should be part of population *and* nutrition *and* health programmes. Indeed these could be better integrated. As Dr Huffman pointed out “... instead of spending another 20 years justifying the link between family planning and nutrition activities, we may have more success if we start with an intervention that integrates both nutrition and population issues: breastfeeding promotion”.

Breastfeeding for Infant Health and Nutrition



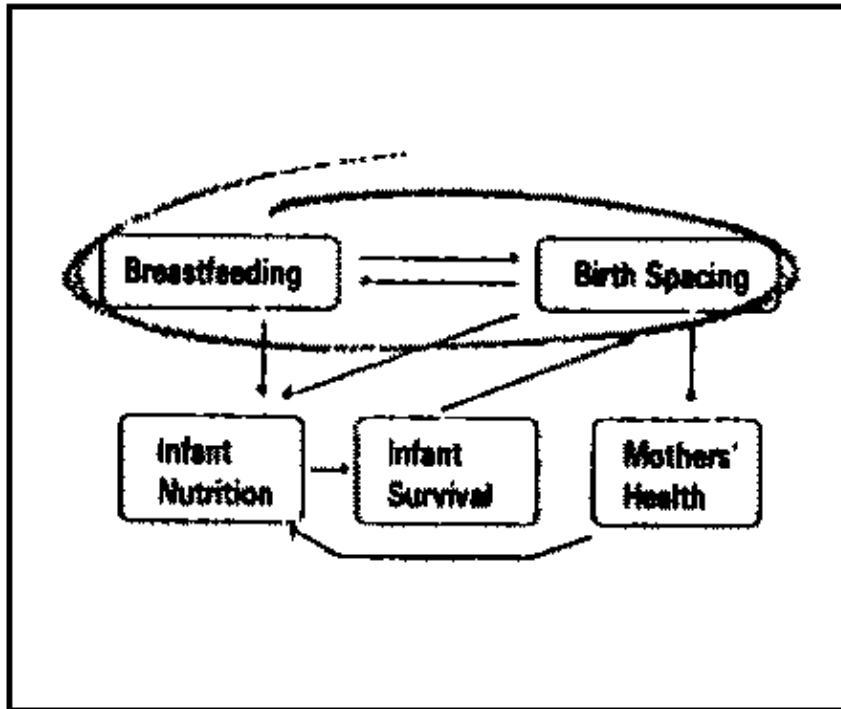
The benefits of breastfeeding are constantly becoming better understood. Breastfeeding reduces exposure to pathogens in the environment, gives protection by immunization, provides anti-bacterial and antiviral substances, and supplies the correct mix and density of nutrients; it also has very little direct cost. Bottle feeding, which is the usual alternative in early life, tends to be contaminated, non-ideal in terms of nutrients, and not affordable to many families in poor societies.

The newborn infant's needs and the mother's ability to provide for them, not only to nourish but to protect¹, are closely linked. A continuity has evolved to bridge the gap between the safety of the womb and the shock of post-natal life, when the gut suddenly replaces the placenta as an interface with the world. The immature infant gut is adapted to the nutrition and protection of breast milk. Antibodies from colostrum and breast milk protect the gut and provide some immunity against other infections. Antibiotic activity in breast milk proteins is being shown to be selective against precisely certain of the harmful bacteria that cause infantile diarrhoea. The protein of breast milk is tailor-made to the infant's needs, and is quite innocuous unlike many non-human proteins. The hazards of sudden exposure of the fragile gut to foreign materials is now being realized. The gut matures in the first few months – the recommendation for 4–6 months' exclusive breastfeeding is no accident. "It is still true to say that the artificial feeding of our infants has been the largest uncontrolled clinical experiment in human history²."

Data collected during the 1970s by the World Fertility Survey show an overall historical decline in breastfeeding both in terms of its initiation and duration. In fact, a steady decrease had been observed by the early twentieth century. In Sweden, reduction in the rate of babies being exclusively breastfed at 2 months from 85% in 1944 to only 35% by 1970 was one example of this continued downward trend. Similar statistics are available for other developed and some urban areas of developing countries through the WHO Collaborative Study (Contemporary Patterns of Breastfeeding, WHO, 1981³). This changing pattern of infant feeding has been attributed to "the demands of modern life" and industrialization, as alternative means of feeding became available to public. According to Dr Short at the SCN Symposium "with the advent of Industrial Revolution, the artificial feeding of infants with paps and gruels became commonplace throughout Europe, and this was given an added boost by the growing availability of cow's and goat's milk and the development of feeding bottles with rubber teats". But breastfeeding decline and increased use of artificial feeding did not immediately result in population increase. "The potential upsurge in fertility that this increase in artificial feeding might have created" in Dr Short's view "was largely counteracted by the staggering increase in infant mortality resulting from these practices". He notes that, for example, in London during the late 18th century almost 50% of children had died by the age of 2, and in Dublin during the same period artificial feeding resulted in the death of 99.6% of over 10,000 children admitted to the Foundling Hospital, mainly as a result of diarrhoea. In Dr Short's opinion by improving formulation and hygienic aspects of artificial feeding, mortality in most developed countries decreased, but left a high potential for fertility in women who had abandoned breastfeeding.

But is breastfeeding decline an inevitable result of modernization? The WHO Collaborative Study while confirming earlier results on breastfeeding's declining trend (particularly in cities and urban slums), found some notable exceptions. Thanks to efforts to encourage breastfeeding through health services, education and supportive measures to mothers, the number of Swedish mothers initiating breastfeeding actually increased in 1976 to 93%, and 50% were still breastfeeding at 4 months although with regular supplements. This and other examples from Australia, Eastern Europe, Scandinavia and the USA shows that the decline in breastfeeding is *not* an unavoidable result of industrialization if the necessary measures for its promotion and support are taken. In most cases, breastfeeding decline accompanied the society's modernization, as noted by Berg and Brems⁴, "at a time when breastfeeding was not advocated in either medical or patient education".

Breastfeeding and Birth Spacing



Breastfeeding directly contributes to increased birth intervals by tending to reduce the resumption of fertility in the mother. This is more pronounced with exclusive breastfeeding. It is related to “lactational amenorrhoea”, and has led to new recommendations for decisions by individuals on family planning. The SCN Symposium stressed that lactational amenorrhoea is particularly relevant to providing an opportunity in the first months after birth for counselling women on modern family planning methods, *and that it is complementary to these not a substitute.*

A major step forward was recently taken when an international group of experts met in Bellagio, Italy, in August 1988 to review the evidence for the contribution of breastfeeding to family planning. The conclusion: “Breastfeeding provides more than 98% protection from another pregnancy in the first six months post partum, if the mother is fully or nearly fully breastfeeding and has not experienced vaginal bleeding after the 56th day post partum”. Recent research by Dr Short and associates on a well nourished group of Australian women breastfeeding their babies examined the probability of becoming pregnant over a 24 month period after the birth. This showed that if modern contraception was adopted only after lactational amenorrhoea ceased, the cumulative probability of becoming pregnant over the 24 month period would have been only 13%⁵.

Lactation delays the resumption of fertility by physiological (neuroendocrine) mechanisms. Briefly, suckling at the breast affects hormone secretion that maintains the production of milk (prolactin) and, probably through other pathways, depresses the hormone levels necessary for fertility (inhibiting ovulation and producing amenorrhoea). The frequency of suckling is important, increasing milk synthesis and secretion and decreasing chances of fertility. An inhibitory peptide is secreted by the mammary alveoli to stop further milk synthesis if the alveoli are not emptied regularly. This, as Dr Short puts it, makes the breast a “supply meets demand organ”, and explains why exclusive, and not so much partial, breastfeeding has the potential to reduce fertility and increase birth intervals and child spacing. The six month period after birth is crucial both for mother and infant, and illustrates the closeness of the mother’s and infant’s needs.

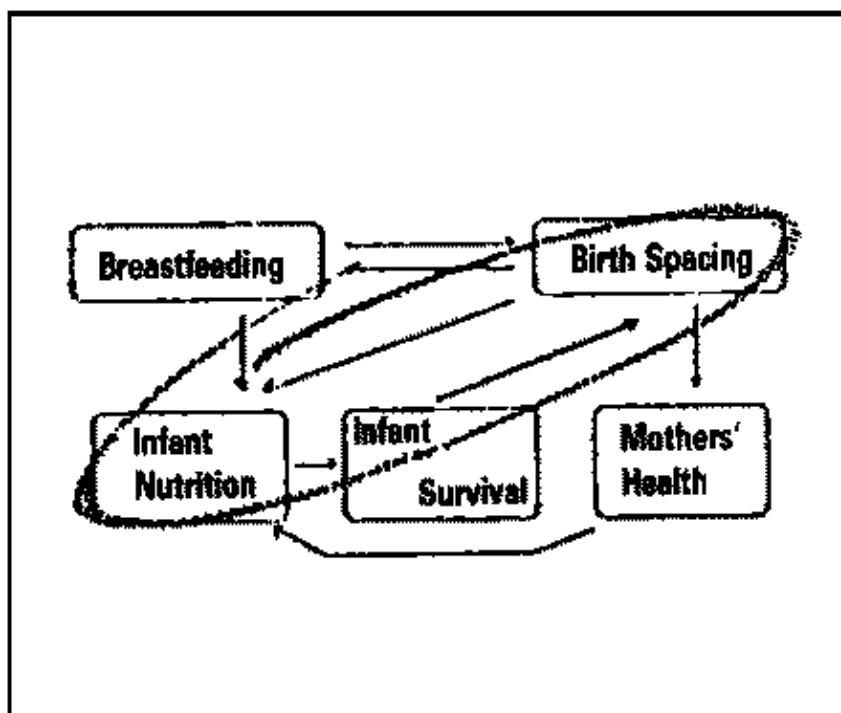
The WHO Collaborative Study from 1976–78 indicated a consistent and close relationship between the duration of breastfeeding and the duration of post-partum amenorrhoea. About 85% of the total variability in the return of fertility could be attributed to reported differences in breastfeeding duration. The same conclusions were reached in many other studies, e.g. Bongaarts⁶, who demonstrated that the duration of breastfeeding explains most of the variation in the duration of post-partum amenorrhoea. Another factor claimed to influence the length of lactational amenorrhoea has been the nutritional status of the mother, with shorter amenorrhoea period in better nourished women. Dr Short, however, reported that in their studies and those of some others, women in developed countries, on an optimal plane of nutrition, still achieve prolonged periods of lactational amenorrhoea.

Such observations have been used to look at questions like the overall influence of breastfeeding practices on population growth, via its contraceptive effect; and the extent to which breastfeeding offsets contraceptive

needs. It has been claimed that lactational amenorrhoea is the single most important variable among the proximate determinants of natural fertility⁷. A World Bank analysis⁸ has pointed to the significant effect of breastfeeding in reducing the total possible number of births to a great majority of the couples in developing countries who do not use modern contraceptives. Projections by Family Health International show that a 25% reduction in breastfeeding duration in five African countries would increase total fertility rates by 12%, and that halving the duration of breastfeeding could mean a 26% rise. Corresponding figures for 12 Asian countries are 11% and 23%⁹.

A major step towards reducing the excessive fertility that is currently fuelling the population explosion, concluded Dr Short, would be to persuade both developing and developed countries to do their utmost to support and encourage prolonged breastfeeding. Breastfeeding, thus, in addition to its nutritional and health values needs to be promoted and supported as a child-spacing strategy. Longer birth intervals will reduce total numbers of children per women as well as benefiting both mothers and their children in the other ways described here.

Birth Spacing Benefits Child Nutrition



A delay of two years or more before its mother becomes pregnant again is important for the baby's welfare and indeed survival. One of the earliest observations of malnutrition was of kwashiorkor as the disease of the displaced child – displaced by a new pregnancy. Short birth intervals have often since then been related to malnutrition. They are also related to infant and child mortality – although this operates in both directions, as discussed in the next section. Nonetheless, anything that prevents too-short birth intervals will benefit the youngest child – including family planning programmes directly, and as an additional indirect result of breastfeeding. As Dr Huffman pointed out in her paper, birth intervals of less than two years have frequently been associated with low birth weight, high infant mortality, growth retardation, high morbidity and inferior nutritional status.

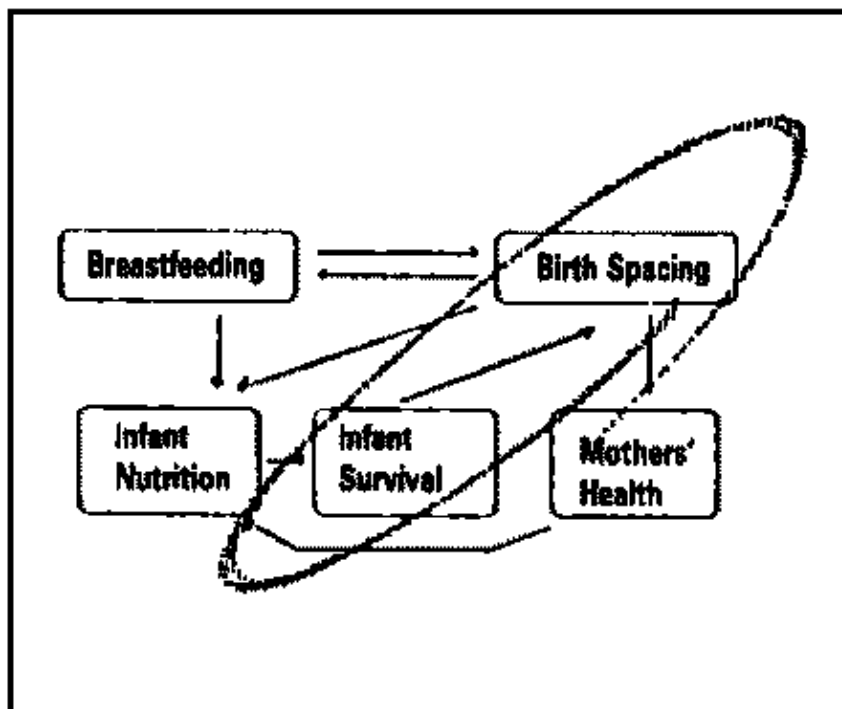
The advantage to the child of adequate birth interval goes beyond maintenance of breastfeeding. The burdens of time and stress on the mother tell on her ability to nurture the family, and these are worsened by too-close pregnancies. Her health itself may suffer, as discussed later – a serious blow particularly to poor families with many children.

This stresses another way in which too-short birth intervals are disadvantageous – through family economics: more mouths to feed with the same resources, or probably less as the mother contributes in cash or kind into the family income. Part of the motivation for short birth intervals, ironically, may itself have an economic perspective, in ensuring for old age, encouraging rapid births to reach large desired family size. In a sense this contributes to a vicious circle, as more births will be wanted when mortality is high: reductions in child mortality are needed to motivate birth spacing.

Short birth intervals thus are to no one's advantage: the future infant, the current infant, or the mother herself. "Adequate child spacing can mean the difference between complete recuperation of the mother and depletion of her physical resources. It can also mean the difference between adequate care of the preceding child, including its continued breastfeeding, and early abrupt weaning from the breast due to a new pregnancy and hence the deprivation of maternal attention"¹⁰.

The health impact of family planning will clearly be greater if it has a specific effect on birth intervals. But a considerable number of the births prevented by family planning programmes are due to sterilization. "While family planning programmes have been more successful in reducing higher parity births, and terminating births through sterilization, they are not generally associated with increasing birth intervals" says Huffman. "Worldwide, over one third of effective modern contraceptive use is through sterilization. This, while preventing any further birth, is usually not associated with adequate birth intervals for the preceding pregnancies."

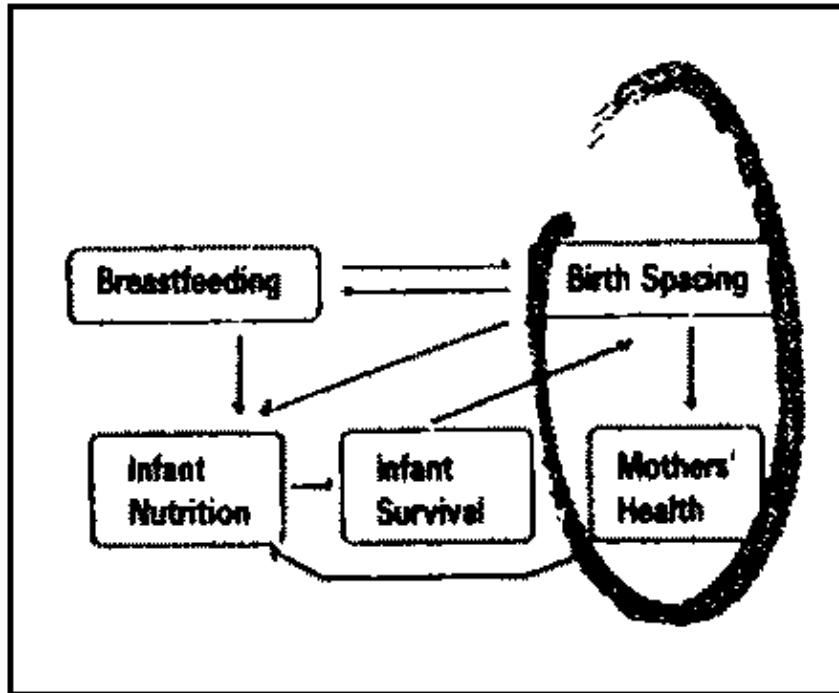
Child Survival Affects Birth Spacing



A feedback is shown in Figure 1 from infant/child nutrition, through child survival, to birth spacing. This is important in the long-run, as part of the motivation for smaller family size, hence eventually reduced population growth rates. The link of nutrition to survival or mortality is clear. The effect of child mortality on birth spacing can act in several ways. As implied earlier, the death of a breastfed infant will tend to lead biologically to resumption of fertility. But conscious decisions may be made to replace the child as soon as possible – perhaps before the mother has recovered from the previous pregnancy. This decision can be based on the family's desire to achieve a certain family size. Indeed the decision to have rapidly-succeeding pregnancies for this reason may be taken without experiencing a child-death in the family, if it is perceived that this risk is high, to insure against possible future deaths and reach the desired family size before the reproductive cycle of the family is complete. This, in turn, may well depend on the overall community perception of risk, influencing the family's decisions.

Here too, we are dealing with a cycle that can benefit from deliberate intervention to break. In this case, for example, promoting infant and child nutrition and survival can gradually establish more motivation for longer birth intervals, hence acceptance of family planning.

Mothers' Health and Nutrition



The consequences of frequent child bearing have been considered more often for the child than for the mother herself. Drs Martorell and Merchant gave evidence in their paper that spacing reproductive events is necessary for maternal recovery. Repeated reproductive cycles have been referred to as “maternal depletion syndrome”, but they proposed avoiding this term and regarding effects of reproductive stress on women’s health and nutritional status as a continuum. “The question is not whether or not maternal nutrition is affected by reproductive stress, but under what circumstances are effects noted and to what degree and in what aspects.”

A substantial proportion of women in developing countries are lactating and pregnant *at the same time*. This situation – perhaps not widely appreciated – is clearly likely to increase the stress on women’s health and nutrition. It is referred to as “overlap” by Martorell and Merchant, defined as two or more weeks of breastfeeding during pregnancy. The phenomenon has been reported to be common among women in a number of poor areas: 30% in Guatemala and Senegal, 40% in Indonesia, and as high as 70% in India (stressed by Dr Ramachandran¹¹ (in a paper prepared for the meeting). Although lactation is generally associated with post partum amenorrhoea, partly because of prolonged breastfeeding in many developing countries, perhaps as many as one third of all pregnancies occur in lactating women. This observation clearly has important implications for both family planning and breastfeeding practices, but here we focus on the impact of this phenomenon on women’s health and nutrition.

The effects of reproductive stress on mothers and infants were shown by Drs Martorell and Merchant using the data from an INCAP longitudinal study. They focussed on women actively exposed to different degrees of reproductive stress by carefully studying the period of overlap. Overlap was found to occur in 50% of a sample of 504 pregnant women. Two extreme situations were compared: the “least stressed” women (those with a recuperative interval of more than six months) and the “most stressed” ones (those experiencing an overlap duration of more than three months). Despite higher consumption of food supplements available freely to all women, the “most stressed” group had lower fat reserves (more pronounced earlier in pregnancy), and gave birth to lighter infants when compared to the “least stressed” mothers. While the emphasis of the paper was on mothers themselves, their results showed that reproductive stress also adversely affects the infant. It is interesting to note the results of the National Institute of Nutrition, India, in which pregnant and lactating women were under even greater stress: while women were similarly facing overlap of different degrees, they were not supplemented and their food consumption, as usual in poor areas, was similar to non-pregnant subjects (NIN, 1984/85 Annual Report). In reporting the results of these studies Ramachandran concluded that irrespective of the duration of lactation and period of gestation, women who continued lactating during their pregnancy had lower body weights than their non-lactating pregnant counterparts. Here too, the differences were more marked in the small group of those working women becoming pregnant in the first 6 months of lactation. Their babies had also lower birth weights.

These results pointed to the fact that overlap should be prevented and birth intervals need to be adequate. Using the fertility-inhibiting effect of exclusive breastfeeding, later followed by other family planning methods,

another pregnancy can be planned at a more appropriate time and with reasonable spacing.

Integrating Nutrition and Family Planning Activities

The mutual benefits of breastfeeding and family planning programmes mean that they will be more successful if they are integrated. Both nutritional support and birth spacing have impacts on mortality reduction and nutritional status improvements. Breastfeeding is now recognized as a child survival strategy. Keeping a child alive is associated with preventing another birth, since the death of an infant is usually followed by another pregnancy. Some reasons for integration are shown in the box below.

Exclusive breastfeeding can be used to protect against conception in the early months after birth when lactation has induced amenorrhoea. Its contraceptive effect will however wane over time and therefore should not be regarded as a substitute to other family planning methods, but as a complement to them. Even with the gradual appearance of other contraceptive devices in the world market, exclusive breastfeeding has remained the only protection many women in developing countries have (whether due to non-accessibility or non-acceptability) against another untimely pregnancy. In 1975 it was stated that more births were averted in the third world countries by breastfeeding than by any modern method of contraception (Rosa¹²). But the fact is that many such women are not protected against pregnancy even when breastfeeding can no longer prevent fertility. These will benefit most from integrated programmes where family planning and breastfeeding promotion are offered together. Family planning programmes can increase their coverage and thus effectiveness by including many women who do not want to use contraceptives until menses have resumed, if they encourage these women to exclusively breastfeed.

Even if contraceptive supply and demand are not constrained – as in reality they often are – significant declines in breastfeeding may place greater pressure on family planning services than can, presently, be coped with. In this regard, breastfeeding can help to use scarce family planning resources more efficiently. But to achieve this effect, family planning programmes should take into account the local breastfeeding patterns and beliefs in order to promote and support breastfeeding, to achieve its maximum fertility-inhibiting effect. When the fertility regulating role of lactation is waning over time, or when more security is demanded, breastfeeding can be combined with other contraceptive methods that do not interfere with lactation. This needs to be accompanied by proper advice and encouragement. Nutrition programmes should similarly combine breastfeeding promotion with family planning messages, appropriate counselling and referrals. In other words, services devoted to maternal and child health should be in close coordination with family planning services.

Some examples given by Dr Huffman indicate that integration works well in practice. “In two breastfeeding promotion projects in Honduras and Guatemala, referrals are provided by breastfeeding counselors to family planning. In addition, exclusive breastfeeding is taught as a family planning method, with the signs of return of fertility taught to breastfeeding women... A recent study conducted in Honduras showed that combining the promotion of breastfeeding with the promotion of family planning can lead to increase in both... The project included the creation of combined breastfeeding and family planning clinics, along with training of health professionals and changes in hospital practices. Along with prenatal, postnatal and post-partum counselling, mothers received a discharge pack with pamphlets reinforcing messages of breastfeeding and family planning... Results of the project showed that exclusive breastfeeding at 3 months increased from 14% to 23% and use of modern methods of contraception increased from 54% to 68% at 6 months post-partum” with substantial increase in duration of amenorrhoea.

Among the World Bank projects in population, health and nutrition, according to Berg and Brems¹³ “at least four projects have explicitly recognized the value of breastfeeding for birth spacing and four have made specific provision for data collection regarding breastfeeding prevalence, duration or practices”. All these have promoted breastfeeding in some way. Yet it appears that there is considerable scope for enhancing both the number and extent of such activities.

One successful linkage between family planning and nutrition over the last 10 years, in Dr Huffman’s view, has been the Demographic Health Survey (DHS). Information on morbidity, mortality and nutritional status are added in recent reports of DHS. Among the reasons for inclusion of nutritional issues in the DHS, Dr Huffman explains, has been the need for more data on breastfeeding and amenorrhoea. She notes that when data on both family planning and nutrition needs are available within the same survey, then they are most likely to be used to affect population and nutrition policies.

Why family planning programmes should promote breastfeeding –

? to increase birth spacing and decrease fertility rate;

? to use resources more efficiently;

? to reduce pressure on the family planning services;

? to reduce infant mortality rate through Improved nutritional status thereby preventing another pregnancy,

? to use breastfeeding as a sound basis on which family planning strategy can be built;

? to decrease the need for supplying more contraceptives which will be required in the absence of breastfeeding;

? to increase programme coverage and effectiveness; and

? to share breastfeeding programme resources towards achieving fertility limitation goals.

Why breastfeeding programmes should promote family planning –

? to avoid disruption in breastfeeding in a lactating woman who is no longer amenorrheic, due to another unwanted pregnancy;

? to decrease infant mortality rate associated with high fertility and decreased nutritional status;

? to avoid “overlap” of pregnancy and lactation and its adverse effects on mothers and Infants’ nutrition; and

? to share family planning resources towards achieving breastfeeding promotional goals.

Challenges Ahead

Reflecting on the important relations between breastfeeding, family planning and nutrition, the Symposium agreed a statement – subsequently endorsed by the ACC – as shown in the introduction. This emphasized the practical steps now needed – the challenges ahead.

How can programmes promoting breastfeeding and those encouraging the use of family planning be more complementary? Although an integrated approach has been stressed, breastfeeding has only infrequently been promoted in population projects. Because of political, religious or cultural sensitivities, nutrition programmes have often been hesitant to promote family planning use. Dr Huffman was of the view of the view that in reality while most developing countries are now stressing the need to develop a more integrated approach “once at a clinic or community level, family planning services are still quite separate from nutrition and health activities, even though their impacts are mutually beneficial”, and that few programmes link nutrition and family planning activities. It is no longer a lack of rationale, but programmatic and policy constraints that have continued to prevent more linkages between the two.

One important obstacle preventing more linkages is that the two programmes address different targets – “family planning programmes focus primarily on women while nutrition programmes focus principally on the child”. Breastfeeding promotion naturally addresses both the mother and the child, and results in benefits for population and nutrition programmes. The conclusions of the Symposium emphasized four priorities for improving integration. An underlying issue is one of policy: the need for organizing different programmes to be mutually supportive notably in promoting breastfeeding. This would then lead to detailed aspects of implementation, such as providing a similar message from different field workers, ensuring appropriate referrals during and after pregnancy, and so on. Importantly leading on from this, the training of health and family planning workers should take account of new efforts for integration. Getting more specific to breastfeeding (in the third point at the end of the statement) the very real constraints to breastfeeding experiences in many countries need to be more widely recognized, and tackled. Within this, sensitivity is needed to the competing demands on women’s time, including her need for income-earning work outside the home, which impinge on her choice of infant rearing practices, particularly breastfeeding. Finally, all this requires resources, not only for implementation, but also for research and gathering relevant information.

The Symposium thus emphasized the importance of training both health and family planning workers, before they can educate and encourage mothers to take full advantage of breastfeeding potentials. Training and retraining of the medical and health professionals in numerous fields is necessary to support breastfeeding, and to take into account the special needs of lactating women when offering them other contraceptives. In Indonesia, the National Family Planning Coordinating Board has launched a programme to train counselors and family planning field workers to educate women about the nutritional and contraceptive benefits of breastfeeding. Education is key in promoting the use of breastfeeding for contraception. Research in this area in the Philippines has shown that through appropriate education programmes women can be encouraged to increase the duration and intensity of their breastfeeding behaviour. The participants in the SCN Symposium felt that it is only through training and education that women can make an informed choice, free from the negative influences of the mass media, advertisements and attitudes which may inadvertently raise barriers to breastfeeding. Policy makers, programme managers and health authorities should equally be informed to set priority to relevant policies and practices and to channel necessary resources. A supportive environment should be created in which breastfeeding can be continued and reinforced in harmony with other responsibilities in and out of household.

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CHAPTER 2: Nutrition and Family Planning Linkages: What More Can Be Done?

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Abstract

We have learned much over the last 20 years about the rationale for integrating nutrition and family planning activities. Both data from the World Fertility Surveys and the Demographic and Health Surveys have illustrated clearly the benefits of increasing birth intervals to reduce infant and child mortality. Improvements in both maternal and child nutrition have also been shown to be related to increases birth spacing. Few programmes, however link nutrition and family planning activities. Is it a lack of rationale that has prevented more linkages? More likely, programmatic and policy constraints have continued to prevent linkages between the two.

Perhaps the greatest constraint to the linkage of activities has been the focus of the programme: whether it serves women or children. Family planning programmes focus primarily on women while nutrition programmes focus principally on the child. Rather than spend another 20 years justifying and stressing the need to link family planning and nutrition activities, we may have more success if we start with a intervention that integrates both nutrition and population issues: breastfeeding promotion. Breastfeeding naturally addresses both the mother and the child, and it results in benefits for population programmes by increasing birth intervals and for nutrition programmes by enhancing child growth and reducing infection.

We now have documentation of how programmes can successfully integrate breastfeeding promotion with family planning. By replicating such activities we may convince programme managers that linking additional nutrition and family planning activities will have benefits for both. This could then allow future linkages to be approached with more optimism, so that in another 20 years, more such examples will be common place.

Introduction

Much has been said and written over the last 20 years about the possible linkages between nutrition and population programmes. Much of the debate in the 1970s centered around whether an “integrated” approach could be as successful as a “vertical” approach, with family planning given the primary emphasis. The early 1980s saw community based contraceptive distribution (CBD) programmes being a focus, and in some for example in Indonesia, they expanded to include growth monitoring because CBD workers were unsatisfied only offering family planning services. Subsequently, Child Survival activities gained predominance with targeted interventions primarily focused on diarrhoea treatment and immunizations. While family planning and nutrition were seen as part of the Child Survival strategy, family planning was able to keep its integrity because of continued high levels of funding, and strong commitment on the part of policy makers and programme managers. Nutrition however played little role in the Child Survival programme, although considered one component, little funding was provided.

We are now seeing a switch back to a more stated “integrated” approach with population funds feeding into large scale Ministry of Health programmes. Most developing countries are now stressing the need to develop a more integrated approach to the provision of health, nutrition and family planning. However, once at a clinic or community level, family planning services are still quite separate from nutrition and health activities, even though their impacts on mortality are mutually beneficial.

Nutrition and Health Impact of Fertility Reduction

We have learned much over the last 20 years about the rationale for integrating nutrition and population activities. Both data from the World Fertility Surveys and the Demographic and Health Surveys (DHS) have illustrated clearly the benefits for infant and child mortality of increasing birth intervals. As the duration of the preceding birth interval increases within an individual country, the mortality rates decrease (Haaga, 1990). We also have clear evidence for an association between increased birth intervals and child nutritional status (Figure 1). Analyses of DHS data for Northeast Brazil, Burundi and Sri Lanka show that short preceding birth intervals are significant predictors of stunting (low height for age) in preschool children after controlling other socio-economic variables including residence, parent's education and survival of preceding child, and breastfeeding status (Sommerfelt *et al.*, 1989).

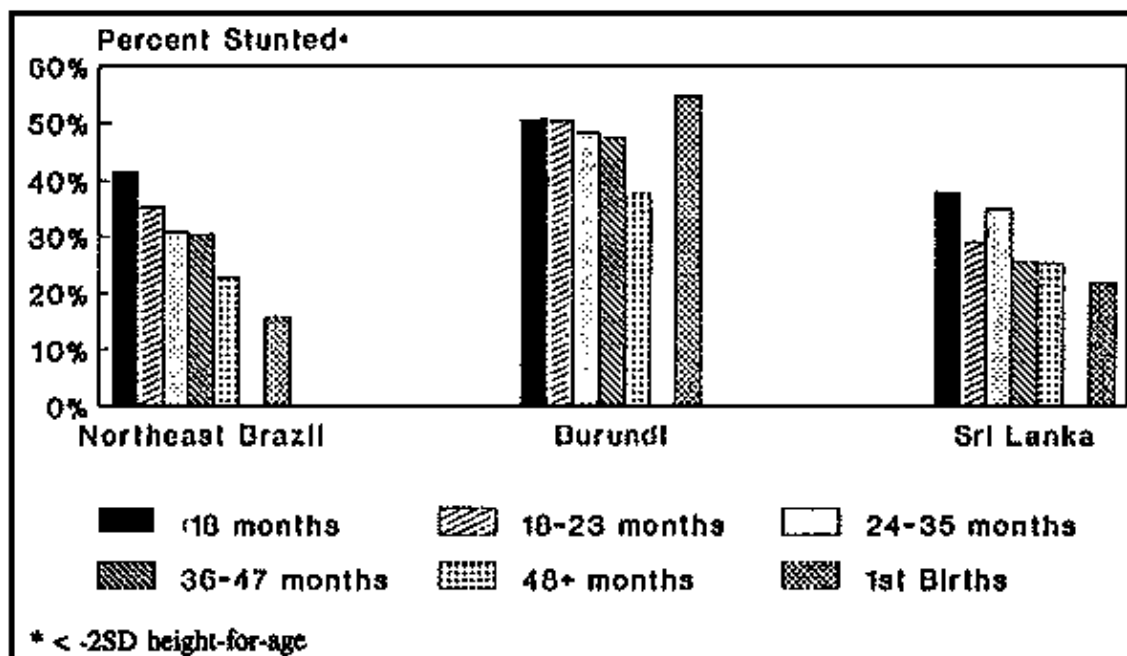


Figure 1. Height-for-age for Preschool Children: Percent Stunted by Preceding Birth Interval

Source: DHS, 1991

Births occurring to older women and women of higher parity are also at increased risk to mortality (Haaga, 1990). The relationship of parity and birth interval duration on child mortality and child growth probably have similar causation. They may be related to a competition for food and child care in the household, or because such an infant may be more likely to be born at low birth weight due to depletion in the mother's nutritional reserves.

We also have more information of the health benefits for women of delayed child bearing, extended intervals between births and reductions in high parity births and births to older women (NAS, 1989). Grand multiparae have higher rates of anemia and malpresentation of births, and are at much higher risk of dying during childbirth than younger women of lower parity except for first births (Haaga, 1990, International Safe Motherhood Conference, 1987).

Such results add further emphasis to previously reported data (Winikoff and Brown, 1980; Winikoff and Sullivan, 1983; Huffman, 1984, Zeitlin *et al.*, 1982; Mosley and Chen, 1984). Numerous conferences and reports by international agencies have emphasized the importance of family planning for the health of women and children or the importance of nutrition programmes to promote increased child spacing (Better Health for Women and Children through Family Planning, 1987; International Safe Motherhood Conference, 1987; Measham and RoCHAT, 1988, Berg, 1973; Berg and Brems, 1990).

Most studies illustrate that the health impacts of family planning will be greatest by extending birth intervals. For example, Trussell and Pebley, (1984) showed that infant mortality would decrease by 10% and child mortality by 21% if all births were spaced at least two years apart. This can be compared to a 5% fall in each if childbearing were limited to maternal ages of 20-34, and a 4% decrease if fourth and higher births were eliminated. To be more effective, family planning programmes need to emphasize extending birth intervals. This will have additional benefits for child and maternal nutrition and health.

However while family planning programmes have been more successful in reducing higher parity births, they are not generally associated with increasing birth intervals. In fact, based on analyses of 39 WFS countries comparing low (0–10% of married women of reproductive age), medium (10%–40%) and high (40–60%) rates of contraceptive prevalence, the percent of births that have a birth interval less than 2 years, *increases* from 25% for countries with low contraceptive prevalence to 30% and 36% for higher contraceptive use countries, respectively (Bongaarts, 1987, Haaga, 1989).

Family planning has had its greatest success in terminating births, with 20% of couples in developing countries using sterilization (Mauldin and Segal, 1986). Worldwide, over one-third of effective modern contraceptive use is through sterilization. Sterilization terminates child bearing and thus does not lead to increased birth intervals with the important health benefits associated with enhanced birth intervals.

Family planning programmes have been inhibited in their ability to extend birth intervals. Nutrition programmes have generally been hesitant to promote family planning use often because of political or cultural sensitivities. This is certainly not due to a lack of rationale that has prevented more linkages between nutrition and population programmes. It would be helpful if we could address both concerns simultaneously by promoting an intervention that extends birth intervals in both programmes that is not subject to the constraints that have affected both nutrition and family planning programmes in the past.

Family planning programmes focus primarily on women (with men served only to a small degree). Nutrition programmes focus principally on the child. While women are those that need to carry out any proposed nutrition or health intervention, and are those who usually bring the child to receive services (whether they be curative care, growth monitoring, Vitamin A distribution, etc), the focus of attention is either on the mother or on the child. Even in the US, where family planning services provided by the government are often offered within the same clinics as those offering nutrition services for women and children, they are often offered on different days. It is more common that they are offered by different clinics. A current advocacy position in the US is the attempt to provide “one stop shopping” so that we can improve the linkages between nutrition and family planning here as well.

Rather than spend another 20 years justifying and stressing the need to link family planning and nutrition activities, we may have more success if we start with an intervention that integrates both nutrition and population issues: breastfeeding promotion. Breastfeeding naturally addresses both the mother and the child, and it results in benefits for population programmes by delaying the return of fertility and for nutrition programmes by enhancing child growth and reducing infection.

Breastfeeding Promotion in Nutrition and Health Programmes

The importance of breastfeeding promotion for child nutrition has been well acknowledged, but new research over the last several years has enabled the quantification of the substantial health benefits of exclusive breastfeeding during the first 6 months of life on the prevention of diarrhoeal morbidity and mortality. In urban slums in Brazil, the risk of mortality from diarrhoea was 25 times higher in infants 0–2 months of age who were not breastfed compared to those who were exclusively breastfed (Victora *et al.*, 1987). Each additional feed of milk or *non-milk liquids* such as tea or juice was associated with a higher risk of dying from diarrhoea. This study also showed a decreased risk of mortality from acute respiratory illnesses (ARI) and other illnesses for infants who were breastfed compared to non-breastfed infants. This risk of dying from ARI was nearly 4 times as high for non-breastfed infants compared to those who were fully breastfed.

Additionally, recent studies in urban Peru and in urban and rural Philippines have shown benefits for diarrhoeal morbidity of exclusive breastfeeding and of any breastfeeding. In Peru, infants who received only herbal teas and other non-nutritive waters, had twice the risk of having diarrhoea than those who only received breastmilk (Brown *et al.*, 1989). Popkin *et al.*, (1990) report an increased relative risk for diarrhoea during the first 2 months of life of 17 for non-breastfed infants in urban areas compared to those exclusively breastfed, and a relative risk for infants receiving breastmilk and non-nutritive liquids 3 times that of exclusively breastfed infants. They also noted that the risk was even higher in urban areas, despite higher access to health care. In these same studies, breastfeeding has been shown to be effective in preventing acute respiratory tract infections.

Diarrhoea and ARI account for the majority of deaths among infants, and thus its health impact can not be over emphasized (Huffman and Steel, 1989).

We also know that malnourished mothers are able to produce sufficient amounts of breastmilk during the first few months of life to maintain adequate growth in their infants (Huffman and Combest, 1988). What about the

impact on the mothers themselves? Some have suggested that women's health may suffer and that "researchers should examine the real conditions under which women live before recommending for or against breastfeeding in a particular circumstance" (Sadik, 1990). But what are the alternatives? If women under poor conditions do not breastfeed, infant mortality rates will increase, and for the individual women, the drain on her health of repeated short pregnancies associated with infant death may be worse than that of longer birth intervals and extended breastfeeding (Huffman, 1990). The risk of her own death under the high rates of maternal mortality seen in poor settings is much greater than the risk of sustained breastfeeding. Rather than pose the issue of whether women should be encouraged to breastfeed, it would be better for both maternal and child health to ask how we can improve maternal nutritional status.

As shown by Merchant and Martorell (1988), an increased interval helps the mother recover her nutritional reserves. The best way for her to do so, aside from the fertility reducing effect that breastfeeding provides, is to extend the interval between births by family planning. The most common reasons for termination of breastfeeding are a subsequent pregnancy or a subsequent child death (Thapa, 1989; Labbok, 1990; Huffman *et al.*, 1980). Once menses returns, contraceptive use is needed to prevent another pregnancy. Thus nutrition programmes need to consider linking with family planning activities to help protect breastfeeding by providing contraception to the breastfeeding mother who is no longer amenorrheic. Data from the DHS survey shown in Figure 2 illustrate that from 4% to 24% of women 6 months postpartum are neither amenorrheic nor using contraception.

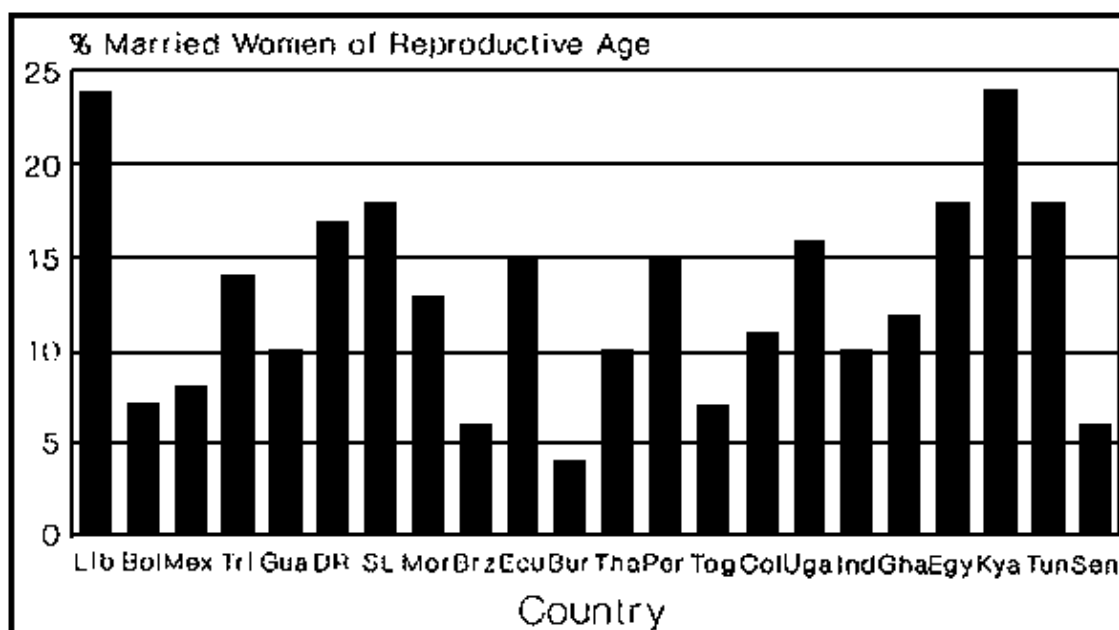


Figure 2. Breastfeeding/Not Amenorrheic and Not Using Contraceptives at Six Months Postpartum

Source: DHS, 1991

As Merchant (1990) has shown, another common occurrence is the overlap of pregnancy and breastfeeding, with associated high energy demands for the mother. The use of appropriate family planning would be an important step to help restore the mother's nutrient reserves.

We therefore know clearly now that the promotion of exclusive breastfeeding is an important nutrition and health intervention for infants. Where can promotion of breastfeeding be supported? Health professionals in numerous fields need to have basic knowledge, not only on breastfeeding's benefits, but how to manage it so that women can successfully breastfeed. Obstetricians and midwives who deliver infants provide an important link between birth, immediate breastfeeding, and during postpartum visits, when family planning also needs to be a part of the visit.

Where are there examples of nutrition programmes that support family planning activities? Integrated primary health care activities offer both, but even vertical programmes have also been shown to combine breastfeeding support and family planning information. In two breastfeeding promotion projects in Honduras and Guatemala, referrals are provided by breastfeeding counselors to family planning. In addition, exclusive breastfeeding is being taught as a family planning method, with the signs of return of fertility taught to breastfeeding women. Referrals to family planning services are offered so that women who choose to use breastfeeding as a family planning method, will know where to obtain additional protection.

A recent study conducted in San Pedro Sula in Honduras, showed that combining the promotion of breastfeeding with the promotion of family planning can lead to increases in both (Canahuati, 1989). The project included the creation of combined breastfeeding and family planning clinics, along with training of health professionals and changes in hospital practices. Along with pre-natal, postnatal and postpartum counseling, mothers received a discharge pack with pamphlets reinforcing messages of breastfeeding and family planning, and a sample of family planning methods, including 10 condoms and foam or tablets. Results of the project showed that exclusive breastfeeding at 3 months increased from 14% to 23% and use of modern methods of contraception increased from 54% to 68% at 6 months postpartum (Canahuati, 1990). The duration of postpartum amenorrhea also increased substantially.

Breastfeeding Promotion in Family Planning Programmes

Why should family planning programmes promote breastfeeding? We know that exclusive breastfeeding is highly effective during the first 6 months of life, when the lactational amenorrhea method is used. Since many women do not want to use contraception until menses has resumed, promotion of the breastfeeding practices that will optimize the fertility reduction effect of breastfeeding should be an important family planning objective. Keeping the current child alive of course is another important goal for family planning workers, because a child death is likely to be soon followed by another birth. We also have historical examples of increases in fertility associated with the decline in breastfeeding (Dyson, 1988). Theoretical calculations have also shown the large increase in contraceptive use that would be need with decreases in breastfeeding (WHO/NRC, 1983; Thapa *et al.*, 1989).

We also know that the promotion of breastfeeding is not associated with decreases in modern use of contraception. For example, in Honduras the promotion of breastfeeding through the PROALMA project in the 1990s resulted in increases in breastfeeding, with concurrent decreases in total fertility in conjunction with increases in contraceptive use (Bailey *et al.*, 1988).

The need for family planning programmes to include breastfeeding as an option is illustrated by data from both the WFS and the DHS which show a large proportion of women at six months postpartum who neither are amenorrheic nor using contraception. For example in Mexico where family planning usage is relatively high (51% of married women of reproductive age at 6 months postpartum), the DHS found that 16% were not breastfeeding nor using contraception (Figure 3). There is therefore a role for exclusive breastfeeding and its contraceptive effect for women currently protected by neither. Data from the other DHS countries illustrate a range from 2% to 18% of such women (Figure 4).

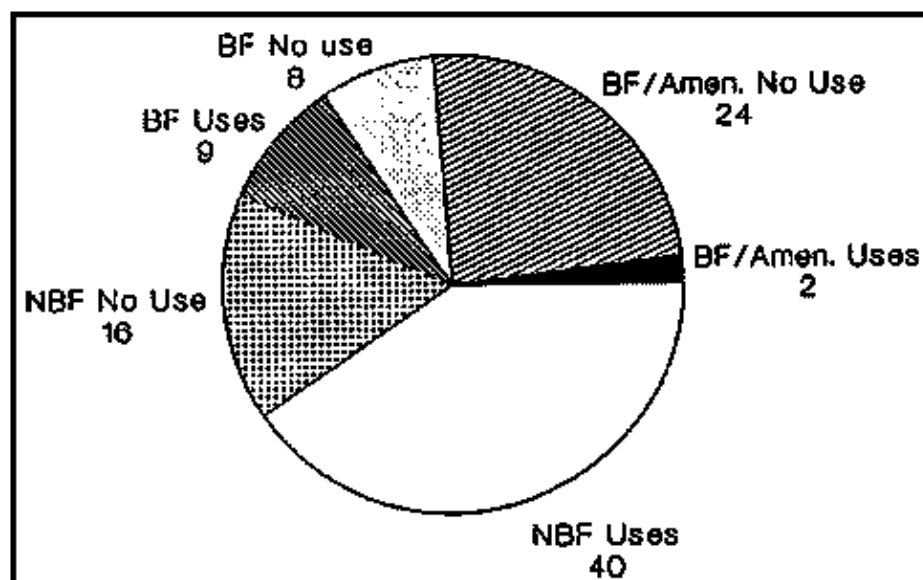


Figure 3. Breastfeeding and Contraception At Six Months Postpartum – Mexico, 1987

Source: DHS, 1991

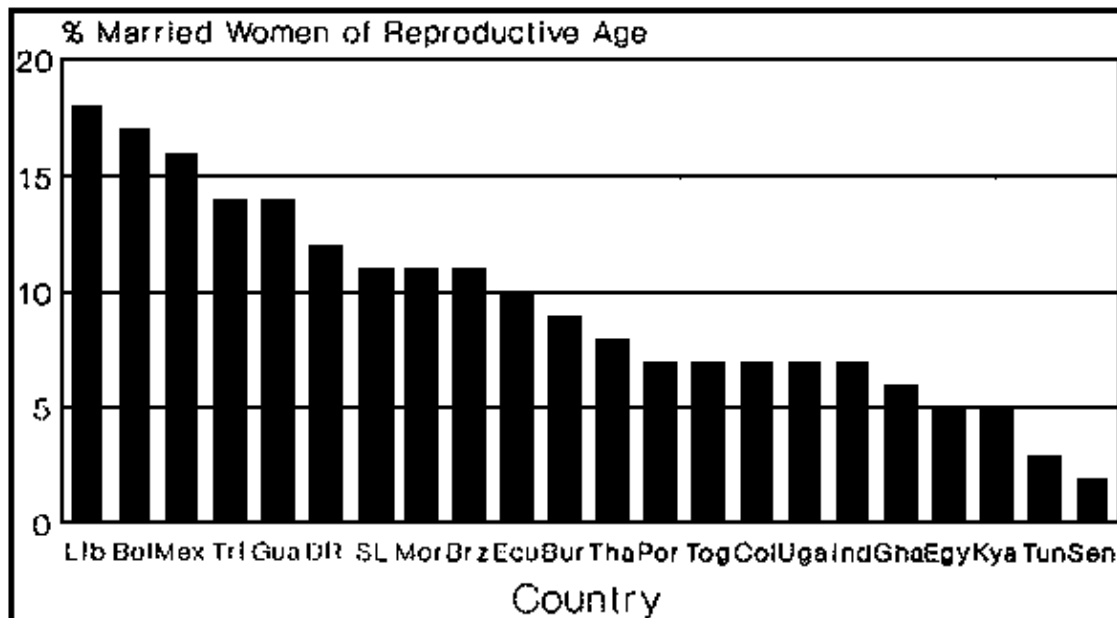


Figure 4. Not Breastfeeding and Not Using Contraceptives at Six Months Postpartum

Source: DHS. 1991

The amenorrhea associated with breastfeeding also has an important role in protecting women not using contraception. In Mexico, of the 48% of women 6 months postpartum not using contraception, half were amenorrheic (DHS, 1991). In Senegal, a country with low rates of contraceptive use, at 6 months postpartum, 82% were not using contraception, but nearly 90% of those were amenorrheic.

Postpartum family planning activities provide an important focus for breastfeeding education. Health workers in family planning programmes need to be sensitive to the impact that contraceptives can have on breastfeeding. Many programmes refuse to provide family planning, especially birth control pills, until a woman stops breastfeeding (Labbok, 1989). This often is associated with earlier termination of breastfeeding (Potter *et al.*, 1987). While estrogen containing pills should preferably not be prescribed for breastfeeding women, especially in the first 6 months postpartum, if no other suitable contraceptives are available, their use should not be restricted to breastfeeding women.

The promotion of breastfeeding within such programmes will help in this impact, using a method that has additional benefits with little costs and few logistics. Where oral contraceptives or barrier methods are the common methods used, discontinuation and poor use effectiveness can limit the success of programmes.

Promoting exclusive breastfeeding with its high effectiveness, can lead to more successful family planning programmes (Jennings, 1990). In the last several years, much new information has emerged on the benefits of exclusive breastfeeding and associated lactational amenorrhea. A recent conference in Bellagio reviewed several clinical studies that assessed the impact of lactational amenorrhea on conception. The results showed that 2% of women became pregnant while amenorrheic during the first 6 months postpartum when they were fully breastfeeding (Family Health International, 1988). Based on these results, the Lactational Amenorrhea Method (LAM) is being promoted to be an additional method for use in family planning programmes (Labbok, 1990). This method is being tested in pilot projects in Mexico, Chile, Ecuador, and Honduras (Labbok, 1990). In Chile, preliminary data show a use effectiveness pregnancy rate of less than 2%. This can be compared to a use effectiveness rate of 3%–20% for oral contraceptives (Potter and Williams–Deane, 1990).

Conclusion

While there have been some successes in integrating nutrition and family programmes during over the last 20 years, many of the suggestions made over the last two decades have not been implemented. The most successful linkage between family planning and nutrition over the last 10 years, has in fact been the DHS survey. The first phase of the DHS conducted nationally representative surveys of women between ages of 15–49 in 30 countries between 1984–1989 (Rutstein and Sommerfelt, 1989). Twenty of these surveys included child anthropometry. The second phase of DHS will be conducted between 1988–1993, and most will contain anthropometric measures. The added information that has been collected on morbidity, mortality and nutritional status is most encouraging. When data on both family planning and nutrition needs are

available within the same survey, then they are most likely to be used to affect policies affecting population and nutrition.

One reason for the inclusion of nutritional issues in the DHS was the concern for need for more data on breastfeeding and amenorrhea. We can use this as a model to further integrate nutrition and family planning activities by promoting breastfeeding, with subsequent benefits for maternal and child health and fertility reduction.

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Comments

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As Dr Huffman has demonstrated so ably in her paper, family planning and nutrition programmes are synergistic resulting in improved health and survival of both mother and child. Improved maternal and child health by definition (since mothers and children constitute 60% or more of the population of developing countries) is an integral component of population and development planning. Characteristic of populations of the Third World, as we all know, is a young age composition, early age at first marriage and first birth, high fertility and birth rates, low educational attainment (especially amongst women) and low income levels (again especially amongst women). Each of these characteristics has been shown to be associated with impaired maternal and child health.

Governments in most Third World countries have, in the face of all this documentation, increasingly related over the past ten years or so, to what has been called “the human face” of development. They have responded with increased emphasis on agriculture and improved nutrition, maternal child health and family planning programmes, and increased emphasis on educational programmes both formal and non-formal.

The status of women is being influenced for the better by a number of factors: national and international. At the national level, migratory patterns result in more and more female-headed households and farmers; economic realities stimulate the active promotion of the private sector and integration of the non-formal sector within the private sector. All of which is leading to increased recognition of the role of women in national development. International development policies, fuelled by the arguments of the women’s movement in developed countries, reinforce this pressure building at national level. Women-in-development programmes recognize the need for fertility control, improved female health and nutrition as well as child health and child survival.

Ironically, it seems to me, it is the issue of breastfeeding in relation to women in development that presents a dilemma for maternal, child health and family programmes. Breastfeeding for the first year (and preferably the first two years of a child’s life) has been recognized as a child survival intervention affordable to even the lowest income populations. However, breastfeeding takes mother’s time – time that is needed to improve her status through income-generation activities and time that is needed to improve her role in national development. This conflict weakens significantly the links between breastfeeding and family planning programmes and is fuelling a need for increased dependence on contraceptive use to regulate fertility. This is the issue that has caused the most opposition to adoption and implementation of the Code on the Marketing of Breastmilk Substitutes.

However, in the area of delaying the number of adolescent pregnancies, the linkage between nutrition and family planning appears to be unassailable worldwide. The need for an individual to complete physical (not to mention psychological) growth is readily acceptable. So is the need for adequate maternal nutrition prior to conception and delivery. In fact, this appears to be the most widely accepted rationale for child spacing. Child spacing is also universally accepted as being an intervention appropriate for preventing childhood malnutrition.

Family planning programmes benefit from these nutrition linkages. Indeed, our experience in Ghana is that family planning as a vertical programme is not acceptable: our IPPF affiliate. Planned Parenthood

Association of Ghana (PPAG), in 1987 initiated an Integrated Nutrition, Intestinal Parasite and Family Planning project in a pilot area. Four years after its inception, the pilot project is recording contraceptive use rates of 20% and more compared to the national rate of 5% (achieved 20 years after the National Family Planning Programme).

With the increased awareness created by Women in Development Programmes, we are tending to lose sight of the fact that in many developing countries, it is not only the situation status of women and children that is low. Men are also affected, albeit to a lesser degree.

In many developing countries there is a growing demand for male involvement in family planning (a recognition of existing male dominance in decision making). Linking nutrition and family planning would appear to address this issue of male involvement in family planning given the fact of female-dominated methods of contraception.

In summary, nutrition and family planning linkages need to be viewed in relation to other population programmes before the true synergism of their relationship can be demonstrated.

CHAPTER 3: Reproductive Stress and Women's Nutrition

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Review of the literature on reproductive stress and nutrition indicate that researchers have focused on influences on fetal and infant outcomes and have paid little or no attention to the possible repercussions of reproductive stress on the nutrition of women. This is a serious gap in the literature which should be corrected.

The term "maternal depletion syndrome" has appeared frequently in the literature since Jelliffe and Maddocks used it in 1964. These authors proposed that a syndrome of impairment results from the increasing and cumulative nutritional stresses of successive pregnancies and lactation periods, apparently moved to use a dramatically descriptive name by the very poor physical condition of women living in a remote mountainous region of Papua–New Guinea.

The term "maternal depletion syndrome" has been used as a descriptor of the consequences of frequent childbearing under difficult living conditions and as an explanation for other relationships. For example, short birth intervals are associated with increased child mortality in several populations and maternal nutritional depletion has been postulated as a possible mechanism for this relationship. Not only infant mortality, but also low birthweight, child growth retardation, and increased morbidity are attributed sometimes to the effects of nutritional depletion of mothers.

While the term has been useful to call attention to an under-studied subject, the use of the word "syndrome", which generally refers to clinical conditions identified by specific signs and symptoms, has led to debates as to whether the syndrome exists or not. The debate has not gone far since there is no agreement on the nature of the syndrome and therefore, no way of estimating its occurrence. In fact, most support for the existence of a syndrome has been indirect, based on inferences from studies of the repercussions of reproductive stress on maternal nutritional status. It is proposed that the word "syndrome" be avoided and that instead, the effects of reproductive stress on women's nutrition be regarded as a continuum, to be measured in terms of the range of outcomes which are understood to relate to nutrition, such a diet, body composition and biochemical indicators. Also, a more interesting question is not whether maternal nutrition is affected by reproductive stress but under what circumstances effects are noted and to what degree and in what aspects.

The results to be shown below come from an unusually rich and widely-known study, the INCAP longitudinal study. The Institute of Nutrition of Central America and Panama, better known as INCAP, conducted research from 1969 to 1977 in four villages of eastern Guatemala. The villages were poor. There was convincing evidence of marked growth retardation and of high prevalence of infectious diseases, particularly diarrhoeal diseases in young children. The intent of the INCAP study was to document the effects of improved nutrition on the physical and mental development of children. As part of the research design, mothers and children were provided with food supplements. Pregnancies were monitored through home visits every two weeks. Pregnant women were scheduled for a variety of measurements, including diet and anthropometric exams. Newborns were weighed within the first 24 hours and children were studied longitudinally using a rich battery of physical and developmental tests.

The research focused on the examination of women actively exposed to different degrees of reproductive stress. To achieve this aim, it was found helpful to focus on the energy demands imposed by reproductive events as depicted in Figure 1. At one extreme are women free of reproductive stress. If women are neither

pregnant or lactating, all available energy will be devoted to physical activity and work or to meet the basic metabolic needs of maternal tissues. If dietary energy intake is insufficient to meet total energy demands, tissue stores will be used as fuel. Alternatively, excesses of intake will lead to tissue deposition. Potential repercussions of previous reproductive behavior such as increased work demands due to child care and the need to replenish body stores used during recent reproductive events are ignored in this discussion.

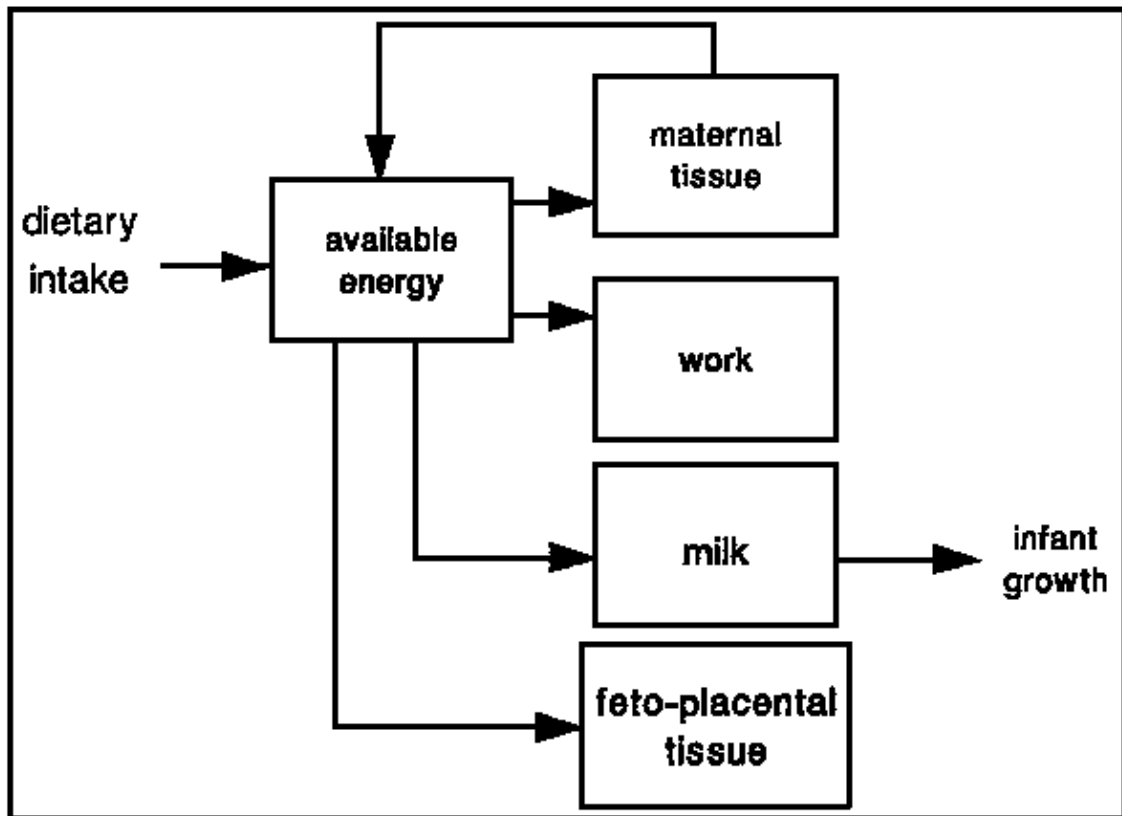


Figure 1. Energy Flows During Pregnancy and/or Lactation

According to current recommendations put forth by FAO, WHO and UNU, women need an additional 350 kcal during the last six months of pregnancy to meet the demands of fetoplacental tissue growth and maintenance (WHO, 1985). Assuming a baseline intake of 2000 kcal, this amounts to an increase of about 17% in energy intakes. In reality, many women in developing countries do not eat appreciably more during pregnancy. In fact, for reasons that are not entirely clear, intakes during the third trimester of pregnancy may be even lower than prior to pregnancy. Pregnancy, therefore, is an energetically stressful phase in developing countries.

Lactation is even more demanding than pregnancy in energy terms. Current recommendations assume that women will use energy derived from 4 kg of fat accumulated during pregnancy. This reserve is expected to provide about 200 kcal/day during the first six months of lactation. In addition, FAO, WHO and UNU recommend that dietary intakes during the first six months of lactation be increased by 500 kcal/day, representing an increase of approximately 25% over the non-pregnant, non-lactating state (WHO, 1985). In reality, many women begin lactation with notably less than the expected amount of fat reserves or even with a net loss of fat. Moreover, their energy intakes, while frequently greater than those of non-pregnant women, often fall substantially short of the recommended.

What if women are faced with pregnancy and lactation simultaneously? This would result, surely in a pronounced degree of reproductive stress. The flow of energy would proceed along all pathways identified in Figure 1. That is, in addition to the ordinary needs of women, this situation would demand energy for milk synthesis as well as for fetal and placental tissues. But, can this situation occur and with sufficient frequency to permit study? The answer is yes to both questions.

The notion that pregnancy and lactation can occur simultaneously is so startling that it deserves some comment. Lactation and pregnancy are generally studied as separate phenomena. To an extent, these physiological states are incompatible because of the antagonistic effect produced by their corresponding hormonal controls. For example, the steroids of pregnancy inhibit the onset of lactation; breastfeeding in turn delays cyclic ovarian activity through poorly understood hormonal mechanisms. However, pregnancy and lactation can and do overlap. Lactation is not prevented by pregnancy if it has been established before

conception.

In traditional societies with long durations of lactation, conceptions will occur despite breastfeeding. This is not to negate the fact that breastfeeding generally prolongs the period of postpartum amenorrhea. Ovulation may be delayed for many months but eventually it will reappear in women who breastfeed, generally after the introduction of other foods to the infant's diet. Therefore, in societies where the use of artificial contraceptives is rare, many women will become pregnant while breastfeeding unless there are strong taboos against sexual intercourse during the period of lactation.

Behavioral studies in the Third World indicate that pregnancy is cited frequently as a reason for weaning (Vis and Hennert, 1978). The belief is widespread that pregnancy and lactation are incompatible states. For example, breast milk sometimes is viewed as harmful to the fetus; conversely, pregnancy sometimes is thought to spoil or damage the milk. The fetus, the toddler, or even the mother may be viewed as being at risk if pregnancy and lactation overlap. But, overlap is probably common because many women may not realize they are pregnant for several months after conception. Also, not all women may choose to wean their children upon discovering they are pregnant.

Surprisingly, little is known (Merchant and Martorell, 1988) about the frequency and extent to which pregnancy and lactation overlap. Where information is available, however, indications are that overlap is a common occurrence. A study of breastfeeding practices in Central Java found that 40% of the mothers who weaned their children were known to be pregnant (Bracher and Santow, 1982). In Senegal, 30% of the study sample who were breastfeeding became pregnant. A substantial proportion of these women continued to breastfeed a previous child: 62% were breastfeeding at 3 mo, 19% at 6 mo, and over 4% breastfed into the ninth month of pregnancy and beyond (Cantrelle and Leridon, 1971). It was estimated by use of cross-sectional data from Bangladesh that 12% of the women who were pregnant at the time of one survey also were breastfeeding a previous child. The cumulative probability of lactation during pregnancy was calculated using data from several successive surveys in the same study. These calculations indicate that among women who were pregnant and breastfeeding a previous child, 45% continued breastfeeding through the sixth month of pregnancy and nearly 20% were breastfeeding at the beginning of the ninth month (Huffman *et al.*, 1980).

The INCAP prospective data set permits careful estimation of the extent of overlap for a rural Guatemalan sample. These estimates are based on 504 pregnancies for which complete information was available. The results are that overlap occurred in 50.2% of the sample. Overlap was defined as two or more weeks of breastfeeding during pregnancy.

There was substantial variability in Guatemala in the duration of overlap (Figure 2). In 56% of cases of overlap, breastfeeding was confined to the first trimester of pregnancy. In 41% of cases, breast-feeding continued into the second trimester. In 3% of cases, breastfeeding continued into the third trimester. Obviously, some women must have known they were pregnant but made a conscious decision to continue breastfeeding, at least for some time. Others may have weaned their infants immediately after discovering their state. Unfortunately, ethnographic information necessary for understanding how women in Guatemala view the phenomenon of overlap were not collected.

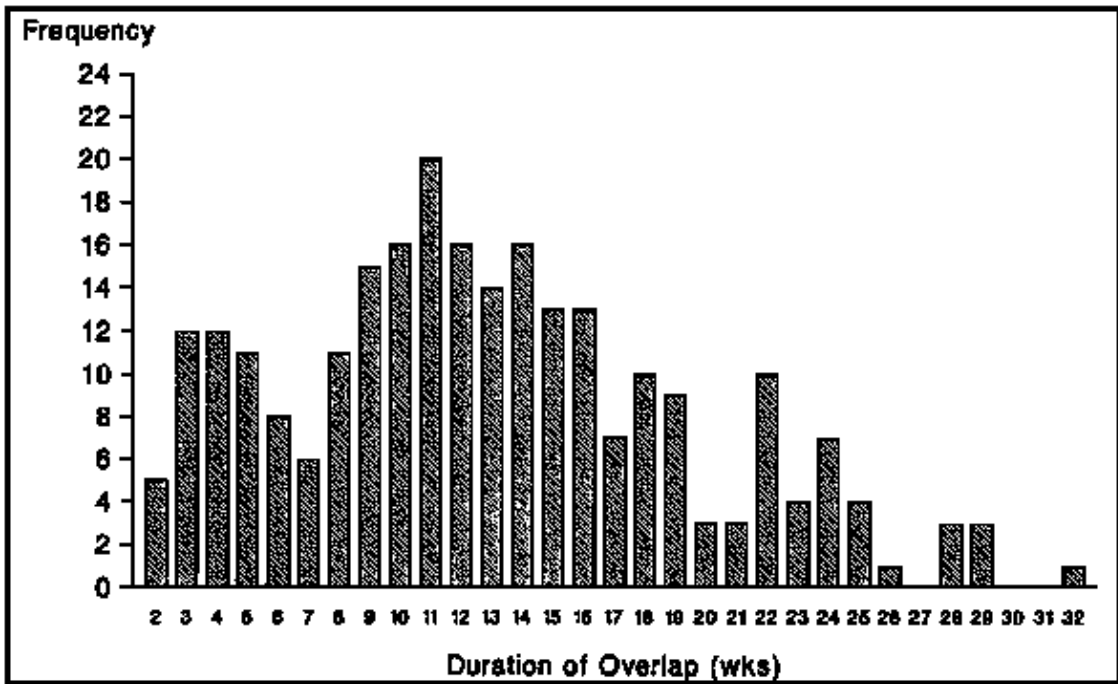


Figure 2. Duration of Overlap of Lactation with Pregnancy (n=253)

To fully appreciate the nature of the stresses brought on by overlap, the components of the birth interval in pregnancies with and without breastfeeding need to be examined. A representation of a common pattern seen when there is no overlap is shown at the top of Figure 3. The extremes of the interval are defined by the first and second pregnancies (P_1 and P_2). Two components separate one pregnancy from the other. The first is the period of lactation (L) which can vary widely in duration and the second is the recuperative interval (R). The latter is an important component for it represents a time when active reproductive stress is absent and therefore, an opportunity for maternal stores to be replenished. Ideally, both long durations of lactation as well as long recuperative intervals are desired.

When overlap occurs, the nature of the birth interval changes dramatically as shown in the bottom of Figure 3. The lactation interval may be shortened considerably. Overlap (O) may extend through part or all of the second pregnancy. Also, when overlap occurs, the recuperative interval is absent. Thus, there are two potential consequences when overlap occurs: energy demands are pronounced due to the simultaneous challenges of pregnancy and lactation and there is a loss of the recuperative interval, leading to reduced energy stores available during pregnancy.

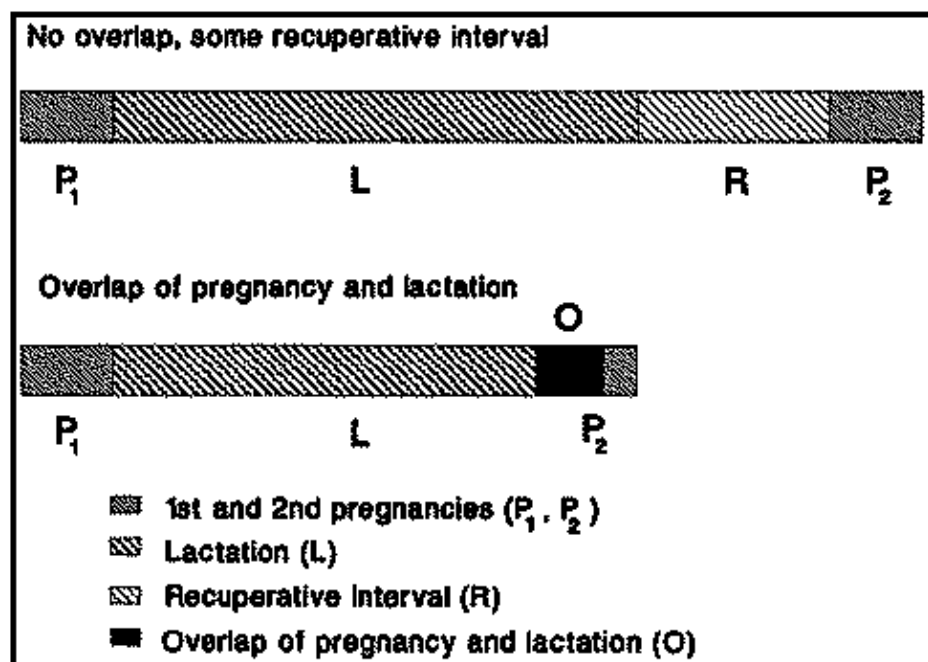


Figure 3. Reproductive Interval Components

After considering the characteristics of the birth interval, four groups which vary in the degree of reproductive stress experienced were constructed (Table 1). Groups 1 and 2 refer to pregnancies where no overlap occurred. Group 1 refers to cases where the recuperative interval exceeds 6 months in duration whereas Group 2 includes cases with shorter birth intervals. Groups 3 and 4 involve overlap and hence in these, the recuperative interval is absent. Group 3 involves overlap only during the first trimester of pregnancy whereas Group 4 involves a longer duration of overlap. Clearly the degree of stress increases from left to right and is least for Group 1 and greatest for Group 4.

Table 1: Nutritional Stress During Pregnancy

	Group 1	Group 2	Group 3	Group 4
Recuperative Interval	Long (> 6 months)	Short (<6 months)	Absent	Absent
Overlap	Absent	Absent	Short (1st Trimester only)	Long (2nd or 3rd Trimester)
Stress	+	++	+++	++++

In a series of publications, the implications of reproductive stress on mothers and infants have been examined in analyses which use all groups (Merchant, Martorell and Haas, 1990a, 1990b; Martorell and Merchant, 1990). In this brief report, only the extreme comparison between Groups 1 and 4 is presented.

It will be recalled that the women in the study were provided with liquid food supplements. These were available twice a day and in any desired amount. Consumption of these supplements was carefully measured each time and very precise measures of daily energy intake from the supplement are available.

Striking differences were found between supplement intake of least and most stressed pregnancies (Figure 4). These differences were evident throughout pregnancy but were most pronounced during the first trimester. Differences during the first trimester amount to about 80 kcal per day. Interestingly, intake levels were similar at three months postpartum. This lends support to the view that the increased consumption was driven by a greater energy demand during pregnancy. It should be added that there were no differences between least and most stressed mothers in home dietary intakes, measured through 24-hour recall surveys every three months. These data may have lacked the necessary precision to allow us to detect small differences in intake.

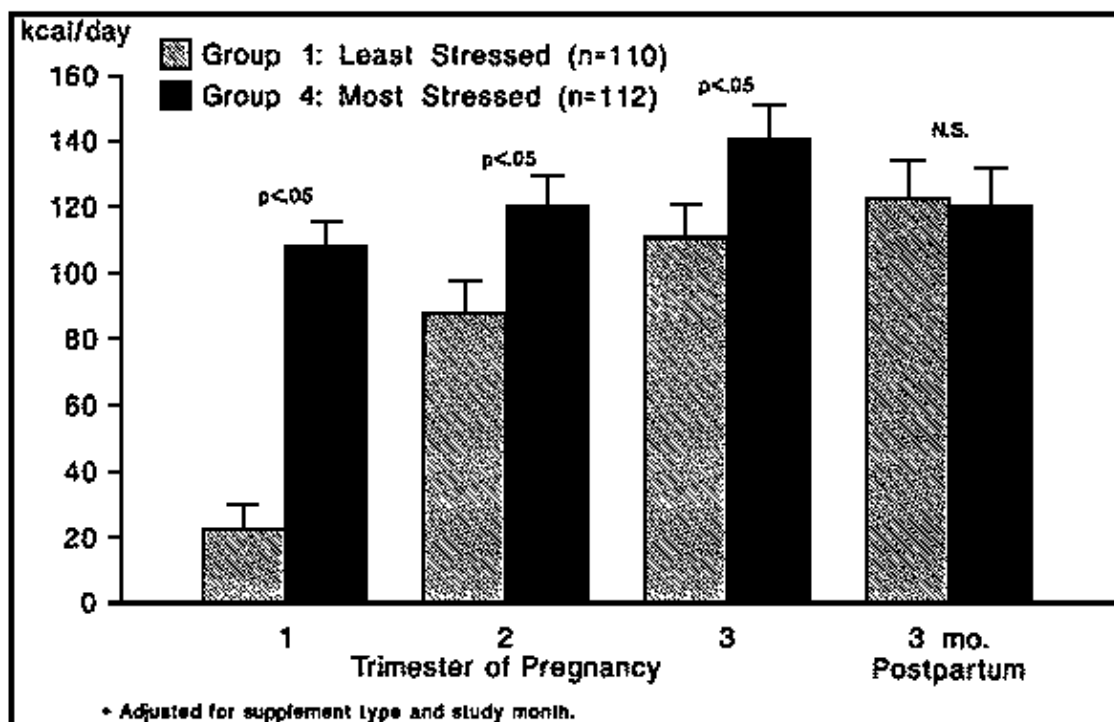


Figure 4. Supplement Intake (\bar{x} + SEM) in Least and Most Stressed Mothers⁺

⁺ Adjusted for supplement type and study month.

The thickness of the thigh fatfold was used as an indicator of maternal fat stores (Figure 5). It was found that thigh fatfold thicknesses were lower in most as opposed to least stressed mothers. This occurred in spite of the increased supplement intake of the most stressed mothers. Again, differences were most pronounced earlier in pregnancy; at three months postpartum, fatfold thicknesses were similar in both groups. The interpretation of the thigh fatfold data becomes more complex when the results of all four comparison groups are considered. See Merchant *et al.*, (1990a) for a detailed description and possible interpretation of these data.

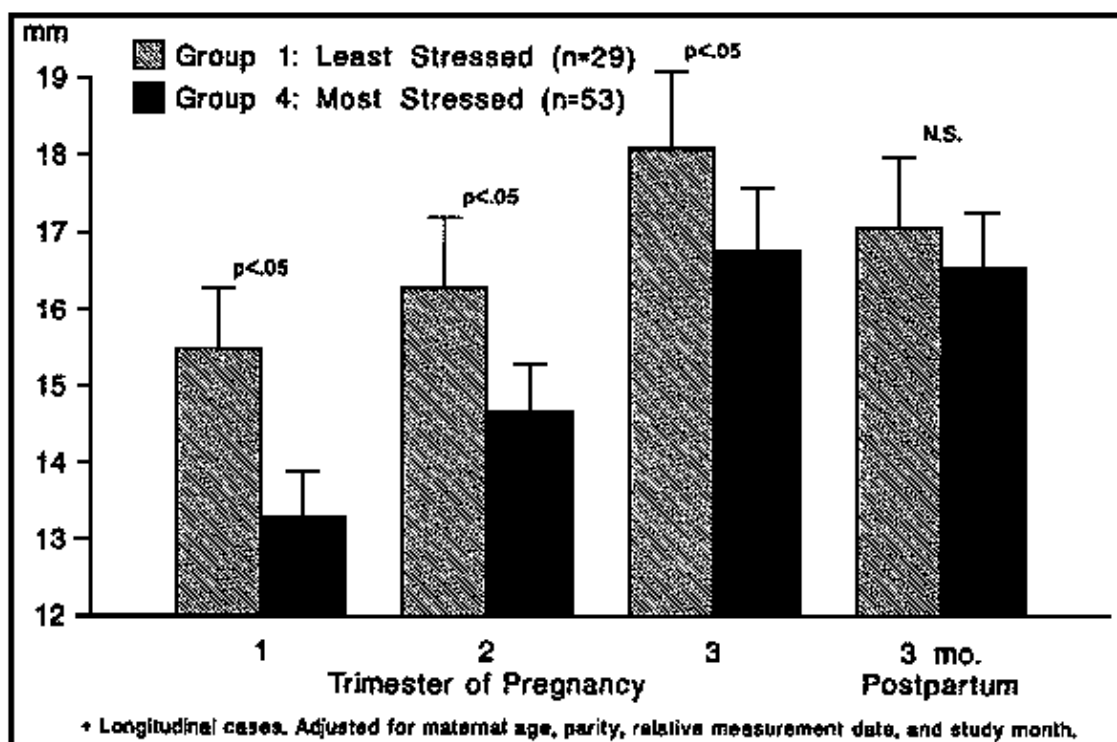


Figure 5. Maternal Thigh Fatfold Thickness (\bar{X} + SEM) for Least and Most Stressed Pregnancies⁺

⁺ Longitudinal cases. Adjusted for maternal age, parity, relative measurement date, and study month.

Comparison of the mean birthweight corresponding to least and most stressed pregnancies shows a difference of 115 g in the expected direction (Table 2). This difference is statistically significant if a one-tail t-test is carried out. Since clear directionality was hypothesized, a one-tail test may be appropriate. When the response to reproductive stress was examined in consecutive pregnancies of the same woman the difference in birthweight between the two groups of stress could not be confirmed, perhaps because this sub-sample was too small. See Merchant *et al.*, (1990b) for more information.

Table 2: Birthweight (g) in Least (Group 1) and Most (Group 4) Stressed Pregnancies⁺

	<i>Least</i> (n=85)	<i>Most</i> (n=103)
Mean	3,204	3,089
SEM	51	51
Difference	115 g t = 1.68	

⁺ Adjusted for sex and gestational age of newborn and for maternal height, age and parity.

Differences in growth between infants arising from least and most stressed pregnancies were also examined (Table 3). At one year of age, infants from least stressed pregnancies were larger than those from most stressed pregnancies. This was the case for length, weight, and head circumference. In all cases, the differences were statistically significant.

Table 3: Infant Size ($\bar{x} \pm \text{SEM}$) at 1 Year of Age from Least (Group 1) and Most (Group 4) Stressed Pregnancies⁺

	<i>Least</i> (n=78 to 90)	<i>Most</i> (n=84 to 95)	<i>Difference</i>	<i>t</i>
Length (cm)	69.08 + 0.31	68.34 + 0.30	0.74	1.72
Weight (kg)	7.96 + 0.12	7.68+0.11	0.28	1.70
Head Circumference (cm)	44.28 + 0.15	43.85 + 0.15	0.43	2.02

+ Adjusted by sex of the child, type of supplement and maternal height.

Discussion

It was found that half the pregnancies in the Guatemalan sample studied involved 2 or more weeks of breastfeeding and that many women breastfed well into the second trimester of pregnancy. Two types of pregnancies were compared which represented the extremes of active reproductive stress in the study population. One was subjected to the lowest level of stress and involved women who benefitted from a recuperative interval of 6 or more months prior to pregnancy. The other group was subjected to the highest level of stress and included women who breastfed into the second trimester of pregnancy or beyond. To emphasize, one group was not exposed to overlap and had a long recuperative interval and the other had no recuperative interval and had a long duration of overlap. We find that both maternal and fetal outcomes were affected. Maternal intakes rose but fat stores declined in women exposed to the greatest amount of reproductive stress during pregnancy. Birthweights were lighter and infant sizes were smaller for the group of mothers exposed to the greatest amount of stress during pregnancy. Thus, a consistent pattern of effects in the expected direction was detected.

What are the policy implications of the study? First, there is the phenomenon of overlap. These results and those few gleaned from the literature suggest that the overlap of pregnancy and lactation is quite common in traditional societies in the Third World. It is surprising that no one had called attention to this condition. Should overlap be avoided? What are mothers confronted with overlap to do? The answers depend partly on what the effects of overlap are on mother and child. The results presented suggest small but consistent adverse effects on mothers and children. This should not be taken to mean that overlap is harmless. The Guatemalan population was receiving supplements and this probably offset some of the reproductive stress on maternal fat stores and fetal growth. Also, as poor as the Guatemalan population was, there are populations that are markedly worse off elsewhere. Women and children in many regions of the world may show more dramatic repercussions arising from overlap than observed in Guatemala. Clearly, this is an issue that deserves to be explored in future research. Obviously, the condition of overlap should be prevented. Breastfeeding is not an effective means of birth control once any of the following three events occur: the infant becomes older than 6 months, the mother resumes menstruation, or the infant ceases to be fully breastfed (Kennedy *et al.*, 1989). Therefore, alternative methods should be used once one of these events occurs. This way, not only will overlap be prevented, but a long recuperative interval will be made possible. But what if overlap occurs anyway? What can one recommend to mothers? This is a difficult question. To answer it properly one should consider not only the health of the mother and her fetus but that of the older infant being breastfed, an issue not yet explored in this study. Whether to wean the child or not might depend partly on the age and health of the breastfed child and on the nutritional status of the mother. If the child is more than say 18 months of age and in good health, then the mother might be encouraged to wean the child to encourage adequate fetal growth and maternal fat reserves. Alternatively, the child might be younger and malnourished. If the mother is able, perhaps she should continue to breastfeed in these cases. If the mother decides to continue breastfeeding, for whatever reason, then she should be encouraged to eat substantially more, particularly energy rich foods. Clearly, no satisfactory answer to the problems posed by overlap can be given presently. The safest course is to avoid it through effective family planning programmes.

Earlier, it was stated that it would not be productive to try to define the signs and symptoms of a syndrome. Rather, it is proposed that researchers focus on the effects of reproductive stress on a continuum of women's nutritional status. This study shows strong evidence that reproductive stress *does* affect women's nutritional status, and subsequent infant growth under certain conditions (Merchant *et al.*, 1990a; Merchant *et al.*, 1990b; Martorell and Merchant, 1990). Therefore, the question is not *whether or not* maternal nutrition is affected by reproductive stress, but rather under what circumstances are effects noted and to what degree and in what aspects. Within this framework, the research reported here merely begins this process.

Acknowledgements

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Comments

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The concept of maternal depletion, that is the idea of the confluence of poverty and recurrent reproductive cycling on the nutritional status of women and children have been a focus of concern over the last three decades. A recent report of the NAS National Research Council on the effects of short birth intervals focused our attention on the potential importance of this topic by stating that maternal depletion is one of the important potential pathways by which repeated reproductive cycles affect maternal and infant health. Only recently have researchers begun to try to quantify carefully the various dimensions of reproductive stress on the mother and the infant.

Women in less-developed countries experience repeated pregnancies followed by long periods of lactation. Up to 60% of their reproductive life is spent being pregnant or lactating. The length of lactation is key determinant of the percentage of time under reproductive stress. In the past much of our attention has been on the effects of these patterns on pregnancy outcome and infant health. Only recently have researchers begun to examine the effects on the health of the mother. In addition most of the early research has focused on the effects of short birth intervals, or the length of the recuperative interval.

The presentation of Drs Martorell and Merchant on concurrent states of pregnancy and lactation fits into this larger topic. They provide evidence of a pattern of reproductive behaviour which has heretofore been largely ignored. They show that a large proportion of pregnant women in their sample fit into the role of pregnancy concurrent with lactation, by presenting data revealing this as a pattern found in Central Java, Senegal and

Bangladesh. My colleague Linda Adair and I looked at the data from a prospective study of over 3300 pregnant women representative of the Cebu region of the Philippines. We find a similar incidence of the proportion of pregnant women who lactate concurrent with pregnancy. Our incidence level is 46.2% with a higher overlap in rural than urban areas. Most of this occurs before the women were aware they were pregnant; we found a median duration of overlap of 10 weeks. This is a high proportion for such a potentially nutritionally compromising state. Most important is that a small percentage of our women continued to breast-feed their infant throughout their entire pregnancy. The nutritional status of these women must have been severely compromised.

Other researchers have tried to disaggregate the reproductive pattern and examine its effects on maternal health. My colleague, Linda Adair and I are doing this. Among our preliminary findings are that very long duration breast-feeding is more likely to be associated with reduced maternal weight and body fat stores. Our work on this process is still in progress but points in the same direction as that reported by Martorell and Merchant and the NRC NAS report. This same research shows that dietary intake increases can easily offset the harmful effects of reproductive stress.

There is no doubt that there is a large potential for women of child-bearing age to be under considerable stress from pregnancy. The effects on the women themselves have only recently begun to be studied. It is clear that there is considerable potential for the woman to be nutritionally compromised by the reproductive process and we need to study this phenomena more carefully as noted by Drs Martorell and Merchant, the National Research Council, and others. At the same time, as we have found in our research, the harmful effects of pregnancy and lactation can be offset by improved maternal energy intake.

The lesson of this symposium is obviously that lactation has important health and family planning benefits and we must consider programmes which should accompany breast-feeding promotion programmes which pay attention to the needs of women.

CHAPTER 4: Breastfeeding, Fertility and Population Growth

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Introduction

Humans belong to the Class Mammalia, one of whose distinguishing features is that the newborn young are totally dependent on their mother's milk for survival. Today, many people have come to regard breastfeeding as an inconvenience, and in one way or another we have been trying to circumvent this biological activity since the dawn of civilization. But breastmilk is our birthright. Breastfeeding has been honed to perfection by millions of years of natural selection, so it is hardly surprising that the premature abandonment of breastfeeding carries heavy penalties for both the mother and her baby. The mother loses the natural contraceptive protection afforded by breastfeeding, and if her children are born too close together their chances of survival are seriously impaired. The mother also loses the protection that breastfeeding can give against the development of ovarian and breast cancer in later life; breast cancer has now become one of the commonest women's cancers in developed countries. The baby loses both short-term and long-term protection against gastrointestinal and respiratory diseases; diarrhoea is the commonest cause of infant morbidity in developed countries, and mortality in developing ones. Bottle fed babies are also much more likely to develop fatal necrotizing enterocolitis, and to be prone to a whole range of allergies in later life, and may even be less intelligent than their breastfed counterparts, and more likely to develop early age onset diabetes.

Since breastmilk is both the cheapest and the best food ever devised for human infants, why has it taken us so long to appreciate its many benefits? What were the historical factors that led to the abandonment of breastfeeding?

The History of Breastfeeding

Aristotle, writing in 350 B.C., had this to say of breastfeeding:

“Women continue to have milk until their next conception; and then the milk stops coming and goes dry, alike in the human species and in the quadrupedal vivipara. So long as there is a flow of milk the menstrual discharges do not take place as a general rule, though the

discharge has been known to occur during the period of suckling.”⁽¹⁾

Thus Aristotle had a clear understanding of the phenomenon of lactational amenorrhoea, and he also appreciated that menstruation could return even though the woman was continuing to breastfeed. He even commented on the contraceptive effect of lactational amenorrhoea:

“While women are suckling children menstruation does not occur according to nature, nor do they conceive; if they do conceive, the milk dries up”.⁽²⁾

The fact that if a woman became pregnant whilst lactating, her milk secretion would cease, is an important point to which we will return later.

Since the dawn of civilization, we have been interfering with the normal pattern of breastfeeding^(3,4). Even the Pharaohs used wet nurses for rearing their children. Both Moses and Mahomed owed their lives to wet nurses after they were rescued from the bullrushes. The earliest known feeding bottles for administering animal milks to human infants date from about 4000 B.C., and large numbers of these feeding vessels of different designs were found in children’s graves all over Greece and Italy; perhaps they had unknowingly been the cause of the infant’s death in many instances. The suckling of human infants by animals was also a common theme in mythology – Romulus and Remus, the twin founders of Rome in the 8th Century B.C., were suckled by a wolf, and Zeus was suckled by a goat.

Table 1 summarizes some of the evidence⁽³⁾ about the ages at which babies were weaned from the breast in the ancient world. It is interesting that although most Egyptians, Babylonians and Hebrews traditionally breastfed their children for about 3 years, the wealthier Greeks and Romans hired slaves as wet-nurses to take over this duty. In Plato’s *Republic*, he advocates the rearing of all children in creches by wet nurses, “while taking every precaution that no mother shall know her own child”. The bonding effect of breastfeeding was evidenced by the lifelong attachments that were often formed between children and their wet nurses, sometimes at the expense of the child’s relationship with its natural mother⁽⁴⁾; this was the reason why many Roman philosophers and moralists such as Pliny, Plutarch and Tacitus spoke out so strongly against wet nursing.

Table 1: Age of Weaning in the Ancient World

<i>Culture</i>	<i>Age (months)</i>
Pharaonic Egypt	36
Babylonian	36
Hebrew	36
Greek	6 wet nursing contract
Roman	6–36 16 wet nursing contract
Byzantine	24
Islamic	24

In the Middle Ages, medical writers began to recommend earlier and earlier ages at weaning (see Table 2), and there was much interest in the development of paps, panadas and gruels as early weaning foods⁽³⁾. Gradually, the administration of these foods, referred to as “dry nursing”, came to be regarded as an alternative to wet nursing for the artificial rearing of infants, although the mortality rates associated with this practice were staggeringly high. Nowhere was this more evident than in the Foundling Hospitals, established in most of the big cities of Europe to care for illegitimate, abandoned or orphaned children. Table 3 summarizes the figures for just 3 of these institutions. The Dublin Foundling Hospital functioned more like a slaughterhouse. Many Foundling Hospitals were opened in Italy between the 11th and 15th centuries, supported by the Church, and it is particularly fitting that the Florence Foundling Hospital, the *Spedale degli Innocenti*, should have given its name to the 1990 U.N.–sponsored Innocenti Declaration on the Protection, Promotion and Support of Breastfeeding⁽⁵⁾. With our new-found knowledge about the manifold benefits of breastfeeding, perhaps we can begin to redress the centuries of abuse of this practice.

Table 2: Ages of Weaning Recommended by Early Medical Writers

<i>Date</i>	<i>Weaning age (months)</i>
1540 – 1584 (4 authors)	24 – 36
1612 – 1699 (7 authors)	12 – 24
1729 – 1748 (5 authors)	8 – 24
1753 – 1799 (13 authors)	6 – 12

Table 3: Mortality Rates in European Foundling Hospitals in the 18th Century

<i>Hospital</i>	<i>Dates</i>	<i>No. of deaths and % of mortality</i>		<i>Method of Feeding</i>
London	1741–59	7,833	56%	wet nursing
Paris	1773–77	25,476	80%	wet nursing
Dublin	1775–96	10,227	99.6%	dry nursing

It was an Eighteenth Century English physician, Dr. W. Cadogan, often regarded as the Founding Father of Paediatrics, who probably determined many of our present-day attitudes to breastfeeding. He was Physician to London’s Foundling Hospital, and achieved fame by lowering the rates of infant mortality in that institution to around 56% by bringing in wet nurses from the surrounding countryside to breastfeed the inmates, in contrast to the dry nursing with paps and gruels that effectively killed 99.6% of the inmates of Dublin’s infamous Foundling Hospital. Cadogan published a pamphlet entitled “An Essay upon Nursing and the Management of Children from their Birth to Three Years of Age” in 1748⁽⁶⁾, and this 43 page treatise was translated into French and reprinted many times in England, France and America throughout the eighteenth century. It must have had an enormous influence on the attitudes of nurses and doctors to breastfeeding; many of Cadogan’s prejudices have persisted up until the present day. Some of Cadogan’s statements therefore bear close attention in the light of what we now know about human lactational physiology.

A large number of Cadogan’s observations were perfectly correct, and remarkably perceptive. For example, when speaking about when it first becomes necessary to supplement the diet of the breastfed baby, he says

“If I could prevail, no Child should ever be crammed with any unnatural mixture, till the Provision of Nature was ready for it; nor afterwards fed with any ungenial diet whatever, at least for the *first three months*: for it is not well able to digest and assimilate other aliments sooner.”

Most significantly, he goes on to say

“I have seen very healthy fine Children, that never eat or drank any thing whatever but the Mother’s milk for the first ten or twelve months. Nature seems to direct this, by giving them no teeth ‘till about that time.’”

The use of tooth eruption to indicate the time at which supplements should first be introduced into the diet of the breastfed baby makes sound physiological sense, and it is surely part of Nature’s design. For our hunter-gatherer ancestors, whose dental eruption patterns we have inherited, there were no special weaning foods available such as animal milks or cereal flour; the infant had to be supplemented with items from the adult’s diet, which would have required that the infant had teeth for biting and chewing. Table 4 summarizes the development of a child’s primary dentition. Maybe we should revert to tooth eruption as an excellent signpost for the mother about when to start supplementing the baby’s diet.

Table 4: Development of Human Primary Dentition

<i>Tooth</i>	<i>Age at Eruption (months)</i>	<i>Age at Root Completion (years)</i>
Central Incisors	6	1.5
Lateral Incisors	8	1.5 – 2
Canines	17	3.25

First Molars	13	2.5
Second Molars	22	3

But if Cadogan gave good advice about the timing of first supplement introduction, he gave manifestly bad advice about the frequency of breastfeeding:

“By night I would not have them fed or suckled at all, that they might at least be hungry in a morning. It is this night–feeding that makes them so over–fat and bloated. If they be not used to it at first, and, perhaps, awaked on purpose, they will never seek it; and if they are not disturbed from the birth, in a week’s time they will get into a habit of sleeping all or most part of the night very quietly; awakening possibly once or twice for a few minutes when they are wet, and ought to be changed. Their meals, and, in my opinion, their sucking too, ought to be at stated times, and the same every day; that the stomach may have intervals to digest, and the appetite return.”

This last sentence seems to have been the origin of those rigid feeding schedules, so well suited to a hospital’s routine, so ill–suited to the needs of the baby and its mother. In traditional hunter–gatherer societies, where the baby sleeps beside its mother, on the ground, it can feed at will throughout the night without even wakening its mother. Frequent feeding, both by night and by day, is the best way of increasing the mother’s milk supply, whilst at the same time ensuring that breastfeeding has its greatest contraceptive impact because of the frequent nipple stimulation. Night–time feeding became increasingly impractical and unpopular as we began to sleep on raised beds. The mother feared that the baby might fall out, or might be smothered by the blankets, so the baby was put into a separate cot. Then it began to cry when it wanted a feed, waking both husband and wife; so the cot was banished to another room, where the baby’s cries would be muted, at least to the husband’s ears. Thus began the irrevocable separation of the infant from its mother, subsequently reinforced by the advent of nannies, and more modern paraphernalia such as creches, perambulators, playpens and “dummies” or “comforters”.

Cadogan was at a loss to explain why breastfeeding was becoming so unpopular:

“Because most Mothers, of any condition, either cannot, or will not undertake the troublesome task of suckling their own Children; which is troublesome only for want of proper method; were it rightly managed, there would be much pleasure in it, to every Woman that can prevail upon herself to give up a little of the beauty of her breast to feed her offspring; though this is a mistaken notion, for the breasts are not spoiled by giving suck, but by growing fat.”

In today’s breast–conscious Western society, some women, and probably many men, secretly resent breastfeeding because of a fear, expressed in a recent letter by a male correspondent to the *Lancet*⁽⁷⁾, that it will inevitably result in drooping, saggy breasts in later life. But I have yet to meet a gynaecologist who could diagnose with conviction whether or not a woman had ever breastfed, based on a clinical examination of her breasts. Maybe we need some “Before and After” photographs of the breasts of breastfeeding and bottlefeeding women taken during youth and again in middle age to drive the point home to men and women alike. This might be more effective in changing Western attitudes than publicity about the manifold health benefits of breastfeeding. And since the Western, developed world is so often the trendsetter for change in the developing world, changing Western attitudes should be a most important objective.

Unfortunately, Cadogan’s idea about the optimal frequency of the baby’s breastfeeds was hopelessly wide of the mark:

“Four times in four and twenty hours will be often enough to give it suck”.

This would seem to be the origin of the 4–hourly feeds that some nurses and doctors have made almost a statutory requirement. But we now know that the breast is ingeniously designed to ensure that milk supply meets milk demand, and that the frequency of feeding is best determined by the baby. The mammary alveoli secrete an inhibitory peptide into the milk, and if the breast is not emptied frequently, the peptide will prevent further milk synthesis⁽⁸⁾. Normal suckling frequencies, as observed in!Kung hunter–gatherers, are about 4 times an hour⁽⁹⁾ – sixteen times the frequency advocated by Cadogan! Since the human breast, unlike the udder of the cow, does not contain a large storage area or milk cistern for the accumulation of all the milk secreted between feeds, its very anatomy tells us that it was designed for frequent feeding. The composition of the milk reinforces this. Mammals that feed their young relatively infrequently, such as once a day or less as in rabbits, hares, tree shrews, seals etc., have milk with a high protein and fat content; in contrast, humans,

with their incredibly slowly growing but frequently fed infants have a very low protein and a low fat content milk that is extremely rich in the carbohydrate lactose⁽¹⁰⁾.

Adoption of Cadogan's 4 feeds a day routine would make early introduction of supplements essential, since the baby would soon not be getting enough milk to sustain its needs. Four feeds a day is also not enough to provide long-term contraceptive protection; the breastfeeding mother on such a regime would soon become pregnant again. Reducing the suckling frequency in this way would therefore put at hazard not only the baby at the breast, which would be starved of appropriate nutrients and rendered susceptible to a range of diseases when supplements were introduced, but it would also endanger the life of the subsequent child, which would have been conceived prematurely. A new conception following too hard on the heels of a preceding birth leaves the mother with depleted energy stores, and so the growth rate of the fetus is reduced, resulting in the birth of a small-for-dates baby with impaired chances of survival⁽¹¹⁾ (see Fig. 1). And as Aristotle had correctly observed, a new pregnancy would soon dry up the mother's remaining milk supply, so that the older child might develop Kwashiorkor – originally a West African word, with the prophetic meaning "The evil eye of the child in the womb upon the child already born", used to describe the often fatal signs of protein and calorie malnutrition in infants.

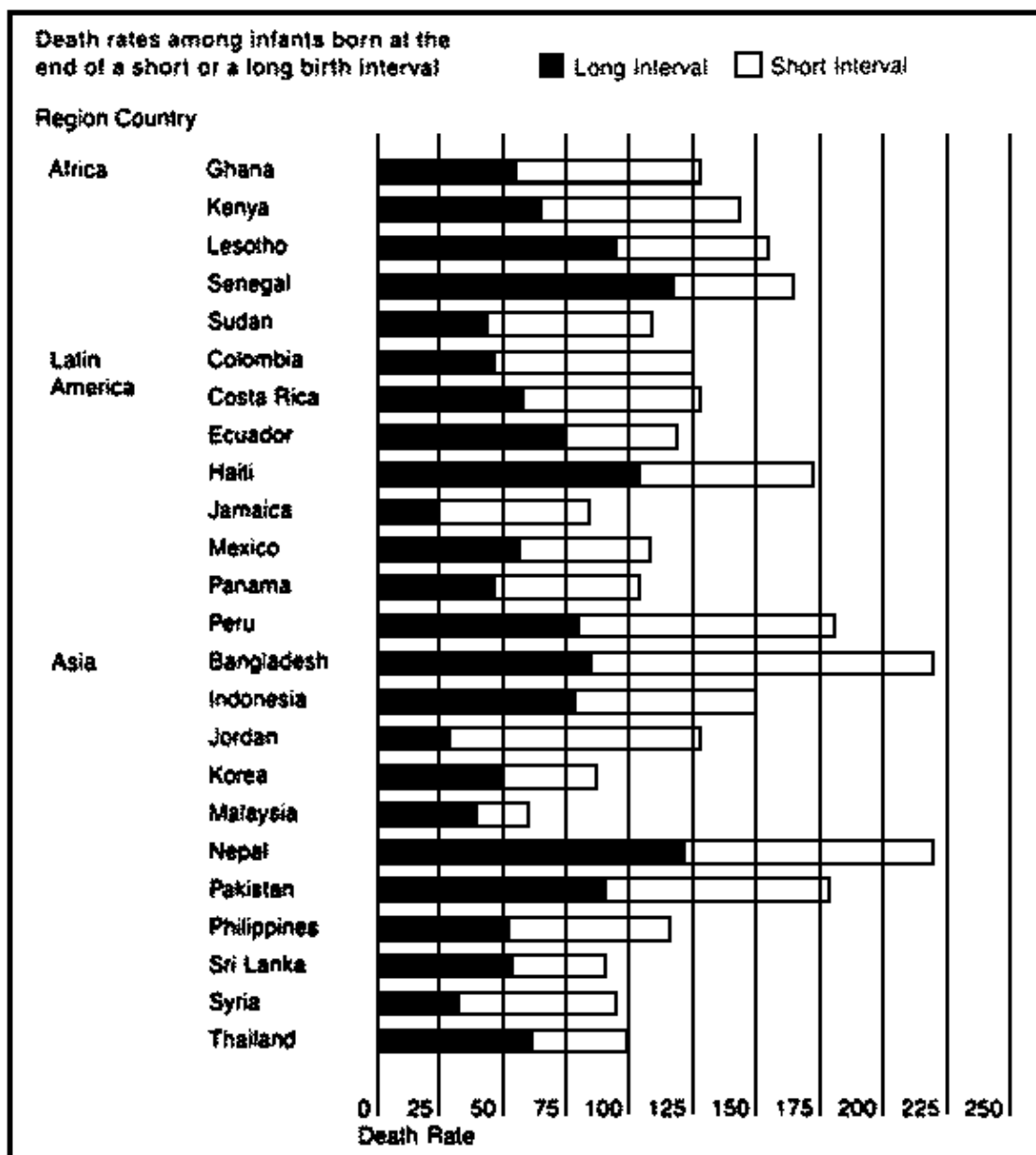


Figure 1. Annual mortality rates per 1,000 children aged 1–4 in 24 developing countries, depending on whether the child was born after a short (<2 years) or a long (2–6 year) preceding birth interval.

Source: Adapted from Chart 4 in Maine, O. and McNamara, R. (1985). *Birth Spacing and Child Survival*, Center for Population and Family Health, Columbia University.

Cadogan made only one brief mention of the contraceptive effects of breastfeeding, and this was in relation to criteria for the selection of appropriate wet nurses; he recommended using only those who have given birth less than 2–3 months previously, believing, incorrectly, that the milk was of little nutritional value if a woman lactated beyond a year, especially if her periods (catamenia) had returned:

“Nature intending a Child should suck about a twelvemonth, the milk seldom continues good much longer. About that time, Women in general, though they give suck, are apt to breed again; some, indeed, that are very sanguine, will breed sooner; these, notwithstanding their milk, are apt to be troubled with the *catamenia*, which disturb it greatly; and therefore are not so proper to be made Nurses of.”

In summary therefore, although Cadogan was a strong advocate of breastfeeding, it is ironic that some of his recommendations undermined many of its advantages for the mother and her baby.

The aristocracy, who were the trend-setters in European society in times past, had been quick to exploit the fact that the contraceptive effect of breastfeeding could be circumvented by the use of wet nurses, thereby making it possible for their wives to produce a child a year, even if many of the infants failed to survive (see Fig. 2). Large families were an advantage to royalty and the nobility, since by arranging the appropriate marriages of sons and daughters, the family could acquire wealth, power and influence.



Figure 2.

A seventeenth-century engraving of Sir Thomas and Lady Remmington of Lund, Yorkshire, with their 20 children five of whom evidently died in childhood. The skull in the bottom left foreground presumably indicates an additional late fetal death or stillbirth. Lady Remmington could never have produced so many children if she had breastfed them; she must have practiced the custom of the day and sent them out to be wet nursed.

The short-sightedness of using wet nurses, or artificial feeding with infant gruels, paps and panadas, was well known. Newcome⁽¹²⁾, in a late 17th Century pamphlet entitled “The Compleat Mother or, An earnest persuasive to all mothers (especially those of rank and quality) to nurse their own children”, had this to say on the subject:

“So vain is that popular pretence that nursing is an impediment to fruitfulness, and to be declin’d by great persons for the better securing of succession, by a numerous posterity: for if those bear faster who dry up their breasts, they that nurse their children commonly bear longer, and bring up more to maturity.”

Almost a century later, Mary Wollstonecraft⁽¹³⁾, the pioneer of the feminist movement, made a plea for breastfeeding in her book “Vindication of the rights of woman”:

“Nature has so wisely ordered things that did women suckle their children, they would preserve their own health, and there would be such an interval between the birth of each child, that we should seldom see a houseful of babies.”

But these admonitions went largely unheeded in the male-dominated societies of those times. Jean-Jacques Rousseau, the renowned French philosopher, and exponent of the idea that all goodness resided in primitive man, the Noble Savage, only to be corrupted by civilization, had a great influence on how middle- and upper-class parents reared their children following the publication of his book *Emile* in 1762. Rousseau was

greatly admired by Mary Wollstonecraft, but he set a pretty bad example by having all his own five children sent to a foundling hospital at birth, never to be seen by him again! In his later years, he made fruitless attempts to trace their whereabouts.

This reliance of the nobility on wet nurses may have had unforeseen consequences for family structure, surely a rich field of exploration for some future social historian. Remembering the Roman philosophers' concern for the powerful bonding of the infant to its wet nurse rather than to its natural mother, it is difficult to imagine a more traumatic succession of events that those that would take place during the early years of life of a young aristocrat. Despatched to a wet nurse, often many miles away in the countryside, within a few days of birth⁽⁴⁾, the mother might not see it again for a couple of years. The wet nurse, in the early months of her lactation, would be some poor country girl, probably unmarried, who had recently lost her own baby, or been forced to give it away, or even worse. She would naturally transfer all her maternal affection to this surrogate child, and could earn a reasonable living by caring for it. Imagine her grief when, at the end of this time, "her" child was taken away from her, never to be seen again. But imagine the greater grief of the child, forcibly removed from its adoring wet nurse, to be returned to a mother it did not recognize, a mother who herself would have had another one or two children in the interim, and who would have neither the time nor the inclination to give the child her undivided love and attention. What chance was there of ever re-establishing those broken mother-infant bonds? Little wonder that in such large, cold, impersonal extended families, children were often little more than chattels, to be bought and sold in marriage. Could it even be that the Age of Exploration was ushered in by such behavioural upheavals? Forsaking home and family for years on end to travel the world might have been a welcome escape from a loveless home environment.

There is even some evidence to suggest that wet nursing was a practice that was exported to the slave colonies of the Caribbean. Since slaves were worth money, the more babies a slave woman could produce the better. Thus it apparently became a practice to employ elderly wet nurses on the slave farms to rear several children at a time, so that the mothers could become pregnant again as soon as possible. When we look at breastfeeding practices in the independent Caribbean nations today, it seems significant that those with the lowest acceptance of breastfeeding are also those that were longest under the colonial yoke⁽¹¹⁾.

We can begin to get some idea of the consequences of the inappropriate artificial feeding of infants from Hugh Smith's "Letters to Married Women on Nursing and the Management of Children", published in 1772⁽¹⁴⁾. He tabulated the annual number of births registered in the City of London for each of the 10 years from 1762 to 1771, and related it to the annual number of burials of children. The averages worked out at 16,283 births per year, with 7,987 burials of children under the age of 2, and 10,145 burials under the age of 5. Thus almost half the children born in the City were dead within 2 years; he was in no doubt as to the cause of this staggering mortality:

"It is well known, that the thrush and watery gripes generally terminate their existence in the early months The thrush and watery gripes are, in the author's opinion, artificial diseases, and both of them totally occasioned by improper food, such as all kinds of pap, whether made from flour, bread, or biscuit; they all cause too much fermentation in an infant's stomach, and irritate their tender bowels beyond what Nature can support.... Let me then intreat those who are desirous of rearing their children, not to rob them of their natural breast. Would they wish them to be healthy and beautiful, let such mothers give suck: for even wet-nurses, we shall find, are very little to be depended upon".

How right he was.

The Uniqueness of Human Milk

The enormous infant mortality rate consequent upon the artificial feeding of babies with wholly inappropriate foods was a challenge to the nutritionists of the day. Some of the Foundling Hospitals, appreciating the benefits of wet nursing as opposed to dry nursing, started to experiment with animal milks in place of human milk. Some French hospitals even kept their own lactating goats and donkeys, and the babies were wheeled beneath them at feeding time, so that they could suck directly from the animal's teats⁽⁴⁾. But no milk from any domesticated animal comes close to the high lactose, low protein content of human milk, and so it was necessary to try and re-formulate the animal milk, to "humanize" it in order to make it more appropriate for the baby's needs. Thus was born the powdered milk industry, which is still trying, in vain, to turn cow's milk products into something that could pass for human milk. But even if we were able to emulate the chemical composition of human milk, it would be impossible to devise an animal milk with the unique biological properties of human milk.

Recent research has revealed the great subtlety of the enteromammary circulation⁽¹⁵⁾ (see Fig. 3). The mother stores up an immunological memory of all the pathogens ingested during her life, a memory that is retained in specific γ cells in the Peyer's Patches, large aggregates of lymphoid tissue lying in the mesentery of the small intestine. During lactation, probably under the influence of the hormone prolactin, these γ cells migrate via the blood circulation and come to rest in the mammary gland (and also the salivary glands). There, they become transformed into plasma cells, which secrete immunoglobulin A into the breast milk in enormous quantities – up to $\frac{1}{2}$ gm a day in the early months of lactation. This immunoglobulin is scarcely absorbed by the baby, but remains in the gut lumen, where it can prevent organisms attaching to the gut wall and setting up an inflammation. The mother is constantly biopsying her environment through her mouth, and should she swallow a pathogen to which her γ cells have previously been sensitized, she will immediately start excreting large quantities of the appropriate neutralizing immunoglobulin in her milk.

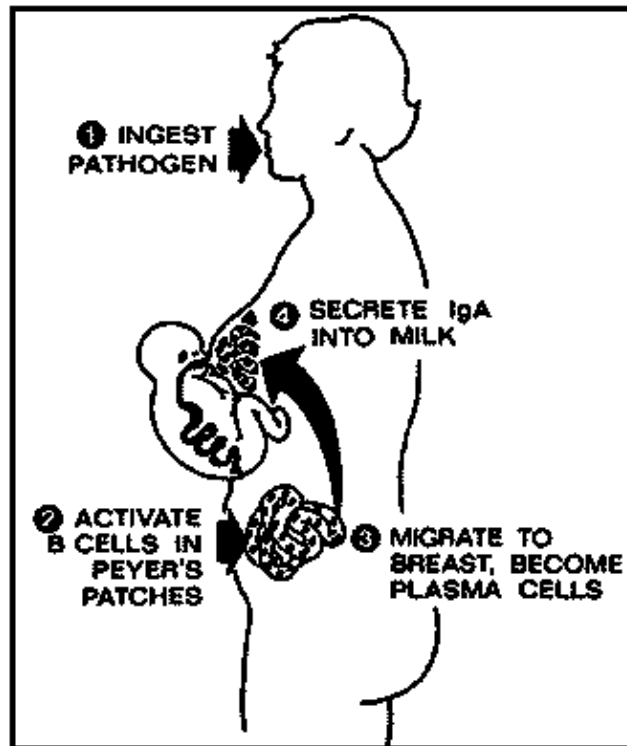


Figure 3. The Entero-Mammary Circulation

The ingestion of a pathogen by the mother results in the activation of previously sensitized B lymphocytes in the Peyer's patches of her small intestine. These migrate in the blood stream to the breast, where they develop into plasma cells secrete into the milk a specific immunoglobulin A directed against the pathogen. This antibody is ingested by the baby, and is neither absorbed nor destroyed, but remains in the gut lumen, where it protects against gastroenteritis.

There is even one further twist to this remarkable story; many animals including the higher primates will lick the faeces of their infants during suckling, thereby biopsying their excreta for signs of pathogens. Although humans do not normally indulge in coprophagia because of our revulsion at the smell of our own faeces, it seems significant that women universally find the smell of the faeces of exclusively breastfed babies not the least unpleasant, so there is no need to wash your hands if the baby defaecates on you. Thus even in humans, there is ample opportunity for the mother, albeit unknowingly, to swallow any pathogen that here baby may be excreting, and subsequently passively immunize the baby against the organism with a specific IgA excreted in her breast milk.

Thus human breast milk is a living, dynamic secretion, changing in composition in response to the baby's needs. There is no way that any manufacturing process could ever tailor-make a synthetic milk to meet the different immunological demands of each and every infant.

The uniqueness of breast milk is not confined solely to its immunological composition. Recent research has shown that human breast milk also contains a high concentration of epidermal growth factor⁽¹⁶⁾, in contrast to cow's milk which contains relatively little. This may have a vital role to play in the post-natal maturation of the infant's gastrointestinal tract. The human baby is born with a relatively porous gut, and if foreign proteins, such

as cow's milk, are introduced into the baby's diet in the first months of life before gut closure has occurred, they can be absorbed unchanged into its circulation, where they may provoke an immune response. This precocious sensitization of the baby to foreign proteins may be the reason why bottle-fed babies are so much more prone to allergies in later life. The role of epidermal growth factor in promoting post-natal development of the gut may also explain why it is that the protective effects of early breastfeeding against gastrointestinal infections far outlast the duration of breastfeeding. A recent study in Dundee, Scotland, showed that babies that had been exclusively breastfed for a full 3 months were protected from gastroenteritis for at least a year⁽¹⁷⁾.

The mechanism by which breastfeeding exerts its contraceptive effect

We now have a good understanding of the mechanisms by which breastfeeding exerts its contraceptive effect⁽¹¹⁾. Afferent nerve impulses generated by the sucking activity of the baby on the nipple pass up the spinal cord to reach the hypothalamus at the base of the brain. In response to these neural inputs, the brain opiate β -endorphin is released in the hypothalamic area, where it appears to have two important effects. Firstly, it decreases the hypothalamic secretion of the gonadotrophin releasing hormone, GnRH, which in turn regulates the secretion of the gonadotrophins follicle stimulating hormone (FSH) and luteinizing hormone (LH) by the anterior pituitary gland. These gonadotrophins are normally responsible for ovarian follicular development and ovulation; women in lactational amenorrhoea have an impaired pulsatile secretion of LH from the anterior pituitary, and this is thought to be the principal mechanism suppressing ovarian follicular development and ovulation⁽¹⁸⁾. Secondly, β -endorphin also suppressed the hypothalamic secretion of dopamine. Dopamine is the prolactin-inhibitory hormone; it normally holds prolactin secretion by the anterior pituitary gland in check. During the early months of lactation, when the suckling frequency is highest, β -endorphin suppresses dopamine secretion and prolactin secretion is therefore elevated. Prolactin appears to be an important metabolic hormone, and is essential for the long-term maintenance of lactation.

Suckling also causes the release of the hormone oxytocin from the posterior pituitary gland, and this acts on the myoepithelial cells of the mammary alveoli, causing them to contract and squeeze the recently synthesized milk out into the milk ducts that are connected to the nipple; the breastfeeding mother knows this as the milk ejection reflex. Thus in response to suckling oxytocin serves today's meal, whilst prolactin prepares the menu for tomorrow, but neither of these hormones is now thought to play any role in the contraceptive effect of breastfeeding.

From this account, it can readily be appreciated that coupled with a relatively high rate of infant and childhood mortality, this effectively held rates of population growth in check. Breastfeeding was Nature's contraceptive. But those days are gone, never to return; few societies would be prepared to breastfeed their infants so intensively. The challenge we face today is to retain as many of the advantages of breastfeeding as possible, and to augment its contraceptive effects by the frequent nipple stimulation is important not only for ensuring an adequate production of milk, but also for suppressing ovarian activity.

How can we capitalize on the natural contraceptive effects of breastfeeding, and integrate it into family planning programmes in order to achieve optimal birth spacing?

In our hunter-gatherer ancestors, who had no knowledge of or access to other forms of contraception, frequent and prolonged breastfeeding by day and by night resulted in children being born about 4 years apart, and appropriate introduction of modern forms of contraception. Even to this day, breastfeeding still prevents more births in most developing countries than all modern forms of contraception⁽¹¹⁾, but breastfeeding alone will no longer keep population growth in check, especially since we have now lowered infant and childhood mortality rates to more acceptable levels.

The ultimate objective must be to achieve an interval between successive births of at least 2 years, since this will maximize infant survival (see Fig. 4). This means that the mother must be guaranteed at least 15 months of postpartum contraception. But how long should she breastfeed for, and for how long will breastfeeding protect her against pregnancy?



Figure 4.

An aboriginal woman with her six children, including one pair of twins. At the time this photograph was taken the mother was 20.6 years old, the eldest child was 7 and the twins 6 months old. All the children grew normally whilst exclusively breastfed, yet all demonstrated growth failure following the introduction of supplementary feeding, which also obviously eroded the contraceptive effect of breastfeeding and resulted in such spectacular fertility. Source: Cox (1978)²⁵.

The *Innocenti Declaration* states that all women should be enabled to practice exclusive breastfeeding for 4–6 months, and that thereafter, children should continue to be breastfed for up to two years of age or beyond, whilst at the same time receiving appropriate and adequate complementary foods. The *Declaration* makes no recommendation about the timing or frequency of feeds, but if the baby is fed on demand, and not according to some prearranged schedule, it will regulate its suckling frequency and hence the supply of milk according to its needs. Under such circumstances, most mothers will experience at least 6 months of lactational amenorrhoea. In a population of 101 well-nourished Australian women, 97% of whom breastfed exclusively for at least 4–6 months, and some for as long as 8–10 months, the mean duration of lactational amenorrhoea was 9.5 months⁽²⁰⁾. During the early months of lactation, the first post-partum menstruation is likely to precede the first post-partum ovulation, so initially lactational amenorrhoea affords excellent contraceptive protection. The Bellagio Consensus Conference on breastfeeding as a family planning method established that a mother who is fully or nearly fully breastfeeding her infant and who remains amenorrhoeic will have more than 98% protection from pregnancy in the first 6 months postpartum⁽²¹⁾. In our large Australian cohort, only 1.7% would have become pregnant during the first 6 months of amenorrhoea and only 7% during the first 12 months or amenorrhoea, regardless of whether or not they had begun to introduce supplements into the baby's diet⁽²²⁾ (see Fig. 5). But when lactational amenorrhoea extends beyond 12 months, ovulation is increasingly likely to precede the first postpartum menstruation, so the woman can no longer rely on the first menstruation as a preliminary sign that her fertility is about to return.

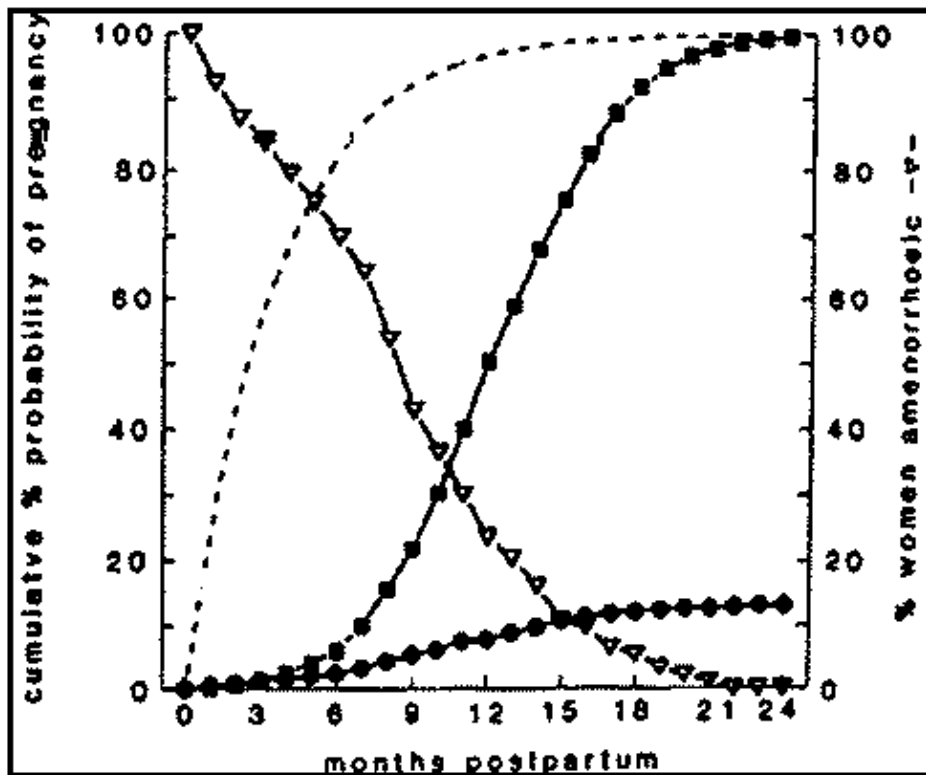


Figure 5.

The cumulative probability of becoming pregnant during breastfeeding, based on a prospective study of 101 well-nourished Australian women who breastfed throughout the duration of the study, and in whom the time of first postpartum ovulation and menstruation was carefully recorded. The data show that lactational amenorrhoea provides excellent contraception for the first 6 months postpartum. --- = non-lactating women of normal fertility having unprotected intercourse; -■- = our breastfeeding women having unprotected intercourse throughout 24 mo of lactation; -●- = our breastfeeding women having unprotected intercourse only during lactational amenorrhoea, and adopting effective contraceptive measures at resumption of menstruation. Percentage of women in lactational amenorrhoea by month post partum (▽) is also shown. Adapted from Short et al., ref. 22.

The programmatic implications are therefore relatively straightforward. Women should be encouraged to breastfeed their babies exclusively for at least 4–6 months, and can rely on lactational amenorrhoea during these first 6 months to give excellent contraceptive protection. Once their periods resume, they must adopt alternative forms of contraception if they do not wish to become pregnant. If the contraceptive failure rate is to be kept below 5%, it would be advisable to take alternative contraceptive precautions after 6 months, even though lactational amenorrhoea still persists.

If hormonal methods of contraception are to be used by breastfeeding mothers, gestagen-only pills, injections or implants are the methods of choice, since they have no adverse effects on milk composition or yield. Oestrogen-containing contraceptives, such as the combined oestrogen/gestagen pill, can cause a significant depression of milk yield. In cultures where HIV infection is prevalent and there are taboos on intercourse during the postpartum period which might encourage the husbands to cohabit with other women during that time, condoms are the contraceptive of choice, especially since the baby is most likely to become infected with HIV via the breastmilk if the mother herself first becomes infected during lactation.

The Effects of Nutrition on Lactation

The maternal plane of nutrition has to be severely depressed before milk yield is adversely affected; farmers are well used to the concept that a lactating dairy cow will “milk off her back”, first depleting her own energy reserves in order to keep up her milk supply. And since the contraceptive effect of breastfeeding depends on a neuroendocrine reflex, not a metabolic one, it is not surprising that within limits, the duration of lactational amenorrhoea is unrelated to the mother’s nutritional status⁽²⁰⁾. But in extreme cases, when the mother is so severely malnourished that her milk supply starts to decline, the suckling frequency of the infant will increase in an attempt to make up the deficit, and this in turn can increase the duration of lactational amenorrhoea.

These considerations also suggest why it is that supplementing the diet of the breastfeeding mother has relatively little effect on her milk yield²³.

Since many mothers in developing countries are malnourished, we need to determine how best to supplement their diet, and that of their infants, without repeating the mistakes of the past. The Western world, with its highly developed agriculture, can produce enormous surpluses of cow's milk. But whilst cow's milk is an excellent form of nutrition for adults, it is disastrous for young infants. It can be particularly inappropriate for famine relief, since there may be no clean water available for reconstituting the milk, and if mothers are encouraged to forsake breastfeeding for bottlefeeding, many will soon become pregnant again, and many of their infants will die of diarrhoea.

One way of ensuring that the milk is not fed to infants is to distribute it not as a powder which has to be reconstituted as a liquid, but as a high protein, high energy biscuit. Several milk biscuits have been developed²⁴, and these should be ideal for supplementing the diet of mothers during pregnancy and lactation, and as a supplement to the diet of the breastfed infant. Since the infant requires teeth to chew the biscuit, this will ensure that the supplement is not given to it prematurely, and hence the biscuit will not interfere with the 4–6 months of exclusive breastfeeding that is so important for infant health. Because the biscuits will encourage the mother to continue breastfeeding, they will also serve as contraceptives. Since the biscuits are relatively sterile, and do not have to be mixed with contaminated water, or fed through contaminated bottles and teats, they should reduce the chances of the infants picking up infections at the time of supplement introduction. Biscuits are also simpler to package than milk powder – they can be kept in paper wrappings rather than in tins – and they have a long shelf life.

The export of milk biscuits by donor countries would support their own dairy industries. And instead of the UN agencies and health authorities having to berate the multinational infant formula companies for the inappropriate advertising, distribution and sale of breastmilk substitutes in developing countries, the donor nations, the UN agencies, the multinational companies and the recipient nations could make common cause to promote the product. Everybody would have something to gain in this system, and each could be seen to be doing well by doing good.

Conclusions

Since the dawn of civilization, we have been interfering with breastfeeding. The rearing of infants on artificial foods has been the largest uncontrolled clinical experiment ever undertaken, and it is still going on, despite the disastrous consequences. It has brought untold suffering, disease and death to countless millions of babies. The erosion of breastfeeding's natural contraceptive effect has been a major factor in bringing about the recent explosive growth of the human population. With human numbers now increasing by a quarter of a million people a day, this is surely the transcending problem of our time.

There is no cheaper or more effective way of improving maternal and infant health and lowering fertility, than the promotion of breastfeedings. As Hugh Smith said, over 200 years ago, "Let me intreat those who are desirous of rearing their children, not to rob them of their natural breast". When will we ever learn?

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CHAPTER 5: Nutrition and its Influence on the Mother–Child Dyad

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Introduction

Ancient folklore and medical knowledge emphasize that the mother–child dyad is a vulnerable group from a health and nutritional point of view. Nutritionists have shown that these segments not only require more dietary intake but are also more susceptible to adverse health consequences following nutritional deprivation. Global studies have unequivocally demonstrated the association between undernutrition and increased risk of

maternal, perinatal and infant mortality and morbidity. Results of small scale clinical trials of food supplementation to undernourished groups suggest that reduction in morbidity and mortality rates and improvement in birth weight and growth in infancy could be achieved by food supplementation.

Based on these findings massive food supplementation programmes aimed at improvement of maternal and child nutritional status among poorer segments of the population were initiated by many developing countries. Very few of these programmes have been formally evaluated. Critics argue that by and large these programmes have not produced any significant improvement in maternal and child health or nutritional status. This, they claim is partly due to administrative bottle necks and logistic problems in getting the food to the target women. Even if this was achieved, food sharing and food substitution were so common that the net increase in dietary intake was no more than 100–150 kcal/day. There is also a growing awareness that unless coupled with health care, increasing food intake alone might not result in improved nutritional and health status of the individual. Because of the increasing awareness of these problems, the newer programmes, like the integrated child development scheme in India, try to achieve an integration of food supplementation, health care and health education.

Recent studies have highlighted some more issues. In undernourished communities any reduction in dietary intake below habitual level is associated with adverse effects on nutritional status of the mother child dyad and reproductive and lactational performance. In many developing countries about a third of all pregnancies occur in lactating women. Many of these women continue to breastfeed their infants. The dual stress of pregnancy and lactation has been shown to have an adverse effect on maternal and infant nutritional status and health.

With mounting social and economic pressures the number of women taking up nontraditional work outside home is rapidly increasing. The stress of work at and outside from home might under some circumstances result in deterioration of nutritional status of the mother–child dyad. However given minimal extra inputs, the increased purchasing power due to gainful employment of women outside home might contribute towards improvement in health and nutritional status of mother child dyad. Data from some of the recent studies on nutritional status and its influence on the mother–child dyad will be briefly reviewed in the following pages.

Effect of Pregnancy on Maternal Nutritional Status

Nutritionists believe that pregnant women need more food to meet the nutrient demands of the growing foetus in utero. Some of the earlier studies and computations suggest that an extra intake of about 300 kcal/day at least in the later half of pregnancy is needed.^{1,2} However, diet surveys indicate that even in developed countries among women who do not have any economic constraints dietary intake during pregnancy is essentially similar to the intake in the pre–pregnant period; often well below the recommended dietary allowances without any apparent adverse effect either on maternal nutritional status or outcomes of pregnancy.^{3,4} Recent studies using currently available sophisticated precision instruments suggest that in pregnancy there is a dip in basal metabolic rate and work activity from mid trimester.⁵ It is now believed that the nutrient saving from this reduction, might be of sufficient magnitude as to meet the needs of foetal growth, and that well nourished women may not need extra dietary intake during pregnancy.

In women from developed countries the average weight gain during pregnancy is about 12 Kg of which 4 Kg. is due to deposition of body fat.^{1,3,4,6} It was believed that this fat deposition was essential to meet the rapidly increasing nutrient needs in late pregnancy and lactation. However recent studies suggest that these women seldom lose the extra fat deposition in pregnancies or lactation unless they take deliberate steps to reduce weight by reducing dietary intake. The weight (fat) gained remains and forms the beginning of problem of obesity in later life.¹

Women from developing countries especially those from poorer segments of the population subsist on diets which contain only 1200 – 1800 kcal/day and are inadequate with respect to all nutrients. There is no increase in dietary intake during pregnancy either. In spite of the continued low dietary intake, they go through pregnancy without any marked deterioration in nutritional status. The weight gain in pregnancy is about 6 kg and the fat loss ranges from 0–2 kg at the end of pregnancy. There is no deterioration in maternal nutritional status with increasing parity provided the inter–pregnancy interval is about 3 years.⁷ These data suggest that among women habitually subsisting on a low dietary intake, there is no deterioration in maternal nutritional status even if dietary intake, does not improve during pregnancy. However data from Gambia demonstrate that a further reduction in dietary intake especially when combined with increased physical work, would result in deterioration in maternal nutritional status.⁸ Studies from India have shown that continued lactation during pregnancy has a similar detrimental effect on maternal nutritional status.⁷ Steps to reduce physical activity and promote birth spacing might form effective non–nutritional interventions to prevent deterioration in maternal nutrition. Supplementary feeding during the pre–harvest season might help in preventing

deterioration in maternal nutrition associated with decreased dietary intake, and heavy manual labour.⁸

Effect of Maternal Nutrition on Pregnancy

Computations based on studies undertaken in the early fifties had shown that the maternal and perinatal mortality rates were higher and birth weight of infants was lower in countries and communities where maternal dietary intake was low during pregnancy.^{9,10,11,12} Based on the data from these studies and theoretical computations of dietary requirements during pregnancy it was suggested that unless extra nutrient needs during pregnancy were met, the course and outcome of pregnancy might be compromised.

However studies undertaken by the Medical Research Council at Aberdeen (UK)³ and by Vanderbilt University in U.S.A.⁴ showed that in well nourished women dietary intake varied considerably without any adverse impact on either on maternal nutritional status during pregnancy or outcome of pregnancy. Studies conducted in New Guinea indicated that a similar situation existed in some developing countries.¹³ These studies also indicated that the majority of pregnant women, if allowed to eat according to their appetite did not consume more food during pregnancy.^{3,4,13}

Dietary intake of the majority of women from poorer segments of the population in developing countries is very low and undernutrition is common. Anaemia and undernutrition antedate pregnancy. Dietary intake continues to remain quite low throughout pregnancy. Undernutrition and anaemia often get aggregated during pregnancy and consequently maternal morbidity, mortality and perinatal mortality rates are high among women belonging to this segment of population.^{7,10,11,12} Available data suggest that there is a close association between maternal undernutrition (as indicated by maternal body weight and haemoglobin status) and low birth weight. However in depth analysis of data suggest that the association is, at least in part attributable to coexistent adverse environmental factors and poor health care.^{7,10,11,12}

Several investigators have attempted to improve the existent low dietary intake by food supplementation programmes, with the hypothesis that increased dietary intake and consequent improvement in maternal nutritional status should result in improvement in outcome of pregnancy and birth weight. Results from some of the closely supervised small scale studies undertaken in the early sixties did in fact suggest that food supplements might improve the birth weight of the offspring by about 200g.^{14,15} However, in these studies women were under close medical supervision throughout the latter half of pregnancy; it is possible that some of the observed benefits might be attributable to early detection and prompt treatment of obstetric and other health problems in these women.

Data from large scale community based studies on the effects of food supplementation on pregnant women have not been encouraging.^{11,15,16,17} One of the major problems in such studies is to ensure that the woman in fact took the food supplements. Many supplements were no more than substitutes for a home meal; in others, foods sharing reduced the quantity of food supplement consumed by the pregnant women. In either case the net increment in the dietary intake of pregnant woman was quite low."

Studies from Guatemala¹⁵ and Gambia¹⁸ have shown that even among those women whose net calorie intake was improved by 500 – 700 kcal daily, the improvement in maternal body weight and birth weight was observed only among the women whose body weight was very low.¹¹ Thus, a review of the available data suggests that food supplementation, unless given to those whose food consumption has been reduced below habitual level and combined with adequate antenatal care, might not be a very effective, feasible and economical method of combating maternal undernutrition and adverse pregnancy outcome. However, if food supplementation is used as a tool to ensure enrolment of pregnant women and delivery of appropriate antenatal care services among poorer segments of the population in developing countries, it might result in a considerable improvement of the health and nutrition status of the mother–child dyad.

It has long been recognized that anaemia is a major nutritional problem in pregnant women. The association between anaemia on the one hand and lower birth weight, higher perinatal mortality and increased maternal morbidity and mortality has been well documented.¹⁹ More recent investigations have shown that anaemic women form a 'high risk' group and at least part of the adverse outcome seen in association with anaemia is attributable to the obstetric and other health problems in anaemic women. Studies undertaken in the National Institute of Nutrition, India and elsewhere have shown that effective treatment of anaemia, preferably in the second trimester of pregnancy, and provision of adequate antenatal care to anaemic pregnant women resulted in a significant reduction in the adverse obstetric outcome seen in association with anaemia.^{7,21}

Ample data exist to show that administration of oral iron to women would prevent any fall in maternal haemoglobin levels during pregnancy. Based on this the National Prophylaxis Programme of Iron and Folate

distribution to pregnant women was initiated. The preliminary data from evaluation of this National programme suggest that there are several bottlenecks which come in the way of the tablets reaching all pregnant women in the country including problems in identification of pregnant women and ensuring that they get the tablets. Even when this is ensured many women do not take the tablets regularly. In India anaemia antedates pregnancy and gets aggravated during pregnancy; the dosage of the tablet administered in the prophylaxis programme is not sufficient for treatment of anaemia. Screening of all pregnant women for anaemia as a part of antenatal care, treating those who are anaemic appropriately and administering prophylactic iron folate tablets to non-anaemic women might be essential to eradicate anaemia and its adverse impact during pregnancy.⁷ As a long term programme, ensuring consumption of salt fortified with iron would improve iron and haemoglobin status of the whole population including women prior to the occurrence of pregnancy.

Effect of Lactation on Maternal Nutrition

Lactating women secrete about 500–800 ml milk a day and lactation involves energy loss of about 500–600 kcal a day. Nutritionists recommend an additional dietary intake of up to 500 kcal/daily to meet the extra nutrient needs of lactating women.² However, studies undertaken in developing countries indicate that among poorer segments of the population, dietary intake does not increase during lactation. In spite of continued low dietary intake, lactating women lose only about 1–2 kg of weight during the first year of lactation. With waning lactation, these women tend to regain their body weight over the next year or two, provided they do not become pregnant during this period.²¹ Obviously adaptive changes have been evolved over millennia to ensure that lactation does not result in deterioration of maternal nutritional status. However, there are limits beyond which these adaptive processes also fail. The added stress of manual work and reduction in dietary intake was shown to be associated with weight loss in lactating women in Gambia.⁸ Studies from India had shown that the added stress of pregnancy and continued lactation resulted in a reduction in maternal weight.⁷

Studies in Gambia have demonstrated that the food supplements to lactating women do not result in improvement in body weight.²² These data suggest that with the availability of food, reversal of adaptive processes is given precedence over body weight gain. Weight gain is one of the parameters widely used for evaluation of the food supplementation programmes. Data from Gambia²² and elsewhere²² suggest that at least in pregnant and lactating women, weight gain may not follow improvement in dietary intakes and so should not be used as a parameter to evaluate the 'success' of food supplementation.

Effect of Maternal Nutrition on Lactation

Ample data exist to suggest that maternal undernutrition does not have any adverse effect on duration of lactation. The mean duration of lactation in undernourished women from poorer segments of the population in developing countries ranges from 18–26 months. Obviously this is a protective adaptation evolved over time to ensure that maternal undernutrition does not have any adverse effect on the breastfed infant.²³

During the last few years, information regarding volume of milk ingested by solely breastfed infants in developed and developing countries has become available. These data suggest that undernourished mothers do secrete an adequate quantity of milk especially considering the fact that their infants are lighter.^{8,23} However, if over and above the existing moderate maternal under-nutrition, there are additional stress factors like reduction in dietary intake, increase in work⁸ or advent of next pregnancy²³, then the volume of milk secreted tends to fall.

Studies from developed and developing countries have indicated that there are no significant differences in the calorie content or proximate principle composition between milk secreted by well nourished and undernourished women.²⁴ However, there are some variations in the fat content of the milk; vitamin and mineral concentrations are lower in the breast milk of undernourished women.

Obviously nature has evolved adaptive processes to ensure that infants get an adequate quantity of milk containing appropriate nutrients for a sufficiently long time to ensure their normal growth and survival in spite of chronic moderate maternal undernutrition.

Nutritional Consequences of Conception During Lactation

It is well documented that lactation prolongs postpartum amenorrhoea and provides protection against pregnancy in the first few months of lactation. However, with increasing duration of lactation, the contraceptive effect wanes off. Among traditional low income groups of women, prolonged lactation for 20–30 months is common; contraceptive use is not widespread in these women. Under these circumstances about 1/3rd of all pregnancies occur in lactating women. Studies conducted in the National Institute of Nutrition, India, showed

that conception during the first year of lactation is not common (15.8%) and tends to occur in working women and those who introduce supplements to breastfed infants early in the third or fourth month of lactation. The majority of conceptions occur during the second (33.6%) and third year of lactation (51.6%). A substantial number of women continue to breastfeed their infants during pregnancy and face the concurrent dual stress of pregnancy and lactation.

Diet surveys undertaken among women who had conceived during lactation have shown that their food intake is essentially similar to the non-pregnant women. It is possible that the dual stress of pregnancy and lactation would widen the already yawning gap between actual intake and nutrient requirements in this group of women.

Irrespective of the duration of lactation and period of gestation, women who continued lactating during pregnancy (Study group) had lower body weights than their non-lactating pregnant counterparts (control group). The differences in body weight were more marked in the small group of women who had conceived during the first six months of lactation.²³

A comparison of the reproductive performance between the study and control group indicated that there were no significant differences in the course and outcome of pregnancy. However, birth weights were significantly lower both in the study and control group women in whom the interpregnancy interval was less than one year. Infants born to mothers who conceived within 6 months of lactation had lower birth weight and higher infant mortality rate.²³

These studies have demonstrated that a short interpregnancy interval and conception during lactation have an adverse effect on maternal and infant nutrition, birth weight and infant survival. Ensuring adequate contraceptive care at an appropriate time to lactating women might therefore constitute an important non-nutritional intervention in reducing the magnitude of maternal and infant undernutrition among poorer segments of the population in developing countries.

Nutritional Consequences of Gainful Employment of Women

Women's participation in economically productive activity outside the home is not a new phenomenon. Mankind evolved in circumstances where families worked together in traditional, agricultural and other activities both in and outside home, and so, have evolved adaptive processes to ensure that these activities do not have a lasting adverse effect. Over the last few decades, due to socio-economic pressures, increasing urbanization and mechanization of agricultural activities have resulted in urban and rural women seeking employment outside home in nontraditional activities. It is estimated that in India working women constitute about 12% of the total population and the number is increasing every year.

Some of the recent studies have shown that the dual stress of work in and outside home has had an adverse effect on maternal nutritional status, reproductive performance, lactation and infant health. It is, however, possible that employment outside home might benefit working women and her family by increasing their purchasing power.

Results of studies undertaken in the National Institute of Nutrition, India, had shown that irrespective of socio-economic class all working women perceived that child care, especially during the first 6 years, is a major problem. In the urban upper and middle income group, work outside home was not associated with any alteration in health, nutritional status or reproductive performance of women. The extra income was useful in improving the standard of living for the family, providing better education for the children and planning for financial security after retirement.

In the low middle income group among women employed in jobs involving moderate physical activity because of the increased purchasing power there was some improvement in maternal nutritional status, as assessed by body weight.

In rural areas the women from families of landless labourers and marginal farmers perform heavy manual work and subsist on very low wages. Because of poor dietary intake and dual stress of work at home and manual labour outside home, the majority of these women are undernourished and weigh less than housewives from the same community.²³

Studies from Gambia have also shown that heavy manual labour and low dietary intake have an adverse effect on maternal body weight both during pregnancy and lactation⁸. Rural women have to continue to work outside home in order to ensure that there is no further deterioration in purchasing power of the family.

However, imaginative intervention programmes if effectively implemented might go a long way in reducing the physical work done—at home and at work and help in improvement of maternal nutritional status.

Infant Feeding Practices and Infant Nutrition

It is now well accepted that breast feeding is the best form of infant feeding for all segments of the population in all countries. Breast milk provides appropriate nutrients in adequate quantities to ensure optimal growth in early infancy. Presence of anti-infective factors in breast milk and the fact that breast milk reaches the infant without any contamination ensures minimal mortality due to infection in breast fed infants. Available global data from all segments of the population suggest that up to 6 months of age solely breastfed infants grow as well as those who receive supplements. It would therefore appear that, contrary to theoretical predictions based on recommended dietary allowances during infancy, breast milk alone might be sufficient to support the growth of infants up to 6 months of age. Wherever possible, growth of infants should be monitored by monthly weighing. If the infant is growing normally and appears to be satisfied by breast feeding alone, it is not necessary to introduce supplements before 6 months of age.^{23,25} In communities where weighing is not possible, if the child is not thriving, or crying (due to hunger) soon after breast feeds, supplements may be introduced before 6 months. In the absence of these problems it might be advisable not to introduce supplements prior to 6 months of age because under the existing conditions of poor environmental sanitation such a practice is associated with increased risk of morbidity due to infection and consequent under nutrition.²⁵

A wide variety of processed cereal-pulse based supplements are available on the market. They are widely used by the urban mothers belonging to middle and high income groups. Recipes for a large variety of low cost home made infant food supplements prepared from locally available foodstuff like cereal, pulse sugar and jaggery have been published by several institutions in India. However, community based studies have shown that very few women are able to prepare these special foods daily. Even when prepared these weaning foods become heavily contaminated with bacteria and if fed a few hours after preparation can cause diarrhoea. It would therefore appear that giving freshly cooked unseasoned rice or wheat and pulse twice a day might be the most feasible method of introducing supplements to breastfed infants under the existing condition in India. It is important that over the next 6 months the infant gets used to eating almost the whole range of adult food when it is freshly cooked. Studies from the National

Institute of Nutrition, India have shown that this practice was associated with a tripling of birth weight by the first year, relatively low morbidity due to infection and a reasonably long interpregnancy interval even in the absence of contraceptive care. Delay in introduction of supplements beyond 6 months of age is associated with growth faltering and increased susceptibility to infection due to undernutrition.²³ It is essential to ensure that health education messages advocating introduction of freshly cooked cereal pulse based semi solid supplements to infants by 6 months of age, reach and are followed by urban rural women from low income groups in developing countries.

Summary

Mild and moderate degrees of maternal undernutrition continue to be widely prevalent among poorer segments of the population in developing countries. The majority of these women consume only 1200 – 1800 kcal/day throughout their reproductive years. Due to ill understood but effective adaptive processes, the continued low dietary intake during pregnancy and lactation does not result in further deterioration of maternal nutritional status provided a) the inter pregnancy interval is over 3 years; b) there is no further reduction in dietary intake and/or increase in physical activity. Chronic mild and moderate maternal undernutrition does not have any adverse effect on duration of lactation, quantity or quality of milk secreted. Solely breastfed infants double their birth weight by 6 months, and if supplements are begun by 6 months triple their birth weight by the first year. Ideally, food for adequate nutrition and health care should be available to all those who need it. Since this could not be achieved easily. An attempt was made during the 1970s to provide food supplements to identified vulnerable segments of the population: pregnant women, lactating women and preschool children. Because of the bottlenecks in reaching the most needy, difficulty in ensuring that supplements result in the expected increase in net dietary intake and problems in providing appropriate health care, these food supplementation programmes did not have the expected beneficial impact on maternal and child health.

It is however possible that if efforts are concentrated on reaching women belonging to the three readily recognizable high risk groups (those whose dietary intakes are falling below habitual level, those who are performing heavy manual labour and those who face the dual stress of pregnancy and lactation) and providing them with food supplements and health care as a package, the beneficial impact might be substantial.

Chronic moderate maternal undernutrition and anaemia have been shown to be associated with adverse outcomes of pregnancy. Food supplementation coupled with effective treatment of anaemia and adequate antenatal care to detect and promptly treat obstetric problems in the high risk groups would ward off these adverse effects.

The dual stress of lactation during pregnancy results in deterioration in maternal nutritional status especially when the interpregnancy interval is less than 1 year. Contraceptive care initiated at the appropriate time during lactation would go a long way in preventing the adverse effect of the advent of the next pregnancy during lactation.

Among rural low income groups, women's heavy manual work in agricultural operations coupled with low dietary intake does have an adverse effect on maternal nutritional status especially during pregnancy and lactation. Innovative, inexpensive labour saving devices might reduce hard physical labour in these women and might prevent deterioration in nutritional status especially when coupled with a food supplementation programme to ensure that further reduction in dietary intake does not occur in the pre-harvest season.

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Comments

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It is obvious that the phenomena of lactation concurrent with pregnancy is occurring commonly. Dr Ramachandran reports that “one third of all pregnancies occur in lactating women” in a sample from India and we have found that one half of all pregnancies occur in lactating women in our sample from Guatemala. Therefore, clearly it is worthy of further attention from researchers and those in health service delivery.

There are two aspects of Dr Ramachandran’s message that concern me. In particular, I am concerned with the repeated reference to “adaptive processes”, a vague notion that is commonly invoked to explain discrepancies in our quantification of energy balance of human female reproductive processes of pregnancy and lactation. Rather than evidence of adaptive processes, these apparent energetic discrepancies are likely to be evidence of our inadequacies in measurement of two difficult components of energy balance, dietary intake and physical work expenditure. As was acknowledged, biological mechanisms for these adaptive processes have not been identified as yet. I have not seen thorough, reliable quantification of dietary intake in free–living populations that provides enough accuracy to warrant the conclusions that adaptive processes with no apparent negative consequence to mother or child are operating.

The investigators studying the Gambian population have recently reported the discovery of large inaccuracies in previously reported dietary data that call into question their conclusions regarding these purported “adaptive processes”. Unless we are cautious with respect to use of this explanation, a number of inconsistencies arise in our interpretation of available data. The generalization that “women from developing countries ... in spite of continued low dietary intake ... go through pregnancy without any marked deterioration in nutritional status” obscures two of your later crucial observations that “there is no deterioration in maternal nutritional status with increasing parity *provided that interpregnancy interval is about 3 years*” and that “data from Gambia demonstrate that a further reduction in dietary intake especially when combined with increased physical work, *would result in deterioration in maternal nutritional status*”. The importance of these later two statements should not be underestimated.

This brings me to my second concern. What percentage of marginally nourished or undernourished women in India have “interpregnancy intervals of about 3 years”? I would venture to guess that this percentage is relatively low, particularly since Dr Ramachandran reports that one third of women become pregnant during lactation and one hundred percent of these occur within the first three years of lactation, with about 50% in the first two years of lactation. This causes me to question whether a conclusion that “Due to ill-understood but effective adaptive processes the continued low dietary intake during pregnancy and lactation does not result in further deterioration of maternal nutritional status” is appropriate given that one of the conditions on this statement may be met in relatively few cases.

Finally, I would like to add that in our research in Guatemala, we found that a non-pregnant/non-lactating interval was important for the adequate recuperation and repletion of maternal fat stores. Therefore emphasis on the solely non-pregnant interval may result in the inadvertent oversight of the importance of a potentially recuperative non-lactating interval.

CHAPTER 6: Breastfeeding, Family Planning and Child Health – Final Comments

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The world's resources are limited. Therefore, we must look for synergy and mutual complementarity in our work to support the health and nutritional status of women and children. The mutual complementarity of nutrition and family planning for safe motherhood may be defined within the parameters of the “seven stages of woman.” There are seven periods in a woman's life (Table, next page) when intervention is appropriate, available, and tested:

- i) *Infancy*: During infancy, breastfeeding provides excellent nutrition, immune system stimulus, and growth factors, as well as providing rapid involution of the postpartum uterus and a period of time for maternal calcium storage. Breastfeeding also helps protect infants against chronic diseases such as diabetes and certain cancers.
- ii) *Childhood*: Girl children need good nutrition to achieve adequate stature so that, as they approach reproductive years, their ability to function in society as well as their ability to have safe deliveries will be enhanced.
- iii) *Adolescence*: Young women must eat well to achieve full stature and must delay conception until long bone growth is completed. Again, the achievement of full stature and adequate energy stores are important both for the health of societal and procreative functions.
- iv) *Pregnancy*: Nutritional intake is necessary that is adequate for maternal health, fetal growth, and storage for lactation.
- v) *Lactation*: Breastfeeding supports maternal health. Maternal calories may be derived from relatively inexpensive foods and the mother will still produce excellent human milk for her infant.
- vi) *Recovery time*: New studies show that the period of weaning is a time for renewing calcium stores. Clearly this time is created by appropriate child spacing. A breastfeeding woman may use the Lactational Amenorrhoea Method (LAM) as an introductory method, giving her time to select a complementary method needed to create a healthy 3–4 year birth interval.
- vii) *Post fertile time*: The elders teach the social and cultural norms. Their interest in their daughters' and daughter-in-laws' health and well being dictate that they be informed and educated on these issues.

The mutual complementarity of breastfeeding and family planning extends well beyond the postpartum period, having an impact throughout life. Breastfeeding contributes to child spacing in populations by prolonging the average interval until the next pregnancy. However, it also contributes directly as LAM. LAM is an introductory family planning option. It is part of informed choice and allows a period of time to select and obtain a complementary method. It is a door opener for those who would or could not previously consider family

planning. Furthermore, LAM increases optimal breastfeeding. Dr. Alfredo Perez' work in Chile confirms that promotion of breastfeeding and LAM increases the percent of women exclusively breastfeeding, the percent of exclusive breastfeeders that are amenorrheic, and the frequency of breastfeeding among exclusive breastfeeders.

Conversely, family planning also contributes to the duration of breastfeeding worldwide, since pregnancy is the number one or two reason reported for cessation of breastfeeding. Therefore, family planning protects sustained breastfeeding and sustained weaning. Recent research by R. Martorell and K. Merchant calls for a period of non-pregnancy for six months after cessation of lactation to ensure complete maternal recovery. To achieve this six-month period of recovery necessitates family planning.

Programmatically, breastfeeding for family planning is sustainable; maintenance is not commodity dependent. Women believe in it, and it has been shown to be doable. In Ecuador, women attending CEMOPLAF clinics may and do choose LAM and use it successfully. Family planning and breastfeeding may well be combined in service programmes. This is more likely to happen if family planning programmes understand the linkage and contribution of breastfeeding to child spacing.

The obvious complementarity of population and nutritional programming also is often ignored. Worldwide, food supplies are often stretched to meet the needs of a rapidly increasing population, even accounting for the issue of mal-distribution. Within countries we often see the influence of population pressure on the carrying capacity of the land, with environmental disasters resulting.

In summary, we must conclude that there is a synergy between nutrition and population growth, that intervention is possible at seven stages in a woman's life, and that breastfeeding, with its fertility impact, especially with LAM, serves as a cornerstone of the complementarity with its multiple positive health effects and with its role in linking the generations.

Seven Stages of Woman

STAGE	INTERVENTION
* Infancy	Breastfeeding and child spacing
* Childhood	Adequate nutrition and support
* Adolescence/Young adult	Nutrition and Family Planning
* Pregnancy	Nutrition
* Postpartum	Breastfeeding and LAM
* Recovery	Weaning and complementary family planning
* Post fertile years	Education on breastfeeding nutrition and family planning

Barry Edmonston, Population Studies Center, The Urban Institute, Washington DC, USA.

Breastfeeding and contraception are the two principal determinants of fertility in the developing world. Numerous researchers have shown that extended breastfeeding promotes prolonged postpartum amenorrhea and, as a result, longer birth intervals. In developing countries with low contraceptive use, breastfeeding is the primary factor affecting birth intervals and overall fertility. For this reason, there is great concern about

decreases in the poorer countries that would both increase fertility as well as increase the likelihood of infant morbidity and mortality. In countries where contraceptive use is relatively high, breastfeeding durations are generally shorter.

Relationship of Breastfeeding and Contraceptive Use

To gain an understanding of the relative impact of breastfeeding and contraception on fertility, it is necessary to look at the relationships within the context of socioeconomic development and family planning programmes. Prior research on the effect of breastfeeding and contraception on fertility has usually been at the individual level. Individual level studies, however, have usually lacked information on a wide variation of social and economic conditions and family planning efforts. An alternative approach is to examine national level data, recognizing that national level data precludes examination of the distribution of individual responses.

I report in this presentation on national level data for 100 developing countries, using data on the median length of breastfeeding and contraceptive rates in 1982. Our data also includes measures of family planning programmes, socioeconomic development and related variables – for 1982 – and estimates of fertility and contraceptive prevalence rates in 1990. These data represent comprehensive, up-to-date estimates for the impact of breastfeeding and contraception on fertility in the developing world.

Regarding breastfeeding and socioeconomic development, the simple regression equation (Breastfeeding = $14.4 - 2.9 * \text{Socioeconomic Development}$, $r = .75$) for 100 developing countries suggests a close relationship between improved socioeconomic conditions and decreased duration of breastfeeding. These data agree with numerous research papers on this topic.

Regarding contraceptive use and socioeconomic development, the simple regression equation (Contraceptive Prevalence = $23.4 + 9.7 * \text{Socioeconomic Development}$, $r = .73$) indicates a strong relationship between increased socioeconomic development and contraceptive use.

Comparing the median duration of breastfeeding and contraceptive use, the inverse relationship ($r = .64$) suggests that these two factors may be complementary at the national level. However, the relationship evidently depends on the overall national fertility levels. In 37 moderately low fertility countries (TFR less than 5.0), the association between breastfeeding duration and contraceptive use is moderately strong ($r = .49$). In the 63 high fertility countries (TFR equal to or greater than 5.0), the association is somewhat stronger ($r = .58$).

Is the relationship between breastfeeding duration and contraceptive use complementary? In this case, I take the meaning of complementary to be that the processes are inherently inversely related, that contraceptive use increases as breastfeeding decreases. This is an important concern for family planning programmes because a complementary nature to the relationship between breastfeeding and contraception would imply that breastfeeding would decrease as family planning successfully increased contraceptive use. What impact, if any, does family planning programmes have on breastfeeding? As contraceptive use increases, how much decrease in breastfeeding generally occurs? And, taking breastfeeding and contraceptive conditions into account, how have fertility declines occurred in recent years?

Contraceptive Prevalence Rates, 1982

Examining the factors related to contraceptive prevalence, we find that family planning programme effort is positively and strongly related to increased contraceptive prevalence. Similarly, improved socioeconomic development is strongly associated with higher levels of contraceptive prevalence. Moreover, we find that breastfeeding duration is negatively related to contraceptive use, taking family planning programme effort and socioeconomic development into account. Thus, there is evidence that longer duration of breastfeeding, other factors being equal, is associated with lower levels of contraceptive use.

Median Breastfeeding Duration, 1982

Examining the factors related to national durations of breastfeeding, we find that family planning programme effort does not have a statistically significant effect on breastfeeding. Indeed, in our analysis, holding all other factors constant, it appears that countries with stronger family planning programmes have a net impact that decreases breastfeeding duration.

Socioeconomic conditions have a strong negative effect on breastfeeding duration. As socioeconomic development proceeds, the median duration of breastfeeding declines.

The net effect of contraceptive prevalence shows a statistically significant negative influence on the median duration of breastfeeding. All other factors being equal, increased contraceptive prevalence is associated with decreased breastfeeding. This suggests that there is a complementary relationship between contraceptive use and breastfeeding duration at the national level. Controlling for other factors, including family planning programme effort and socioeconomic development, suggests that breastfeeding and contraceptive use have a negative association. But how important are these two factors for overall fertility levels? If both contraceptive use and breastfeeding duration were equal partners in a complementary relationship, we would expect that each would have similar impacts on overall national fertility levels.

Total Fertility Rates, 1982

Examination of the factors determining national fertility levels shows that contraceptive use and breastfeeding duration do not have equal impacts. The proportion of women in the childbearing years who use modern contraception is the single most important variable affecting national fertility levels. Contraceptive use has a strong inverse relationship with fertility levels, taking other factors into account. The effect of breastfeeding duration on fertility levels, however, is weak and is not statistically significant. Breastfeeding does not have an important effect on fertility levels, when measured at the national level and when taking other factors into account.

Conclusions

1. Breastfeeding and contraceptive use appear to be complementary factors in national data, as they have been found to be in prior individual level studies. Both breastfeeding and contraception are affected by socioeconomic development. However, family planning programme effort is apparently related to contraceptive use, and not to breastfeeding duration.
2. The role of breastfeeding and contraception do not appear to have a complementary role in their affects on fertility at the national level. This suggests that there is not an “automatic” inverse relationship whereby contraceptive use increases as breastfeeding declines. Therefore, fertility would increase as breastfeeding declines unless family planning programmes encourage the greater use of contraception.
3. Both socioeconomic conditions and family planning programme efforts work most effectively together in promoting increased contraceptive use. These results indicate that countries experiencing socioeconomic development can promote more rapid fertility decline by coupling development with an effective, strong family planning programme.

These results from national-level data indicate that a strong family planning programme has very little effect on breastfeeding duration. The policy implication seems clear: if a government wants to encourage its citizens to reduce fertility, it should pursue policies of social and economic development (as most countries would do regardless of population goals) and it should implement an aggressive family planning programme. National-level data indicates that breastfeeding duration declines with socioeconomic development. Although breastfeeding reductions have important health consequences, these data do not suggest that breastfeeding declines have a strong positive impact on fertility.

Beverly Winikoff, The Population Council, New York, USA.

In these comments I will try to bring forward some ideas about where the “disagreements” between family planning and breastfeeding come from and what can be done to integrate these two issues on a programmatic level.

In the first place, there seems to be no doubt on any side or in anyone’s mind about the major, positive effects of breastfeeding on both infant health and on fertility reduction. Nonetheless, the effects of breastfeeding operate differently with respect to each of these outcomes. One difference is that the fertility-reducing impact of breastfeeding can be replaced by technology (at least in theory), while the health benefits cannot be totally replaced in any environment.

(Parenthetically, data presented earlier in the day by Sandra Huffman suggest that, even with respect to fertility, there may be some problems. As she pointed out, birth spacing is longer, on average, in low contraceptive prevalence countries than in high contraceptive prevalence countries!)

In any case, the fact that some benefits of breastfeeding are more technologically replaceable than others, on an individual level, may contribute to tensions between breastfeeding and family planning advocates: family

planning advocates may conclude that breastfeeding is *totally* replaceable whereas those focused primarily on breastfeeding will view the health effects as non-replaceable even if the fertility effects are replaced.

Another aspect of this discussion relates to programme functioning. I want to elaborate here, a little bit, on why breastfeeding advocates may have complained about family planning *programmes* in the past.

I emphasize here the word *programme* because I believe that this is where the problem lies: not on an intellectual, theoretical level or on an individual level, but on a programme level. It seems to me that there are two main issues here, and they both revolve about programme implementation:

a) Family planning programmes have in many places urged contraception on women when it is not yet biologically necessary, perhaps against the preferences of mothers and perhaps limiting mothers' options, and

b) Family planning programmes have often failed to take into account, not only the importance of lactation, but even underlying the *existence* of lactation among clients. In many programmes, two-thirds to three-quarters of the clients are lactating women! Yet, programmes often totally lack special attention to (or even mention of) the special needs of lactating women. This is true in respect to the educational materials available for clients; to the counselling that is given on a one-to-one basis; and to the methods available at clinics. This often means, in the end, that methods inappropriate for lactating mothers and/or detrimental to lactation itself may be offered.

I should add here that a major problem is the technology-driven nature of the choices available to lactating women. Virtually all "modern methods" are stated to be optimally applied during menstrual bleeding. Since lactating women often request contraception when they are still amenorrhoeic, they may not receive any of the "modern methods" available. This applies to oral contraceptives, IUDs, and implants! Thus, we have, by programme norms and technology, restricted or made difficult the provision of effective contraception to lactating women. Women who are not bleeding are often asked to return at a later – often much later and unknowable – date when they have resumed menses. The result is that many women are essentially offered a choice between a) continuing to breastfeed or b) contraception. I believe that we need to rethink the ways we use existing methods – and the norms for the use of those methods – especially for lactating women and also to develop new methods especially for lactating women that do not have similar restrictions for optimal use.

Having said all this, I believe, nonetheless, that breastfeeding promotion should not be seen in opposition to family planning. The two are not opposing but clearly complimentary. We have already seen how they are biologically complimentary. At the individual level, they are also complimentary. In terms of mothers' own needs, desires, and goals, we can say at least the following things:

a) One thing mothers care about desperately is the survival and well-being of their children, and for this, breastfeeding is irreplaceable.

b) Another thing women want very much is not to have more children than they can care for properly, and for this, family planning programmes are needed.

I offer some conclusions about programme functioning from these thoughts:

i) It is clear that no matter how much we value breastfeeding, breastfeeding cannot substitute for family planning programmes.

ii) Family planning programmes must provide a full range of options for breastfeeding women, both as to timing and choice of method.

iii) It is, hence, urgent that family planning programmes (and those responsible for the policies of family planning programmes) recognize, understand, and support the importance and goals of breastfeeding promotion including, when necessary, revising practices and norms within programmes.

iv) Finally, family planning programmes need to remember the child, at least, in part, because the child is also the center of attention of the postpartum mother.

Some of the bad feeling between “family planning” and “breastfeeding” may be resolved by the realization that *family planning* is not a *technology*. It is a *life strategy*. *Contraceptives* are *technologies*. Family planning is what people do to plan births.

Breastfeeding can be an important component of family planning. But it cannot replace contraceptives. (Indeed, the fertility-reducing effects of breastfeeding extend beyond the period of amenorrhea but not reliably; therefore, as a *strategy* breastfeeding is not effective beyond amenorrhoea.) A holistic and realistic family planning programme needs to support women and families in the strategies they choose to plan births, including using breastfeeding as part of an overall plan.

At the same time as family planning programmes need to remember the importance of the baby, nutrition programmes need to remember the centrality of the mother to her children and husband, to production and income in the family, and particularly to her newborn.

Feeding the mother almost always makes more sense for mother’s and baby’s health (and programmatically) than supplementation directed at young infants. As Roger Short’s paper points out, the mechanisms that prevent ovulation in lactating work via neuroendocrine, and non-nutritional, pathways. After much research, we can now feel comfortable that feeding mothers will not have the negative effect of reducing lactation’s inhibition of ovulation.

No doubt, there have been strains between breastfeeding and family planning. (These are perhaps symbolic of potential, but rare, conflicts between maternal and infant well-being). Nonetheless, the need for both nutrition and family planning programmes is great. They need to, and can, support each other. For them to do so, policy-makers, professionals, and managers need to understand the importance of each others’ goals and incorporate positive and supportive elements in programmes.

Additional comments on service delivery

There are basically three categories of lactating women

- i) Those immediately postpartum (often in service delivery institutions, e.g. hospitals),
- ii) Interval postpartum women who have experienced the return of menstruation, and
- iii) Interval postpartum women who are still amenorrheic.

Programmes need to think separately about these three categories of women, as they have different needs.

In particular, family planning, health and nutrition services have failed women in several ways:

- i) There is a lack of counselling on how to manage breastfeeding successfully. There is lack of counselling on amenorrhea, what causes it, how to use it as part of a family planning strategy, and when to initiate other contraceptives for women who do not want contraception earlier than the return of menses.
- ii) There is a lack of training for health workers to understand the importance of supporting breastfeeding and of providing proper advice to breastfeeding women. There is also a lack of information and education for these same workers regarding the effectiveness and feasibility of incorporating breastfeeding into a child-spacing plan.
- iii) There is a lack of linkage of prenatal and delivery services. This makes difficult (if not unethical) the provision of immediate postpartum contraception when women have not been counselled and informed correctly during prenatal care.
- iv) There are frequently no methods available specifically appropriate for lactating women. In particular, the progestin only pill is not available in many programmes that do supply oral contraceptives.
- v) There are unrealistic norms for the provision of family planning technologies to amenorrheic breastfeeding women that involve the issue of initiation during menstrual bleeding mentioned above.

Service delivery issues for nutrition include expanding the possibility of supplementing the mother and specific referral to family planning for breastfeeding when menses have returned. Regrettably there are still nutrition programmes that supplement babies. Some distribute powdered milk or discounted formula products, in which case the nutrition programme itself is responsible for undermining breastfeeding.

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