# Breastfeeding: Issues and Challenges in the New Millennium

## West Africa Nutrition Focal Points Meeting

25-29 September, 2000
Bamako, Mali

## Technical Report of Presentations

LINKAGES

*Improving Nutrition and Reproductive Health*

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*Breastfeeding: Issues and Challenges in the New Millennium* is a publication of the LINKAGES (Breastfeeding, Complementary Feeding, and Maternal Nutrition Program) Project. LINKAGES is supported by the G/PHN/HN, Global, U.S. Agency for International Development, under Cooperative Agreement No. HRN-A-00-97-00007-00 and managed by the Academy for Educational Development. The opinions expressed herein are those of the author(s) and do not necessarily reflect the views of the U.S. Agency for International Development.

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March, 2001

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## Foreword

*Breastfeeding: Issues and Challenges in the New Millennium* is a collection of papers based on the presentations made at a one-day technical update during the September 2000 meeting of the Nutrition Focal Points from West Africa. The papers present evidence from research, note policy advances, and discuss programmatic implications. They examine the health, economic, and fertility benefits of breastfeeding; the risks and realities of HIV transmission through breastfeeding; the links between breastfeeding and vitamin A; and implementation of the Code of Marketing of Breastmilk Substitutes.

The first meeting of the Nutrition Focal Points was held in Dakar, Senegal in December 1996. This meeting was an outcome of a 1995 recommendation by the Administrative Council of Ministers of Health of the Organization for the Coordination and Cooperation in the Fight Against the Major Endemic Diseases in Francophone West Africa (OCCGE). The council recommended that a network of nutrition actors in the subregion be created under the auspices of the Office for Research in Food and Applied Nutrition (ORANA). The goal of the first and subsequent meetings was to develop a common vision of pertinent and appropriate strategies in nutrition to solve community health problems.

Those attending the first meeting represented heads of National Nutrition Services from the Ministries of Health of Benin, Burkina Faso, Ivory Coast, Mali, Mauritania, Niger, Senegal, Togo (all of them OCCGE member states) and the Republic of Guinea (accorded observer status). At the second meeting, held the following year in Dakar, members decided to rotate the meeting site among member countries. In 1998 the meeting was held in Abidjan and in 1999 in Niamey. In Niamey, membership expanded to all 16 states of the Economic Community of West African States (ECOWAS), including the Anglophone countries in West Africa. This expansion reflected the creation of the West African Health Organization, which became operational in 2000.

At the end of the Niamey meeting, members decided to:

- Hold the Nutrition Focal Points in 2000 in Bamako, Mali,
- Conduct technical update sessions on "Breastfeeding: Issues and Challenges in the New Millennium," and
- Ask the USAID-funded LINKAGES Project to coordinate and provide technical leadership in the preparation of the technical update sessions.

More than 100 nutrition policy makers and programmers from 16 West African countries attended the Fifth Meeting of the Nutrition Focal Points, held in Bamako from September 25-29, 2000. The LINKAGES Projected organized the technical update, and the Regional Center for Food and Nutrition Research (CRAN) coordinated the meeting. This publication makes available to a wider audience the State-of-the Art presentations from this meeting.

# Infant Feeding Behaviors and Maternal Dietary Practices to Improve the Nutrition of Infants and Young Children

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## Introduction

This paper examines feeding and dietary practices using a holistic, life cycle approach. For the health and nutrition of future generations, as well as for national development, attention needs to be directed to dietary and nutrient needs not only in infancy and childhood, but in adolescence and the reproductive years. The goal is for healthy women to give birth to healthy babies who receive optimal nutrition, first through their mothers' breastmilk and then—from around six months to 24 months and beyond—through breastmilk and appropriate complementary foods. The paper is framed around a set of recommendations for different points in the life cycle: 0-6 months, 6-24 months, and adolescence and the reproductive years. These recommendations are also examined in the context of infant feeding in emergencies. The recommendations set forth in the paper were developed by the USAID-funded LINKAGES Project based on existing evidence of their feasibility and effectiveness in improving child and maternal survival, health, and nutrition.

## Exclusive Breastfeeding during the First Six Months

### Benefits of Exclusive Breastfeeding

International recommendations for the feeding of infants 0-6 months call for exclusive breastfeeding for six months, or from four to about six months. The World Health Organization's definition of exclusive breastfeeding is the feeding/nourishing of a child on breastmilk alone, with no other liquids, not even water, or solids. Drops or syrups, vitamins, mineral supplements, or medicines that are medically prescribed are allowed. Exclusive breastfeeding also applies to a child who receives only expressed breastmilk or is fed only breastmilk from a wet-nurse.

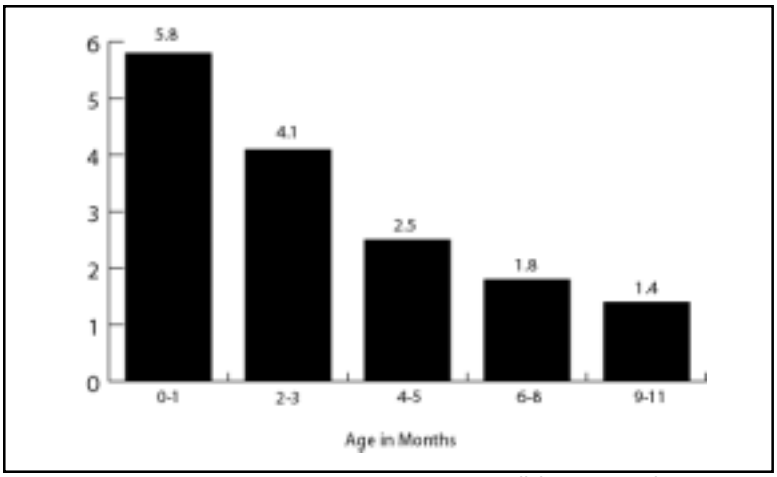
Exclusive breastfeeding confers many nutritional and health benefits for the child. Breastmilk is a hygienic/clean source of energy, all essential nutrients, and water. Breastmilk is a living substance containing immune factors and many other components that are beneficial for infants and young children. It meets all nutrient and fluid needs and changes to meet the changing requirements of the child.

The health benefits include reduced mortality and reduced morbidity from diarrhea, respiratory infections, and other causes. Exclusively breastfed infants are protected because they are exposed to fewer bacterial contaminants. Artificially-fed babies get diarrhea more often than breastfed babies because artificial feeds lack anti-infective factors and are often contaminated with harmful bacteria.

Figure 1 shows the association of mortality with *not* breastfeeding. The data come from a meta-analysis of a number of countries where diarrhea and respiratory infections are major causes of infant deaths. Infants who were not breastfed had a greater

chance of dying from infectious diseases throughout the first year of life. The risk was greater for younger infants. In the first two months of life, infants who were not breastfed had an almost six-fold greater risk of dying from infectious diseases than breastfed infants. Risk declined as the child got older.

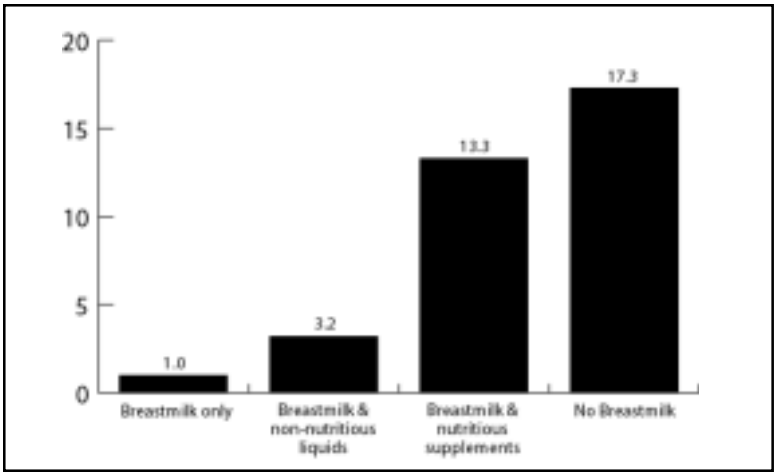
**Figure 1. Risk of Mortality from Infectious Disease if Not Breastfed (Pooled Odds Ratio)**




Source: WHO Collaborative Study Team, 2000

Figure 2 shows the risk of morbidity (in this case diarrhea) based on the findings of a study from the Philippines. The study compared infants who received only breastmilk with those who received no breastmilk. The figure also illustrates the risks of two kinds of mixed feeding (breastmilk with liquids such as water and teas and breastmilk with other supplements, often other milks). The risk of diarrhea was lowest for exclusively breastfed infants and highest for artificially-fed babies who received no breastmilk. The artificially-fed babies were 17 times more likely to get diarrhea than babies fed only breastmilk. The risk was intermediate for babies who received breastmilk and other substances.

**Figure 2. Risk of Diarrhea by Feeding Method in the Philippines among Infants 0-2 Months**




Source: Popkin, 1990

In addition to health benefits for the infant, there is a large literature that shows:

- the psychosocial and developmental benefits to the infant, including intellectual development
- greater food security, especially in emergency situations
- health benefits to the mother, such as the delay in the return of fertility postpartum
- economic benefits to the family
- benefits to the environment.

In a meta-analysis (Anderson, 1999) on intellectual development of breastfed versus non-breastfed infants, every study reported better intellectual development among breastfed children. Overall, breastfeeding was associated with a 3.16 point higher score for cognitive development compared with formula feeding, after adjusting for significant covariates. The difference between breastfed and formula-fed children was observed as early as six months and sustained through 15 years of age. Longer duration of breastfeeding was accompanied by greater differences in cognitive development between breastfed and formula-fed children. The magnitude of difference was greater in low birth weight infants, who benefited more from breastfeeding.

What difference does it make? An IQ increase of three points (one-fifth of a standard deviation) from 100 to 103 would elevate an individual from the 50th to the 58th percentile of the population and would potentially be associated with higher educational achievement, occupational achievement, income, and social adjustment.

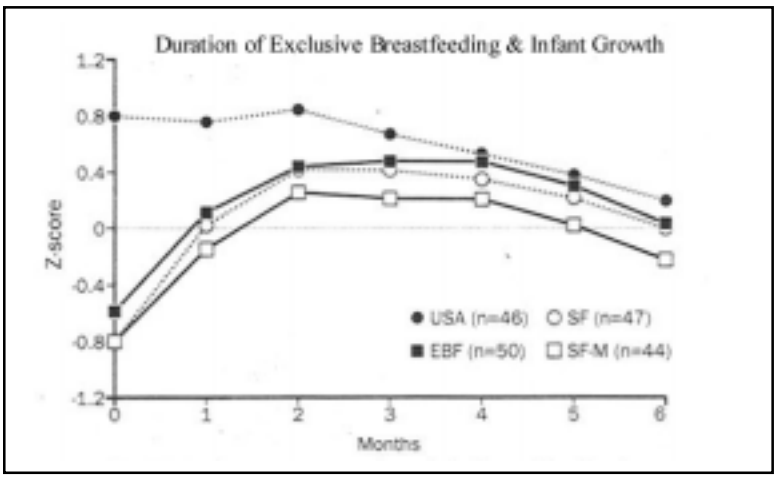
**Length of Exclusive Breastfeeding**

One question under discussion is the recommended length of exclusive breastfeeding. WHO currently recommends the introduction of complementary foods between four and six months. However, many experts argue that in developing countries, the risks of introducing foods before six months outweigh potential benefits. A study in Honduras (Cohen, 1994) offers strong evidence that exclusive breastfeeding to six months is the correct recommendation. This study looked at whether complementary foods introduced before six months increased the infant's total energy intake or replaced breastmilk.

Figure 3 shows growth (weight-for-age Z-scores) of infants from 0 to 6 months. The top line presents data for breastfed infants from a population in the United States. The bottom three lines report on data for three groups of infants in Honduras who were exclusively breastfeeding until 16 weeks. At that point, they were assigned to different feeding patterns: 1) exclusive breastfeeding continued to 26 weeks, 2) solid foods introduced at 16 weeks with the infant breastfed on demand, and 3) solid foods introduced at 16 weeks while the mother attempted to maintain the same frequency of breastfeeding. Commercial baby foods were used to avoid the potentially confounding influence of higher morbidity or nutrient deficiency in the groups receiving complementary foods.

The study showed no sign of differences in growth between four and six months for the three groups of Honduran infants. There was no difference in food intake or food acceptability. Breastfed infants self-regulated their total energy intake when other foods were introduced. They spontaneously decreased their nursing frequency and duration and significantly decreased their breastmilk intake. The conclusion to draw from this important study is that there is no advantage in introducing complementary foods before six months. Moreover, there may be strong disadvantages if there is increased exposure to contaminated complementary foods, displacement of breastmilk by foods of poor quality, and increased risk of morbidity.

**Figure 3. Weight-For-Age Z-Scores from 0-6 Months: Honduras vs. USA Breastfed Infants**




Source: Cohen et al., 1994

**Practices and Interventions Contributing to Successful Exclusive Breastfeeding**

Behavioral research has identified a number of specific practices and interventions that contribute to successful exclusive breastfeeding.

- *Immediate initiation of breastfeeding* post-delivery stimulates the release of oxytocin, which in turn stimulates strong uterine contractions. This may help to control post-partum bleeding. To encourage immediate initiation, the mother should remain with the newborn for at least several hours following delivery

- *Feeding colostrum* provides immunologic benefits to the baby and may help to discourage the feeding of pre-lacteal feeds (water, sugar-water, or other substances given before the start of breastfeeding). Pre-lacteal feeds can damage the baby's gut/intestine and expose the newborn to pathogens.

- *Frequent, on-demand breastfeeding* day and night ensures that the mother will make enough milk to match the baby's needs. Breastmilk is produced on a "supply and demand" basis. The more the baby suckles, the more breastmilk the mother produces. Frequent breastfeeding decreases the risk of engorgement, which can lead to breast inflammation and mastitis. It also prolongs lactational amenorrhea. Lactational amenorrhea is associated with reduced fertility and increased birth spacing.

- *Proper positioning and attachment* to the breast ensure that breastfeeding is comfortable and efficient and may help reduce the problem of "insufficient milk" that many women report. Proper positioning also decreases the risk of nipple problems.

Interventions in health facilities and the community can both promote and support exclusive breastfeeding.

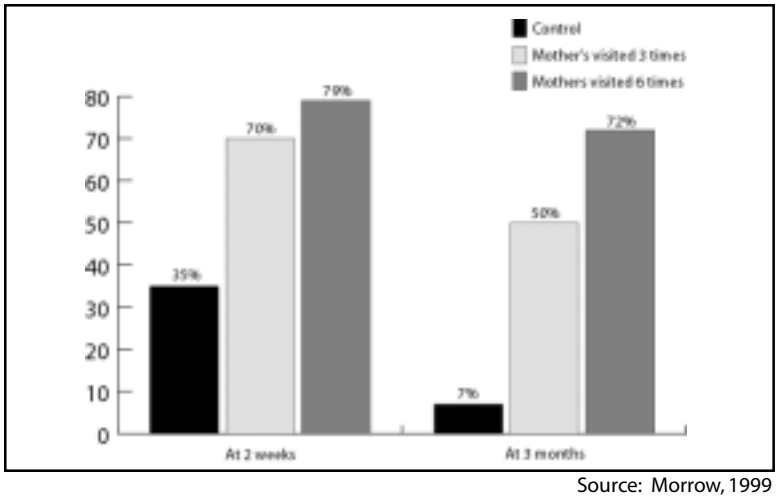
- *Prenatal education* offers the opportunity for counseling on optimal feeding practices.

- *Supportive hospital policies* include encouragement of early contact and suckling within the first hour of birth, rooming-in, training of hospital staff in lactation management, and restriction on the use of bottles in the hospital. These policies are all associated with increases in the duration of exclusive breastfeeding, especially in the first few weeks postpartum.

- *Community-based interventions* include peer counselors, mass media, and women's groups. Specific messages targeting key behaviors, skills, and perceived obstacles need to be addressed to the appropriate audience. Formative research can help to identify the specific messages. Since only about one-third of births in Africa occur in hospitals or maternity centers (WHO, 98), community-based interventions are important in increasing rates of early initiation and the duration of exclusive breastfeeding.

  Home visits can help to maintain exclusive breastfeeding. A study in Mexico (Morrow et al, 1999) conducted by the National Institute of Nutrition and La Leche League of Mexico found a relationship (dose-response effect) between the number of home visits by a peer counselor and the duration of exclusive breastfeeding, as illustrated in Figure 4. At three moths postpartum, 72 percent of mothers who were visited six times (twice during pregnancy; immediately after delivery; and at two, four, and eight weeks postpartum) were exclusively breastfed compared with only 7 percent among mothers who were not visited. This study is especially important since large improvements in exclusive breastfeeding were achieved in a country where this behavior is not commonly practiced.

**Figure 4. Effect of Home Visits on Rates of Exclusive Breastfeeding (Mexico)**




Source: Morrow, 1999

## Appropriate Complementary Feeding of Children 6-24 Months

After six months, breastmilk alone cannot meet the infant's total energy and other nutrient needs. At this time, complementary feeding should begin. Complementary feeding refers to the period when other foods or liquids are added to breastmilk. Complementary foods are any non-breastmilk foods given to young children during this period. Adding complementary foods to breastmilk is important because breastmilk remains an important source of energy, fat, high quality protein, and other nutrients. Breastmilk will be the most nutrient-rich food the older infant and young child receive. Most complementary foods are lower in fat than breastmilk. The fat in breastmilk may be necessary for the utilization of vitamin A.

Table 1 shows that the amount of energy needed from complementary foods depends on whether a child does or does not receive breastmilk. An infant six to eight months of age who is not breastfed will need to get three times as many calories from semi-solid and solid foods as the breastfed child. At nine to eleven months, the non-breastfed child will need about twice as many calories from these foods as the breastfed child.

**Table 1. Energy Needed from Complementary Foods among Breastfed and Non-Breastfed Children**

| Age in Months | Total Calories Needed | Not Breastfed | Breastfed |
|---|---|---|---|
| 6-8 | 680 | 680 | 270 |
| 9-11 | 830 | 830 | 450 |
| 12-23 | 1090 | 1090 | 750 |

Source: WHO/NUT/98.1

The key recommendations for feeding children 6-24 months of age are as follows:

- *Continue frequent, on-demand breastfeeding to 24 months and beyond.* In addition to contributing nutrients, breastmilk continues to reduce the risk of infection, especially diarrhea.

- *Introduce complementary foods at about six months.*

- *Increase food quantity and feeding frequency, using a combination of meals and snacks, as the child gets older; maintain frequent breastfeeding*. Many breastfeeding counselors recommend that women breastfeed before feeding complementary foods, especially until a child is 10-12 months old. This recommendation is intended to maximize breastmilk consumption and stimulate breastmilk production. Although there is no scientific evidence for this recommendation, it is a "common-sense position."

- *Increase breastfeeding frequency during and after illness*. Breastmilk is extremely important during illness. Children often continue breastfeeding even when they have no appetite and refuse other foods.

- *Adapt the diet to the child's requirements and abilities*. Increase food thickness and variety as the child ages.

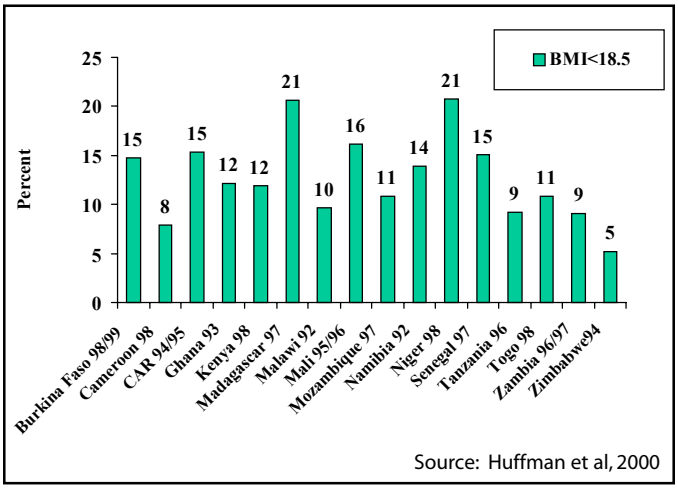
- *Practice active feeding.* Active/interactive feeding means that the caregiver adapts to the child's interest in eating and motor skills (such as ability to pick up pieces of food) and responds to the child's desires (such as reaching for food or wanting to feed himself or herself).

Several lessons can be learned from infant feeding policies and programs. More attention needs to be directed to maintenance of breastfeeding, inter-active feeding, reduced contamination of complementary foods, increased intake of important micronutrients (especially those that affect growth such as iron and zinc), and improved child feeding practices during illness and convalescence.

## Recommended Practices to Improve the Nutrition of Adolescent Girls and Women of Reproductive Age

Many women throughout the world have inadequate weight in relation to their height, indicating insufficient dietary intake. The Body Mass Index (BMI) measures this relationship. In adult women, BMI $< 18.5$ (kg/m$^2$) is used as an indicator of chronic energy deficiency. Figure 5 shows the high proportion of African women falling below this cut-off value.

**Figure 5. Prevalence of Malnutrition among African Women 15-49 Years (DHS 1990-1998)**

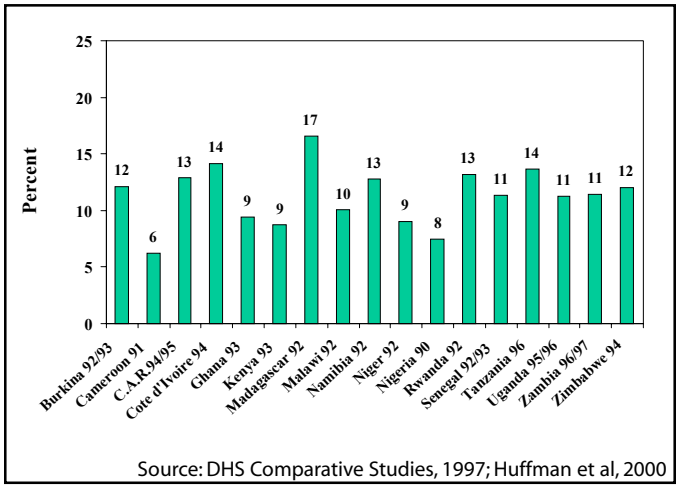



Chronically energy-deficient women have a higher prevalence of infections because of reduced immunity/immunocompetence. As a result of the disproportion between the size of the baby's head and the space in the birth canal, they are at increased risk for obstructed labor. This puts them at higher risk of mortality. Obstructed labor accounts for eight percent of maternal deaths worldwide (WHO and World Bank, 1997).

Malnourished women are also at greater risk of giving birth to low birth weight infants. In more than 70 percent of the sub-Saharan countries with data from Demographic Health Surveys, 10 percent or more of babies were born with low birth weight (see Figure 6). Neonatal mortality rates are two to three times higher for low birth weight infants compared to those of normal birth weight. The risks of infant mortality from infectious diseases (diarrhea and pneumonia) and growth failure are also greatly increased for infants born growth retarded.

About two-thirds of low birth weight in developing countries is due to fetal growth retardation, largely associated with maternal malnutrition prior to and during pregnancy. There is a strong association between low pre-pregnancy weight and intrauterine growth retardation, demonstrated in a meta-analysis of 25 studies of maternal anthropometry and pregnancy outcome from 20 countries (WHO, 1995).

**Figure 6. Percent Low Birth Weight (<2.5 kg) in Africa**




Deficiencies in iron, iodine, and vitamin A are highly prevalent among women in many regions of the world. More vitamin A may be needed by lactating women to ensure adequate vitamin A concentration in breastmilk. Iron requirements are particularly high during pregnancy, when rates of anemia rise to 50 percent or more in many countries. Higher iron levels are needed because of the growth of the fetus and placenta and the expansion of blood volume. Anemic women are more likely to die from blood loss during delivery and more likely to deliver low birth weight infants. Those infants who survive show lower scores on tests of intellectual ability than non-anemic children.

The timing and spacing of births can have a nutritional impact on both mother and child. Pregnancy at an early age contributes to early cessation of growth and its associated risks. Closely-spaced pregnancies and lactation lead to increased nutrient needs in order to achieve adequate weight gain during pregnancy and to build stores for lactation. Multiple pregnancies_contribute to the depletion of a mother's own nutrient stores.

When women's nutritional requirements are not met, maternal malnutrition has negative results for the mother and for the next generation. Maternal malnutrition is a significant link in the intergenerational cycle of malnutrition. In this cycle, small maternal size leads to low birth weight and then to growth failure in children, which in turn leads to small adult women.

The following list of recommended practices is divided into four sections: those that apply at all times and those that address additional nutritional requirements during adolescence, pregnancy, and lactation.

**At All Times**

- *Increase food intake, if underweight*, to protect health and establish reserves for pregnancy and lactation. Women who enter pregnancy underweight may have difficulty gaining sufficient weight for adequate fetal growth and good birth outcomes, especially if they continue to perform heavy physical labor. It is, therefore, recommended that they continue to increase their energy intake between reproductive cycles.

- *Improve diet quality and micronutrient intake by diversifying the diet.* Increase consumption of fruits and vegetables, eat animal foods when possible, use fortified foods when available (vitamin A-fortified sugar, iron-fortified flour, other micronutrient-enriched staples), and use iodized salt.

- *Take micronutrient supplements* if requirements cannot be met through available food sources. Limiting supplements to only one or two micronutrients may be less effective in improving overall nutrient status because of the interactions among nutrients. Addressing multiple deficiencies (iron, folic acid, vitamin A, zinc, and others) prior to pregnancy and lactation is recommended.

**During Adolescence**

- *Increase food intake* to accommodate the adolescent "growth spurt," establish reserves for pregnancy and lactation, and meet greater iron needs. Physical growth is more rapid in adolescence than at any other time, with the exception of the first year of life. The adolescent "growth spurt" begins about a year before the first menstrual period. Growth in height_continues for up to seven years after the onset of menstruation (menarche). The development of the birth canal does not occur until two to three years after full height is reached. Many women are still growing into their twenties.

- *Delay the first pregnancy*. Adolescent girls are able to conceive before their body development is completed. Adolescent girls who become pregnant are at increased risk of malnutrition as nutrients are diverted from mother to fetus. They experience more pregnancy complications and poor birth outcomes. For adolescent girls less than 18 years, the risk of dying in childbirth is three times greater than for women between 20-29 years.

**During Pregnancy**

- *Increase food intake* to support fetal growth and build stores for lactation. The average woman gains about 10 kilograms during pregnancy. In many developing countries, women gain barely half this amount as a consequence of poor diet and heavy workloads. For women who start pregnancy with good nutritional status, the additional food intake required is about 200 kilocalories. For women who enter pregnancy underweight, more kilocalories are needed to achieve adequate weight gain. The effect of food supplementation on maternal nutritional status and infant birth weight is greatest when it targets undernourished women, particularly at times of the year when food is scarce and/or workload is high.

- *Take iron/folate acid supplements daily.* An estimated 20 percent of maternal deaths during childbirth are attributed to anemia. Recommendations for iron/folic acid

vary based on whether the prevalence of anemia in pregnant women is greater than or less than 40 percent. For regions where the prevalence of anemia in pregnant women is lower than 40 percent, pregnant women should take a daily supplement of iron and folic acid (60 mg of Fe and 400 µg folic acid) during the last two trimesters of pregnancy. In regions where the prevalence of anemia in pregnant women is higher than 40 percent, supplementation should continue for three months after delivery. If supplementation starts late in pregnancy, there are two options: 1) increase the amount of supplement given during pregnancy (120 mg Fe until the end of pregnancy) or 2) supplement at the same level during the remainder of pregnancy and continue to supplement for six months after delivery (60 mg Fe daily). Folic acid is included in the supplement because it helps to prevent anemia and reduces the risk of obstetric complications and neural tube defects.

- *Reduce workload*. Pregnant women should reduce their workload to decrease energy expenditures and optimize energy balance.

**During Lactation**

- *Increase food intake*. In developing countries, breastfeeding mothers should be advised to consume the equivalent of an extra meal per day (about 650-700 kcal) to meet their energy requirements. This is more than three times the additional requirement during pregnancy (200 kcal/day). One question that is often raised is the relationship between a woman's nutritional status and her ability to breastfeed. The nutritional status of the breastfeeding woman has little effect on her ability to breastfeed her infant. Only in extremely malnourished women is the energy and protein content of breastmilk significantly affected. Malnourished mothers can breastfeed successfully, but they need to increase their food intake so that they do not compromise their own nutritional status and health to nourish their infants.

- *Take a high dose vitamin A capsule* (200,000 IU) as soon after delivery as possible in areas where vitamin A deficiency is prevalent. Some micronutrient deficiencies *may* result in lower levels of these nutrients in breastmilk. Vitamin A is a good example of this. The high-dose capsule should be taken as soon after delivery as possible (but not more than eight weeks postpartum because of the possible risk of pregnancy and the potential harm to the fetus). The added vitamin A boost will help to build stores, improve the vitamin A content of breastmilk, and reduce maternal morbidity.

- *Protect against pregnancy and space births for three years or longer*. A short interval between births may not provide women with enough time to replenish lost energy stores before beginning another reproductive cycle. A short interval can result in higher rates of maternal anemia. Moreover, babies born less than two years after their next older sibling have higher rates of fetal growth retardation and shorter breastfeeding duration. They are twice as likely to die compared to children with at least a two-year interval (Rutstein, 1999 ). A three-year interval between births provides even more protection.

- The Lactational Amenorrhea Method (LAM) is an effective modern, temporary family planning method that can help to both space pregnancies and provide optimum nutrition to infants. LAM is defined by three criteria: 1) the woman's menstrual periods have not resumed, *and* 2) the baby is fully or nearly fully breastfed, *and* 3) the baby is less than six months old. Full breastfeeding is the

term applied to both exclusive breastfeeding and almost exclusive breastfeeding (vitamins, water, juice, or ritualistic feeds given infrequently in addition to breastfeeds). While exclusive breastfeeding is not necessary for LAM to be effective, the closer the pattern is to exclusive, the better for mother and baby. When any one of the three LAM criteria is no longer met, a woman needs to switch to another contraceptive method.

#### During the Interval between Stopping Lactation and the Next Pregnancy

- *Plan for a recuperative period between lactation and the next pregnancy*. Allow at least six months between the end of breastfeeding and the next pregnancy. This will help the mother to replace and build up fat and micronutrient stores. The recuperative period will also have a positive impact on pregnancy outcomes (birthweight, maternal survival, and infant morbidity/mortality).

## Feeding during Emergencies

Another time when we need to pay special attention to meeting the nutritional needs of populations is during an emergency. The number of people forced from their homes by violence and repression stood at more than 35 million by the end of the decade, with millions more affected by natural disasters. Approximately 13.7 million Africans remained internally-displaced or refugees by the end of the decade. A significant proportion of these emergency-affected populations (up to 80 percent in some situations) are women and children.

If we assume that ten million African women between the ages of 15 and 49 have been uprooted and that 20 percent of these women are pregnant, this means that there are about 2 million African mothers and their infants who are emergency-affected.

#### Benefits of Breastfeeding in Emergencies

- The feeding recommendations for these two million women and their children remain the same as those in non-emergency situations. Breastfeeding is important in emergencies because:

- *Breastmilk provides high quality food*. Breastfeeding mothers are excellent converters of poor quality food (emergency rations) and contaminated water into good quality food and safe fluid. Therefore, it is especially important in emergencies to feed the mother and let her breastfeed the baby exclusively for the first six months.

- *Breastfeeding enhances survival.* As in non-emergency situations, breastfeeding helps protect against common childhood diseases that are major killers of infants and children. In emergency situations, a breastfed infant carried by the mother during mass population movements is less likely to get lost.

- *Breastfeeding ensures food security*. In a very insecure environment, supply lines of basic food rations and pharmaceutical and medical supplies are often cut or disrupted. This situation is especially dangerous for mothers who are using artificial formula and depending on externally-supplied infant formula. Political and social

hierarchy in many situations also results in inequitable access even if infant formula is available.

- *Breastfeeding helps reduce demand for services in chaotic environments*. For logisticians, this reduces the need to provide infant formula, cups, additional water for mixing and for cleaning, fuel, mixing utensils, and soap. For providers of health and medical services, this means less work. If women do not breastfeed, these providers must demonstrate and educate mothers about mixing and feeding, provide supervision and follow-up, and then provide additional care for sick infants.

Conditions that exist in emergencies make safe artificial feeding especially difficult for mothers and other caregivers. Risks of artificial feeding dramatically increase due to limited water and fuel, unreliable transport, unpredictable formula supplies, improper storage, unsanitary handling, and cargivers' lack of familiarity with breastmilk substitutes. Indiscriminate, free distribution of breastmilk substitutes can lead to "spillover." Women in either the emergency-affected or host populations can needlessly switch to artificial feeding.

**Challenges to Breastfeeding in Emergencies**

The benefits of breastfeeding in emergencies are overwhelming, and the risks of artificial feeding are high. At the same time, the challenges to breastfeeding are ever present. These challenges include:

- *Daily survival activities*. During emergencies, these activities take more time and energy than normal and often require separation of mother and infant.

- *Stress* from dislocation, insecurity, sexual violence (rape).

- *Fewer social supports.* Separation from those they trust in the family and community, a breakdown of health and social services, and overburdened emergency health facility staff who are ill-prepared to counsel on breastfeeding can undermine breastfeeding.

- *High incidence of low birth weight babies.* These babies may be too weak to suckle and stimulate adequate breastmilk supply.

- *Often indiscriminate, free distribution of breastmilk substitutes* (both deliberate and well-meaning) can undermine the confidence of breastfeeding mothers and create dependency.

- *Misconceptions about breastfeeding in emergencies*. One of the misconceptions is that women under stress cannot breastfeed. We know that extreme stress or fear may cause milk to momentarily stop flowing. This response, like many other physiological responses to anxiety such as accelerated heart rate and sweating, is usually temporary. The treatment for poor milk release is increased suckling frequency and duration, along with social support to the mother from other breastfeeding women. Despite widespread beliefs to the contrary, a mother who has stopped breastfeeding can begin breastfeeding again if she receives skilled assistance for re-lactation and support. In the 1980s, mothers in South Africa were helped to restart breastfeeding after they had switched to donated formula.

Another misconception, previously discussed, is the belief that maternal malnutrition affects a woman's ability to breastfeed. During emergencies, it makes no sense to let the mother go hungry while truckloads of formula are brought in. Food should go to the mothers so that they can breastfeed their infants and maintain their strength to care for other children in the family.

In some cases, a health worker who has adequately assessed a woman may determine that artificial feeding may be the appropriate option. In such circumstances, caregivers should be provided with information on the alternatives–prioritized for their safety–along with education, support, and monitoring for correct use.

### Support for Breastfeeding in Emergencies

To overcome the challenges to breastfeeding in emergencies, appropriate response is needed at many levels by national authorities, UN bodies, and development and relief agencies. At the international level, major efforts are underway to address the issue of appropriate infant feeding in emergencies. For example, the InterAgency Working Group is a joint effort by UN agencies, groups in east and southern Africa, IBFAN, LINKAGES, and humanitarian agencies to develop agreed-upon standards and activities for infant feeding in emergencies. The Operational Guidance developed by the Working Group lays out "what should be done" and not "how to do it." Another example at the international level is the development by WHO, UNICEF, LINKAGES, and IBFAN of training materials that address implementation activities to support appropriate infant feeding in emergencies.

Development of policies and guidelines on infant feeding and the procurement, distribution, and use of infant feeding products is also important at the national level. One of the activities that supports an appropriate and comprehensive response is pre-deployment and in-service training. Agencies should draw upon the resources of local and national breastfeeding expert groups. These expert groups can serve as a focal point to coordinate efforts at the central and field levels.

To ensure accountability and to minimize the risk of artificial feeding, changes in infant feeding practices and adherence to the International Code of Marketing of Breastmilk Substitutes should be monitored. The impact on breastfeeding of activities undertaken by those involved in logistics, camp management, and health and nutrition should also be monitored.

## Summary

Nutritional deficiencies often begin before birth and continue throughout life. This paper identified a set of recommendations from conception through the reproductive years to improve infant and young child nutrition. These recommendations are based on evidence and experience showing that:

- Exclusive breastfeeding for about six months provides an infant the best start in life and the best chance for survival, growth, and development.

- Breastmilk continues to provide important nutritional benefits to about 24 months.

- Immediate initiation, proper attachment and positioning, and frequent, on-demand feeding will help an individual mother achieve successful infant and young child feeding.

- Infant feeding recommendations remain the same in emergencies. What changes are the challenges. Preparedness, coordination, and vision at the national level have a vital role to play.

- A life-cycle approach to nutrition, including attention to the nutrition of adolescents and all women of reproductive age, will benefit the woman herself and contribute to the development of future generations.

## References

Anderson JW, Johnstone BM, and Remley DT. Breast-feeding and cognitive development: a meta-analysis. AJCN 1999; 70:525-35.

Cohen RJ, Brown KH, Canahuati J, Rivera LL and Dewey KG. Effects of age of introduction of complementary foods on infant breast milk intake, total energy intake, and growth: a randomised intervention study in Honduras. Lancet 1994; 343: 288-93.1994.

Haggerty PA and Rutstein SO. DHS Comparative Studies: Breastfeeding and Complementary Feeding, and the Postpartum Effects of Breastfeeding. MACRO International, Inc., Calverton, MD, 1999.

Huffman, SL et al. Essential Health Sector Actions for Maternal Nutrition in Africa. Draft, October 2000.

International Federation of Red Cross and Red Crescent Societies. World Disasters Report 2000: Focus on Public Health.

LINKAGES. Recommended Feeding and Dietary Practices to Improve Infant and Maternal Nutrition. Washington, DC. Academy for Educational Development, 1999.

Morrow AL, Guerrero ML, Shults J, Calva JJ, Lutter C, Bravo J, Ruiz-Palacios G, Morrow RC, Butterfoss FD. Efficacy of home-based peer counseling to promote exclusive breastfeeding: a randomized controlled trial. Lancet. 1999 Apr 10;353 (9160):1226-31.

Popkin BM, Adair L, Adin JS, Black R, Briscoe J, Flieger W. Breast-feeding and diarrheal morbidity. Pediatrics 1990; 86:874-82.1990.

RNIS 31: Report of the Nutrition Situation of Refugees and Displaced Persons. United Nations Sub-Committee on Nutrition, 25 July 2000.

Rutstein S. Effect of Birth Intervals on Mortality and Health. Multivariate Cross-Country Analyses. DHS+/Macro International, 1999.

WHO Collaborative Study Team on the Role of Breastfeeding on the Prevention of Infant Mortality. Effect of breastfeeding on infant and child mortality due to infectious diseases in less developed countries: a pooled analysis. Lancet 2000; 355: 451-55. [Vol. 35. February 5, 2000.]

WHO/CHD/98.9 Evidence for the ten steps to successful breastfeeding. Division of Child Health and Development, Geneva, 1998

WHO/NUT/98.1. Complementary Feeding of Young Children in Developing Countries: a Review of Current Scientific Knowledge. WHO, Geneva.

WHO Bulletin OMS: Supplement Vol 73 1995. Maternal Anthropometry and Pregnancy Outcomes. A WHO Collaborative Study.

WHO and World Bank, 1997. Wall Chart: Maternal Health Around the World. WHO, 1997.

# HIV/AIDS and Infant Feeding: Risks and Realities in Africa

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## Introduction

Every year, approximately 600,000 babies are infected with HIV, the virus causing AIDS. Five-hundred thousand of these babies are born in Africa. Mother-to-child transmission of HIV is responsible for nearly all pediatric infections and for about 10 percent of all new HIV infections worldwide.

HIV can be transmitted from mothers to babies during pregnancy, at the time of delivery, or through breastfeeding. This paper provides a brief overview of what is known about the risks of HIV transmission during each of these periods, and it discusses experience adapting international guidelines on HIV and infant feeding and counseling women about feeding options in Africa.

## Mother-to-child transmission of HIV: Magnitude of the problem

Sentinel surveillance and HIV prevalence studies among pregnant women living in urban areas suggest that HIV infection rates in Africa range from around 5 percent to 45 percent. HIV infection rates are highest in Southern Africa. In urban areas of Zimbabwe, Zambia, Swaziland, Botswana, Malawi, and South Africa, more than 25 percent of pregnant women are HIV-infected. In some clinics where data are collected, the rates are as high as 50 percent.

In general, antenatal infection rates are lower in East and West Africa, although the problem is still serious. In Kenya, Uganda, Tanzania, Ethiopia, Cote d'Ivoire, and Burkina Faso, between 10-20 percent of urban women receiving antenatal care are HIV-infected. In Nigeria, the HIV-infection rate in pregnant women is less than 10 percent. However, due to the large population size, many HIV-infected women are likely to be seen in MCH programs.

In contrast, in Latin America and Asia, antenatal HIV seroprevalence rates among urban women are usually 5 percent or less, although the epidemic is spreading rapidly in Asia and higher rates and absolute numbers of infected women are expected in the future.

When considering the problem of mother-to-child transmission of HIV, it is important to remember two basic facts:

- not all HIV-infected women pass the virus to their babies; and
- it is not possible to determine the precise timing of HIV transmission among infants who test positive in the first weeks of life.

It is estimated that between 25 and 45 percent of HIV-infected women living in resource-poor settings will pass on HIV to their babies during pregnancy, delivery, or through breastfeeding in the absence of anti-retroviral drug (ARV) interventions. This means that 55-75 percent of babies born to HIV-infected mothers will not become infected, even if breastfed.

## Mother-to-child transmission: Timing of HIV transmission

Several tests have been used to determine the infection status of infants. A complete discussion of the different tests used is beyond the scope of this paper. More information is found in Preble and Piwoz (1998).

Antibody tests (e.g., ELISA) do not distinguish between antibodies acquired from the mother and the infant's own antibodies produced in response to actual HIV-infection. These tests therefore can not accurately detect infection in babies until all maternal antibodies have cleared (by about 15 months of age), and they can not determine when the infant became infected.

More recent tests use PCR (polymerase chain reaction) methods to detect HIV DNA or RNA in infants. However, these tests can not distinguish between infections occurring late in pregnancy, at delivery, or through breastfeeding in the first weeks of life. This is because of a variable "window" or lag period between the time of infection and when it is first detectable with PCR technology.

To determine the timing of infection the convention among researchers is as follows:

- **Pregnancy:** infants with a positive PCR test within the first 48 hours of life are considered to be infected in-utero.

- **Delivery:** infants with a negative PCR within the first 48 hours and their first positive PCR test within 60 days of birth are considered to be infected during delivery. However, as noted above, the baby may have actually been infected in late pregnancy or, if breastfed, early transmission through breastfeeding may actually be the source of infection.

- **Post-natal:** breastfed infants with a negative PCR in the first 60 days and their first positive PCR after 60 days are considered to be infected through breastfeeding. Again, if there is no test before 60 days it is not possible to say when transmission occurred – during pregnancy, delivery, or through breastfeeding.

Thus, determining that HIV-transmission occurs through breastfeeding actually requires at least two carefully timed PCR tests. Even in controlled research studies it has proven challenging – and expensive - to get infants' blood for testing at such carefully-timed intervals. Although researchers have tried to use uniform methods, published reports cover various age periods, making it difficult to compare transmission rates attributed to breastfeeding at different ages.

Even with these limitations, it is possible to make some rough estimates of the risk of HIV transmission at different time periods.[1] Studies suggest that of the 25 to 45 percent of women who pass HIV to their babies, the risks attributable to each period are as follows:

[1] These estimates are the result of the author's analyses and calculations. A recent paper (De Cock et al. *JAMA* 2000; 283(9): 1175-82) gives similar estimates, but with higher upper limits for breastfeeding transmission.

- **Pregnancy:** 5-10 percent (in the absence of antenatal ARV treatment, the published study average is ~ 7 percent)

- **Delivery:** 10-20 percent (average with no delivery intervention: ~15 percent).

- **Breastfeeding:** 10-20 percent (the average where breastfeeding is practiced for about two years: ~15 percent).

Recent studies suggest that the risk of breastfeeding transmission may be greater in the first 6 months of life than in the remaining 18 months, with about half (~ 8 percent) of the total attributable risk taking place by 6 months. The reasons are not clear but could be related to the immaturity of the infant gut and immune system; the higher volume of milk ingested; higher frequency of breast inflammation and/or infection in early infancy; or a combination of all of the above.

**Table 1** summarizes the findings of several longitudinal studies and/or intervention trials that report data on HIV-infection rates among breastfed infants at different time periods. Two studies compare rates among breastfed and non-breastfed infants from the same population. Only one study has differentiated between exclusively breastfed and partially breastfed babies, which is remarkable since it has long been known that exclusive breastfeeding protects against a number of infections in early infancy. However, there is interest in ensuring that breastfeeding patterns are measured in all future studies. As more data become available, these estimates may change or become more precise.

For purposes of comparison, HIV transmission rates in the Uganda HIVNET 012 protocol trial, which provided intrapartum and postpartum nevirapine (NVP) or zidovudine (ZDV) to women who breastfed their infants are also presented in **Table 1.** MTCT rates among women receiving ARV treatment in the RETRO, DITRAME, and PETRA studies are not shown. However, these studies found that 8-10 percent of breastfeeding women who received ARV treatment during late pregnancy, delivery, and the first week postpartum transmitted the virus to their infants between 6 weeks and 18-24 months of age (Wiktor et al, 2000; Gray, 2000).

**Table 1** shows that consistently, across countries, MTCT rates among breastfeeding women are around 30 to 35 percent by the second year of life. However, mothers who practice early exclusive breastfeeding, at least in the Durban study, appear to have lower MTCT transmission rates. These rates were similar to the HIVNET 012 nevirapine (NVP) arm at 3 months (14.6 versus 13.6 percent at 90-120 days).

**Table 1**: Cumulative HIV infection rates in infants born to HIV-infected mothers from cohort and/or intervention trials in Africa according to first HIV-positive PCR and feeding pattern.

EBF=exclusive breastfeeding MBF=non-exclusive BF NBF= not breastfed
ZDV=zidovudine NVP=nevirapine

| Site | < 2 d | 30-60 d | 90-120 d | 6 mos | 12-15 mos | 18-24 mos |
|---|---|---|---|---|---|---|
| **Durban**[2] | | | | | | |
| NBF | 6.4 | 14.8 | 19.4 | 19.4 | 19.4 | |
| EBF | 6.8 | 8.7 | 14.6 | 19.4 | 24.7 | |
| MBF | 5.2 | 14.2 | 24.1 | 26.1 | 35.9 | |
| **Nairobi**[3] | | | | | | |
| BF | 7.0 | 19.9 | 24.5 | 28.0 | 32.3 | 36.7 |
| NBF | 3.1 | 9.7 | 13.2 | 15.9 | 18.2 | 20.5 |
| **Blantyre**[4] | | | | | | |
| Any BF | 26.0 | | | 29.5 | 33.0 | 36.3 |
| **RETRO**[5] **& DITRAME**[6] **Abidjan & Bobo Diollosso** | | | | | | |
| Any BF (placebo) | 8.4 | 23.6 | 25.6 | 26.4 | 28.8 | 30.3 |
| **PETRA**[7] **Kampala, Dar, Durban, Jo'berg** | | | | | | |
| All infants/ placebo arm | 16.4 | | | | | 26.8 |
| ***HIVNET 012***[8] ***Kampala*** | | | | | | |
| *Any BF* | *10.3(ZDV) 8.1 (NVP)* | *20.0 (ZDV) 11.8 (NVP)* | *22.1 (ZDV) 13.6 (NVP)* | | *24.1(ZDV) 15.7(NVP)* | |

**Table 2** summarizes the total and proportional risks of MTCT during different time periods. As seen in column 3, where breastfeeding is practiced for about two years and there is no ARV drug intervention, about 20 percent of MTCT occurs during pregnancy, about 40 percent occurs during delivery, and about 40 percent occurs through breastfeeding. If breastfeeding or study follow-up is for shorter duration, the proportion of HIV infection attributable to breastfeeding will be less[9].

It is also important to put these numbers into context. Column 4 of **Table 2** shows the percentage of infants in the total population who may be affected by MTCT at different periods for areas with relatively low and high antenatal HIV seroprevalence rates. The data in column 4 are derived by multiplying the HIV antenatal seroprevalence rate by the attributable risk. In areas of low seroprevalence, MTCT affects less than 2 percent of babies born each year, whereas in areas of high seroprevalence, about 10 percent of babies born are affected. Less than 4 percent of babies born each year in high seroprevalence areas are infected with HIV through breastfeeding.

[2] Coutsoudis et al,. 1999; 2000

[3] Nduati et al, 2000

[4] Miotti et al, 1999

[5] Wiktor et al, 1999; 2000

[6] Dabis et al, 1999

[7] Gray, 2000. 30 percent of babies in the placebo arm did not breastfeed. The 18-month data reflect HIV transmission and mortality among placebo group infants.

[8] Guay et al, 1999; Owor et al, 2000.

[9] In non-breastfeeding populations about one-third of MTCT is attributable to pregnancy and the remainder (~ 67 percent) occurs during delivery.

**Table 2**. Total and proportional risk of HIV transmission from mothers to babies during pregnancy, delivery, and through breastfeeding

| Timing | Total Attributable Risk | Proportion of MTCT transmission | Proportion of all infants likely to become infected if antenatal HIV prevalence is low (5%) or high (25%) | |
|---|---|---|---|---|
| **Pregnancy** | 7% (range: 3-10) | 20% | **Low**: 0.35% | **High**: 1.75% |
| **Delivery** | 15% (range: 2-19) | 40% | 0.75% | 3.75% |
| **Breastfeeding**<br>(Up to 6 mo)<br>Up to 24 mo | <br>8% (range: 3-12)<br>15% (range: 9-22) | <br><br>40% | <br><br>0.75% | <br><br>3.75% |

## Risk Factors for MTCT of HIV

There are many known risk factors that make it more likely that an HIV-infected mother will pass the virus to her baby. The relative contribution of each is not known since most studies have not measured all the known risk factors. **Table 3** summarizes the known risk factors for MTCT at different time periods with an indication of whether the evidence for increased risk is strong or limited. This table is adapted from a paper published by WHO (1998). The exact criteria for determining strength or limitation were not given. It is assumed that strong evidence assumes that the risk factor was important in more than one study, that the evidence is consistent across several studies, and, possibly, one or more clinical trials has shown MTCT risk reduction when the risk factor was changed. Limited evidence is likely to mean that there is only one study suggesting the risk factor, that studies have produced conflicting results, or that there have been no clinical trials.

**Table 3.** Risk factors for MTCT of HIV by time period and strength of the evidence

| Risk factor | Pregnancy | Delivery | Breastfeeding |
|---|---|---|---|
| High viral load | Strong | Strong | Strong |
| Viral Characteristics | Strong | Strong | Strong |
| Advanced disease | Strong | Strong | Strong |
| Immune deficiency | Strong | Strong | Strong |
| Vitamin A deficiency | Limited | Limited | Being studied |
| Anemia | Limited | | |
| Placental malaria parasitemia | Limited | | |
| Untreated STI | Limited | Limited | |
| Chorioamnionitis | Limited | Limited | |
| Vaginal Delivery (vs. C-section) | | Strong | |
| Prolonged rupture of membranes (4+ hrs) | | Strong | |
| Invasive delivery procedures | | Limited | |
| Episiotomy | | Limited | |
| Any breastfeeding (vs. none) | | | Strong |
| Non-exclusive BF | | | Limited |
| Elevated BM sodium | | | Limited |
| Mastitis, abscesses | | | Strong |
| Cracked, fissured nipples | | | Limited/Strong |
| Lesions of infant mouth, intestine | | | Limited |
| New HIV infection while breastfeeding | | | Strong |
| Breastfeeding duration | | | Strong |

Adapted from WHO (1998). HIV and Infant Feeding: A review of HIV transmission through breastfeeding.

As shown in **Table 3**, the most important risk factors for breastfeeding transmission include:

- High maternal viral load
- Viral characteristics
- Maternal immune status/disease progression
- Breastfeeding status and duration (and possibly also pattern of breastfeeding)
- Breast health (infection, inflammation, cracked nipples, etc.)
- HIV infection of the mother occurring during lactation

Additional risk factors are likely to be identified in the future and the strength of the evidence is likely to change as more studies are conducted on breastfeeding transmission. In many instances evidence is 'limited' because there has only been one study addressing the issue. It is not because the issue is not important or the biologic plausibility is weak.

As shown in **Table 3**, high maternal viral load is one of the most important risk factors for MTCT at all time periods. This poses a challenge for intervention programs because viral load is high immediately following infection during the window period when infection can not be detected using an antibody and a person might not suspect he or she is infected or infectious. Most short-course ARV treatments, given late in pregnancy and during labor and post-delivery, are believed to reduce transmission by reducing maternal viral load and preventing establishment of the infection in the baby (Shapiro et al, 1999; Coovadia, 2000).

The fact that viral load is higher immediately after infection has important implications for breastfeeding transmission and interventions. It is important for <u>all</u> breastfeeding women to take steps (e.g., use condoms during sexual intercourse) to prevent becoming infected with HIV while they are breastfeeding because the risk of transmission through breastfeeding is two-fold greater – estimated to be about 30 percent - immediately following HIV exposure.

Also with respect to interventions, it is important to consider the potential of exclusive breastfeeding and proper lactation management to reduce HIV transmission through breastfeeding. A study in South Africa (see **Table 1**) suggested that the increased risk in HIV transmission through breastfeeding during the early months of life occurred primarily in babies who were not exclusively breastfed. In that study, babies who had been breastfed exclusively for at least three months had similar rates of HIV infection at six months as formula fed babies.

Other studies have shown a higher risk of HIV transmission in the presence of breast inflammation (two-fold), cracked nipples (five-fold), breast abscesses (up to 50 fold), and clinical mastitis (more than 20 fold). These conditions can be minimized by proper lactation management, including proper infant positioning, breast attachment, milk emptying, and prompt treatment of all breastfeeding problems and infections.

## UN Policy and Guidelines on HIV and Infant Feeding

With increasing evidence and growing media attention on the issue of HIV transmission through breastfeeding, the UN agencies (UNAIDS, UNICEF, and WHO) issued a revised policy statement on HIV and infant feeding in 1997. That statement articulated the issue from a human rights perspective, recognizing the importance of primary prevention and protecting the health of mothers and children. It outlined the elements for establishing a policy on HIV and infant feeding, including supporting breastfeeding; improving access to HIV counseling and testing; ensuring a concept of 'informed choice'; and preventing commercial pressures for artificial feeding.

The concept of informed choice was the newest element of this policy – a departure from previous policy statements. The statement reads:

> *"…it is mothers who are in the best position to decide whether to breastfeed, particularly when they alone may know their HIV status and wish to exercise their right to keep that information confidential. It is therefore important that women be empowered to make fully informed decisions about infant feeding, and that they be suitably supported in carrying them out…"* (WHO, 1997)

The next year, in 1998, the UN agencies released a guidelines for decision makers to define the actions that should be taken to promote informed choice and support to HIV-positive mothers on infant feeding issues (WHO, 1998). These guidelines, which pre-date many of the findings described in this paper, include the following infant feeding options for HIV-positive mothers:

- **Replacement feeding**: From birth to 6 months the options described include commercial infant formula, home-prepared formula, and modified full-cream powdered milk formula. After 6 months, general information on feeding with home prepared foods (3 or 5 times per day) is provided.

- **Modified breastfeeding:** The options described include early cessation of breastfeeding (the duration decided by the mother), and expressing and heat-treating breast milk.

- **Other breastfeeding options:** This includes breast-milk banks and wet-nursing.

It is important to emphasize that for HIV-negative women and women who do not know their status, the guidelines clearly state that breastfeeding is to be promoted, supported, and protected. All other previously recommended breastfeeding and complementary feeding behaviors (e.g., exclusive breastfeeding, continued breastfeeding for two years and beyond, etc.) are still recommended.

## Adapting the HIV and Infant Feeding Guidelines to the Local Context

Following the release of the HIV and infant feeding guidelines — as well as a great deal of media pressure accompanying the release of findings from Thailand showing a 50 percent reduction in MTCT with a short course of AZT and no breastfeeding — several countries in East and Southern Africa began to develop local policies on HIV and infant feeding. Different approaches were taken in different countries.

In Zambia, Zimbabwe, and South Africa, with support from USAID through the LINKAGES and SARA Projects, these guidelines were adapted using formative ('consultative') research methods. The research methods used were similar to those described in *Designing by Dialogue* (Dickin et al, 1997), but with modifications to adapt and streamline the process, particularly with respect to the testing of specific breastfeeding and replacement feeding recommendations.

Although the research approach was similar in each country, the context in which the formative research was carried out varied, as shown in **Table 4**. In Zambia, for example, the research was carried out prior to the development of the Ndola Demonstration Project, which was being implemented in order to inform the national policy on HIV and infant feeding. In this setting women did not yet have easy access to HIV testing and counseling and no specific MTCT interventions were available. Health providers had not yet received any formal information or training on MTCT issues. In this case, the formative research was carried out among people who did not know their HIV status. This created a tricky research environment because we did not want to introduce ideas that would cause stress or fear in people who do not yet have access to follow-up information and support. As researchers, we did not want to introduce ideas or practices that would be detrimental to babies if their mothers were not HIV-infected. For these reasons, replacement feeding issues were studied among care-givers of orphaned babies.

**Table 4. Settings and Contexts Where Formative Research Was Carried Out to Develop Local Feeding Guidelines for HIV-positive Mothers**

| Country | Antenatal HIV-seroprevalence rate | MTCT interventions provided at the time of the research |
|---|---|---|
| Zambia (Ndola, Lusaka) | ~ 20-25 percent | None |
| Zimbabwe (Harare) | ~ 33 percent | HIV VCT, counseling |
| South Africa (Khayelitsha) | ~ 15 percent | HIV testing, AZT, infant formula |

In Zimbabwe, on the other hand, women were being tested for HIV as part of the ZVITAMBO Project, a large vitamin A research trial in Harare. HIV VCT was available to the general population, and the research trial provided HIV counseling services, including pre-test and post-test counseling, and bereavement counseling and support. The formative research was carried out to develop a strategy for reaching women and their partners with information about MTCT, and materials for infant feeding counseling and group education sessions. No other MTCT interventions were provided by the project. In this context, the formative research respondents included women who had been tested and knew their HIV status as well as those who did not know their status. The impact of counseling on MTCT knowledge, infant feeding decisions and practices, HIV status disclosure, and HIV transmission through breastfeeding is now being assessed.

Finally, in South Africa, we were able to examine the actual decisions and concerns about breastfeeding and replacement feeding among women who were given AZT during late pregnancy and delivery and were provided infant formula to feed their babies. We were able to discuss the implementation challenges for health providers and mothers involved in the program. The context is different because MTCT interventions are in place, and the influence of the program on attitudes and perceptions about breastfeeding in the general population could be explored.

The formative research methods used in each of the countries described above is summarized in **Table 5.** In each setting the research has been implemented rapidly and at low cost. In Zambia, for example, the research took less than three weeks and cost less than US $5000 for fieldwork expenses.

**Table 5. The Research Methods, Target Groups, and Content of the Formative Research Studies by Country**

| Country | Exploratory | Home visits | Testing of changes |
|---|---|---|---|
| **Zambia**: Content: | Knowledge of MTCT; HIV and BF; attitudes toward testing, results disclosure, women who don't breastfeed; provider practices | Hygiene, sanitation, food availability, purchasing patterns, food preparation, cooking and feeding demonstrations | Opinions, reactions, practice, feedback on breastfeeding and replacement feeding recommendations |
| Respondents: | Health providers, TBAs, Community leaders, pregnant women, mothers, fathers, HIV+ support group members | Mothers of children < 2, orphan care-givers, other family members | Same as home visits, plus community leaders, health providers |
| Methods: | Focus groups, semi-structured interviews | Structured interviews, observation, demonstrations, market surveys | Structured interviews, trials of new practices |
| **Zimbabwe:** Content: | Same as Zambia, decision making autonomy, mental health and stress, social support, household resources, sanitation, feeding practices, reactions to UN feeding recommendations | Assessment of knowledge and skills of women who receive infant feeding counseling on any feeding option (breastfeeding, replacement feeding, complementary feeding) | Same as Zambia, but for all women who are counseled and agree to home visit and all HIV+ women who choose a feeding option other than breastfeeding |
| Respondents: | Pregnant women, mothers, fathers, HIV+ and HIV- women | Mothers of newborns (< 2 wks), 6 wks, after 6 mo | Mothers of babies < 6 wks old |
| Methods: | Focus groups, in-depth interviews | Structured interviews, skills checklists, observation | Structured interviews with observation |
| **South Africa:** Content: | Same as Zambia | Same as Zambia | Same as Zambia |
| Respondents: | Mothers of children < 2, health providers, AIDS support groups | HIV+ mothers in AZT program, other mothers children < 2 | HIV+ mothers, other mothers |
| Methods: | Semi-structured, in-depth interviews | Interviews, observation, demonstrations | Structured interviews, trials of new practices |

## Feeding Recommendations and Counseling Experience

The findings from the formative research studies described above were combined with the scientific research described in the beginning of this paper to adapt the UN recommendations on HIV and infant feeding in all three countries. The formative research findings were used to develop age-specific feeding recommendations for HIV-positive women who choose to breastfeed, and for those who choose replacement feeding. The findings have also been used to develop training and counseling materials for health providers, as well as brochures and take home information for mothers and family members in Zimbabwe.

The research uncovered many important ways that women and families need to be supported in order to truly be able to make informed decisions about infant feeding, without creating stress, fear, and stigmatization. A presentation of all the findings from the studies is beyond the scope of this paper. Details can be found in NFNC/LINKAGES (1999) for Zambia; Gavin et al (1999) for Zimbabwe; and Chopra et al (2000) for South Africa.

It is important to point out that in Zambia and Zimbabwe the formative research clearly indicated that replacement feeding was not a realistic or affordable option, even for literate, urban women in low-income settings. In Zimbabwe, where HIV testing was available and women were fully informed about feeding risks and options, nearly all infected women who knew their status still chose to breastfeed (Tavengwa et al, 2000). It is not yet clear whether these women will choose to wean their babies early because of the information provided. This issue is now being studied.

Because replacement feeding does not appear to be feasible for women in these settings (where only 4 or 5 percent of all babies would be infected by breastfeeding), the projects in Zambia and Zimbabwe have chosen to include "safer breastfeeding practices" as a feeding option for women who are fully informed and choosing to breastfeed. Safer breastfeeding is not one of the UN recommended feeding options though perhaps, in the future, the guidelines will be changed to include this option.

"Safer breastfeeding" includes the following practices:

- Immediate, exclusive breastfeeding (with no other liquids, oils, solids, etc.);
- proper infant positioning, and breast attachment ("latching-on") by the baby;
- expressing and discarding milk from breasts with sores, abscesses, inflammation, or cracked nipples;
- seeking immediate medical attention and treatment for these problems; and
- practicing safe sex.

**Table 6. Safer Breastfeeding Recommendations for Women Living in the Context of HIV**

| All women who choose to breastfeed should … | HIV+ women who choose to breastfeed should also… |
|---|---|
| Initiate breastfeeding immediately after birth<br>Receive counseling and support to demonstrate appropriate infant positioning and breast attachment.<br>Receive counseling and support to encourage, understand, and implement the practice of exclusive breastfeeding.<br>Become familiar with the process of lactation in order to be able to identify potential problems associated with breastfeeding and how to overcome these while continuing to breastfeeding (e.g., breast engorgement, inflammation, sore nipples, etc.). They should know how to relieve engorgement with frequent emptying of the breast and hot compresses.<br>Receive counseling and support to encourage safe sexual activity and to understand the risk of HIV transmission through breastfeeding (and alternatives).<br>Receive counseling and support to continue breastfeeding and to introduce safe and appropriate complementary foods after 6 months. | Be advised to express and discard breast milk if there are signs of engorgement, blocked ducts, or inflammation. They should continue to feed from the unaffected breast. Medical attention should be sought if the engorgement or blocked ducts do not resolve within 1-2 days or if breast pain, fever, or other indication of mastitis or HIV disease progression is experienced.<br>Receive counseling and support describing the risks and benefits of early cessation of breastfeeding. On an individual basis, their ability to secure safe and appropriate replacement feeding should be assessed. They should be advised that continuing to breastfeed may still expose their baby to HIV but that early cessation of breastfeeding may increase the risk of poor growth and non-HIV diseases such as diarrhea.<br>Women who choose to discontinue breastfeeding should receive counseling and support to facilitate a rapid transition to replacement feeding. |

Source: Piwoz EG and Preble EA 2000.

Safer breastfeeding is a good practice for all women, not only the HIV-infected ones and this concept is not in conflict with advice for women who do not know their HIV status or who are not HIV-infected.

Safer breastfeeding practices are currently being advocated for mothers of children less than 6 months. After 6 months, in both Zambia and Zimbabwe, women will be (Zambia) or are (Zimbabwe) counseled about the continued risk of HIV transmission through breastfeeding and early/abrupt weaning is being presented as an option for women who can provide breast milk substitutes in combination with enriched household foods. The feasibility, affordability, and acceptability of this practice will be monitored.

## Conclusion

In conclusion, the transmission of HIV through breastfeeding poses a dilemma with a number of competing risks for African women and families. More research is needed to better understand how to make breastfeeding safer for HIV-infected women who choose to breastfeed for economic, personal, or cultural reasons.

International guidelines and recommendations on HIV and infant feeding need to be adapted to the local context and to local realities, particularly bearing in mind that, even when fully informed, many African HIV-infected women may still choose to breastfeed. The international guidelines need to be updated regularly to include new evidence about breastfeeding transmission. Consideration should be given to incorporating recommendations on safer breastfeeding for all women.

Counseling and empowering women to make an informed choice is not simply a matter of telling them about theoretical risks and different feeding options. It requires deep understanding of the social issues; compassion; knowledge of the household situation; the ability to communicate complex concepts; and the ability to emotionally support women in a decision that affects themselves, their children, and the rest of their entire family.

## References

Chopra M, Schaay N, Piwoz E. 2000. HIV and infant feeding in Khayelitsha (Cape Town), South Africa: Findings from a formative research study. Report prepared by the University of the Western Cape, Cape Town and the SARA Project. June, 2000.

Coovadia HM. 2000. Prevention and treatment of perinatal HIV-1 infection in the developing world. *Curr Opin Infect Dis* 13: 247-251.

Coutsoudis A, Pillay K, Spooner E et al. 1999. Influence of infant-feeding patterns on early mother-to-child transmission of HIV-1 in Durban, South Africa: a prospective cohort study. *Lancet* 354:471-476.

Coutsoudis A. 2000. Method of feeding and transmission of HIV-1 from mothers to children by 15 months of age: Prospective cohort study from Durban. Abstr. LbOr6. Paper presented at the XIII International AIDS Conference, Durban, South Africa.

Dabis F, Msellati P, Meda N et al. 1999. 15-month efficacy of maternal oral zidovudine to decrease vertical transmission of HIV-1 in breastfed African children. *Lancet 354:December 11, 1999.*

DeCock KM, Fowler MG, Mercier E et al. 2000. Prevention of mother-to-child HIV transmission in resource poor countries. *JAMA* 283 (9): 1175-1182.

Gavin L, Tavengwa, Iliff P et al. 1999. Development of an intervention to inform women about infant feeding in the context of HIV. The ZVITAMBO Project, Harare, Zimbabwe.

Gray G. 2000. The PETRA study: early and late efficacy of three short ZDV/3TC combination regimes to prevent mother-to-child transmission of HIV-1. Abstr. LbOr5. Paper presented at the XIII International AIDS Conference, Durban, South Africa.

Guay LA, Musoke P, Fleming T et al. 1999. Intrapartum and neonatal single-dose nevirapine compared with zidovudine for prevention of mother-to-child transmission of HIV-1 in Kampala, Uganda: HIVNET 012 randomised trial. *Lancet* 354:795-804.

Miotti PG, Taha TE, Kumwenda NI et al. 1999. HIV transmission through breastfeeding: A study in Malawi. *JAMA* 282(8): 744-749.

Nduati R, John G, Mbori-Ngacha D et al. 2000. Effect of breastfeeding and formula feeding on transmission of HIV-1: A randomized clinical trial. *JAMA* 283 (9): 1167-1174.

NFNC, Ndola District Health Management Team, LINKAGES, SARA. 1999. HIV and infant feeding: A summary of the formative research in Ndola, Zambia. National Food and Nutrition Commission, Lusaka, Zambia, April.

Owor M, Deseyve M, Duefield C et al. 2000. The one year safety and efficacy of data of the HIVNET 012 trial. Abstr. LbOr1. Paper presented at the XIII International AIDS Conference, Durban, South Africa.

Piwoz EG and Preble EA 2000. *HIV/AIDS and nutrition: A review of the literature and recommendations for nutritional care and support in Africa*. Washington DC: Academy for Educational Development

Preble EA and Piwoz EG. 1998 *HIVand infant feeding: a chronology of research and policy advances and their implications for programs*. Washington DC: Academy for Educational Development.

Shapiro DE, Sperling RS, Coombs RE. 1999. Effect of zidovudine on perinatal HIV-1 transmission and maternal viral load. *Lancet* 352: 156.

Tavengwa N, Ali F, Piwoz EG et al. 2000. The impact of counselling in infant feeding in the context of HIV on mothers' feeding knowledge, decisions, and skills: Preliminary results from the ZVITAMBO Project (Harare, Zimbabwe). Paper presented at the Durban International AIDS meeting, July 2000.

WHO. 1997. HIV and infant feeding: A policy statement developed collaboratively by UNAIDS, WHO, and UNICEF.

WHO. 1998. HIV and infant feeding: A review of HIV transmission through breastfeeding. WHO/FRH/NUT/CHD/98.3.

Wiktor SZ, Epkini E, Karon JM et al. 1999. Short-course oral zidovudine for prevention of mother-to-child transmission of HIV-1 in Abidjan, Cote d'Ivoire: a randomised trial. *Lancet* 353:781-785.

Wiktor SZ, Leroy V, Ekpini ER. 24-month efficacy of short-course maternal zidovudine for the prevention of mother-to-child HIV-1 transmission in a breast feeding population: A pooled analysis of two randomized clinical trials in West Africa. Abstr. TuOrB354. Paper presented at the XIII International AIDS Conference, Durban, South Africa.

# The Link between Vitamin A and Breastfeeding

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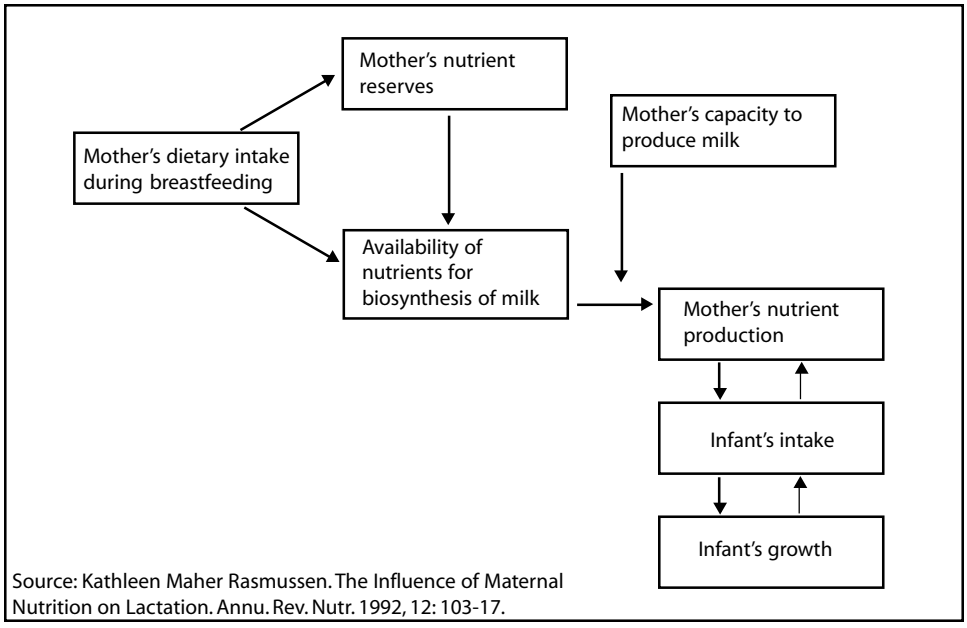
## Introduction

A significant source of energy and nutrients, human milk also plays a role in warding off disease. Breastmilk contains vitamin A in levels that are almost always adequate to meet the needs of infants born in well-nourished populations. Human milk contains approximately twice as much vitamin A as cow's milk, which is frequently used as a substitute. Studies providing a comprehensive analysis of human and cow's milk have shown differences, but until very recently they have seemed to suggest that cow's milk could be modified easily and safely to meet the nutritional requirements of infants. Early commercially-produced substitutes for breastmilk were based on the limited knowledge then available regarding the nutritional value of human milk and the physiology and nutritional requirements of newborns and young children. The criterion for assessing the nutritional value of these foods was based on growth and often on rudimentary ideas, such as the notion that more foods at an earlier age meant better nutrition. Today it is increasingly clear that feeding practices during the first year of life must take a wide variety of factors into consideration (Figure 1).

**Figure 1: Link between the mother's dietary intake, her nutritional status, milk production and the infant's growth during lactation**




Source: Kathleen Maher Rasmussen. The Influence of Maternal Nutrition on Lactation. Annu. Rev. Nutr. 1992, 12: 103-17.

Vitamin A plays a critical role in infant growth and development.

- It is now well established that in vitamin A deficient areas, improving vitamin A status reduces child mortality by approximately 23%. Every year in OCCGE[1] countries, vitamin A deficiency is responsible for approximately 57,000 deaths among children aged 6-59 months, or 15% of the total number of deaths for this group. This finding has been confirmed by several scientific studies, making the

[1] Members of OCCGE (The Organization for Coordination and Cooperation in the Fight Against Major Endemic Diseases) are: Benin, Burkina Faso, Côte d'Ivoire, Mauritania, Mali, Niger, Senegal, and Togo.

fight against vitamin A deficiency a powerful tool for reducing child mortality. At the subregional level, the most striking example is the integration of vitamin A distribution into broad-based public health campaigns such as National Vaccination Days and National Micronutrient Days. Strong support from the international community will also make it possible to implement programs aimed at producing vitamin A-fortified foods.

- Vitamin A plays a major role in building a child's immune system, thus reducing morbidity levels. Recent studies[2] have shown that supplemental vitamin A produces a 30% drop in the number of parasite counts and febrile episodes associated with Plasmodium falciparum. Supplemental vitamin A can therefore become an effective strategy in the fight against Plasmodium falciparum malaria, since clinical episodes of the disease and parasite counts are influenced by various immunological mechanisms that are related to infection and anemia. In countries such as Niger—where vitamin A coverage is adequate after increasing over the past few years—health officials expect to see episodes of malaria decline from six per child per year to four per child per year.

- Vitamin A interacts synergistically with several other nutrients that are required by the human body. Deficiencies in these nutrients are frequently found in the subregion in combination (iron deficiency, protein-energy malnutrition, etc.). We now know that protein-energy malnutrition can result in vitamin A deficiency by reducing levels of retinol-binding protein, serum albumin, or transthyretin. It has also been shown[3] that vitamin A reduces the inhibiting effects of phytates and polyphenols on iron absorption. Vitamin A provides the same beneficial effect on iron absorption as phytases. In children with multiple deficiencies, as is the case in most African countries, increasing vitamin A intake through supplements also increases the effectiveness of iron supplements.[4] In our view, the findings of these various studies are important because they have practical implications and show that an integrated approach to child nutrition programs is both appropriate and essential.

For all of these reasons, this paper will seek to summarize the most recent scientific and epidemiological information on the link between vitamin A and breastfeeding. First, we will focus on vitamin A concentration in breastmilk, as well as vitamin A requirements for infants and young children and how to meet them. We will then examine the importance of including efforts to fight vitamin A deficiency in programs that promote breastfeeding.

## Vitamin A Concentration in Human Milk

In the first five days after childbirth, milk production is limited and consists of a thick, yellowish liquid (colostrum) that gradually changes to transitional milk between the sixth and fourteenth days after delivery. The milk then becomes very light in color and the period of mature milk begins.

- The quantity of colostrum produced varies widely, but averages 30 ml per day. It is very rich in vitamin A and various other substances (immunoglobulins) that protect against infection and parasitic conditions. The colostrum contains at least twice as much vitamin A as mature milk (Table 1). Even when the mother has nursed another child during her entire pregnancy, she will secrete colostrum immediately before and after the birth of the new child. Despite its low volume, the colostrum is adequate to meet the vitamin A requirements of newborns.

[2] Anuraj H. Shankar, Blaise Genton, Richard D. Semba et al. Effect of vitamin A supplementation on morbidity due to Plasmodium falciparum in young children in Papua, New Guinea: A randomised trial. *Lancet* 1999; vol 354: 203-209. XIX International Vitamin A Consultative Group (IVACG Meeting. Vitamin A and other micronutrients: Biological interactions and integrated interventions. Durban, South Africa. Report, September 1999.

[3] Miguel Laryrisse, Maria Nieves Garcia-Casal, Liseti Solano et al. Vitamin A reduces the inhibition of iron absorption by phytates and polyphenols. *Food and Nutrition Bulletin* 1998: 19(1): 3-5.

[4] Sight and Life. Newsletter 2/2000.

**Table 1: Retinol and Retinol Precursor Content of Various Types of Milk[5]**

| Vitamin A and Milk Type | Retinol Content (µg/dl) | Beta Carotene Content (µg/dl) |
|---|---|---|
| Mature Milk | 52-57 | 23 |
| Colostrum: | | |
| Parity 1 | 114 ± 1.32 | — |
| Parity 2-3 | 218 ± 1.96 | 66 |

- Transitional milk is also rich in vitamin A, but its levels fall in the intermediate range.

- In well-nourished women in the United States and Europe, mature milk supplies 40-70 µg/dl of retinol daily, or approximately 250 IU of vitamin A per 100 ml of milk. In developing countries, human milk contains approximately half of the vitamin A found in the milk of well-nourished mothers in developed countries.

Vitamin A concentration in human milk is higher in developed countries than in developing countries. This holds true even among the wealthier populations of developing countries, as shown in a comparative study [6] examining vitamin A levels (in µg/100 ml) in the breastmilk of affluent and disadvantaged mothers in Ethiopia and their counterparts in Sweden. Vitamin A levels measured at .5 to 1.5 months after childbirth were shown to be significantly higher in the Swedish women (47.8 ± 16.2) than in the Ethiopian women, whether affluent (36.2 ± 7.7) or disadvantaged (29.0 ± 9.5), although beta-carotene levels were significantly higher among both the affluent (28.1 ± 16.1) and disadvantaged (25.3 ± 12.8) Ethiopian mothers than in their Swedish counterparts (16.3 ± 7.5). Similarly, the proportion of retinyl esters in the milk was significantly higher among the Swedish mothers than among the two Ethiopian groups, and the difference was greater among the disadvantaged mothers.

## Vitamin A Requirements in Infants and Young Children

All infants are born with very limited vitamin A reserves (approximately 6 µmol, or less than two weeks' supply). During the first six months of life, liver storage capacity increases markedly, and infants' reserves improve if they are exclusively breastfed by mothers who are either well nourished or taking supplements. Recommended intake for premature or low-birth-weight infants is even higher, ranging from 200 to 1000 µg of vitamin A per day.[7] Daily requirements are presented in Table 2 below:

**Table 2: Recommended Vitamin A Intake for Infants (FAO, 1998)**

| Age Group (in months) | Minimum Needs | Minimum Daily Requirements |
|---|---|---|
| Infants under 3 months | 184 µg | 359 µg |
| Infants aged 3-6 months | 179 µg | 345 µg |
| Under 1 year | 180 µg | 350 µg |

[5] Jensen RG, Ferris AM and Lammi-Keefe CJ. Fat-soluble vitamins in human milk. Annu. Rev. Nutr. 1992, 12: 417-41.

[6] Gebre-Medhin, Vahlquist A, Hofvander Y et al. Breast milk composition in Ethiopian and Swedish mothers. I. Vitamin A and beta-carotene. American Journal of Clinical Nutrition 1976; 29: 441-451.

[7] WHO. L'alimentation infantile: bases physiologiques. WHO [Newsletter]. Supplement to volume 67, 1989.

## Meeting Vitamin A Requirements in Infants

Meeting an infant's vitamin A requirements from birth to age six months poses special problems:

- Requirements are very high due to rapid growth. An infant grows at an average rate of 25-30 grams a day for the first two months, and 20 grams from ages two to six months. The child will grow 25 cm in a year, with 5-6 cm of that growth taking place in the first two months.

- The infant's digestive and metabolic systems are immature, limiting the types of food that can be included in the diet.

- Reserves are low, which means that vitamin A must be supplied frequently through the child's diet.

There are also indications that the vitamin A concentration found in human milk in developing countries is approximately 50% lower (1.05 µmol/L) than in the milk of well-nourished mothers. A study in Africa has shown that malnourished mothers produced an average of 500-550 g per day, as compared with 600-700 g produced by mothers who lived in the same circumstances but enjoyed better nutritional status. When children are breastfed under these circumstances, the average daily absorption of vitamin A is expected to cover barely 105% of their minimum needs and 55% of minimum daily requirements. Given these conditions, it is difficult to build vitamin A reserves, and infants soon become vulnerable to vitamin A deficiency.

In areas where undernourishment is chronic, breastmilk volume is influenced by the mother's diet. Seasonal variations are apparent. Breastmilk volume drops during the period between harvests, when food is scarce and dietary intake is limited. In the same way, the mother's diet affects the concentrations of vitamin A and other vitamins and minerals in breastmilk (Table 3). In epidemiological studies involving vitamin A-fortified sugar and other foods, and in trials in which mothers were given massive vitamin A supplemental doses during the six-week period following childbirth, researchers found a link between diet and breastmilk composition. Transfer of vitamin A from the mother's bloodstream to her breastmilk depends, among other things, on retinol-RBP levels in the mother's body and perhaps on levels of retinyl esters incorporated in chylomicrons. As a result, any situation (such as a zinc deficiency, malnutrition, or infection in the mother) that reduces serum levels of vitamin A can limit the quantity of retinol transferred to the milk.

**Table 3: Influence of the Mother's Diet on Nutrient Content of Breastmilk[8]**

| Most Influenced Nutrients | Least Influenced Nutrients |
|---|---|
| Fatty acids | Proteins |
| Vitamin A | Lipids |
| Vitamin D | Carbohydrates (lactose) |
| Vitamin E | Calcium |
| Vitamin K | Magnesium |
| Thiamine | Folates |
| Riboflavin | Iron |
| Vitamin B6 | Zinc |
| Vitamin B12 | Copper |
| Selenium | Manganese |
| Iodine | |

[8] WHO/MI Apports de sécurité en vitamine A pendant la grossesse et l'allaitement. Series on micronutrients. WHO/NUT/98.4.

## Interrelationships between Breastfeeding Programs and Vitamin A Deficiency Programs

### Infants from Birth to Age Six Months

With the exception of affluent groups in the cities, diets in the subregion are monotonous and low in vitamin A. Access varies, sometimes sharply, from one socio-economic group to another. A study in Bamako found that the median level for meeting vitamin A requirements through household diet was 69% in wealthy households, as compared with 22% and 6% in intermediate and poor households respectively.[9] Although lactating women have greater vitamin A requirements, they are not given special attention. A recent study, conducted in a Malian village during the period when availability of vitamin A-rich foods was at its highest, showed that median vitamin A intake in nursing mothers was 343.4 µg per day, or less than half of the recommended level (1200 µg per day), as compared with 743 µg per day for pregnant women.[10]

Breastfeeding practices in the subregion are not especially conducive to reaching maximum vitamin A intake. For socio-cultural reasons, many women discard colostrum. The percentage of exclusively breastfed infants under four months of age is generally low, although it does vary from one ECOWAS country to another. This further reduces the chances for increased intake, since premature ingestion of food reduces the quantity of milk that is absorbed each day. A study[11] has shown that water represents 11% of the daily intake of infants who are not exclusively breastfed. An 8-10% drop in calorie and vitamin A intake can produce a major nutritional imbalance, leaving infants vulnerable to vitamin A deficiency even when they are breastfed. This is why health experts recommend taking steps to improve vitamin A status in nursing mothers and infants. Possible approaches include:

- Administering megadoses of vitamin A (200,000-300,000 IU) to lactating women during the six-week period following childbirth. This allows their infants not only to meet their minimum needs but also to build reserves. In a recent study,[12] mothers were given 200,000 IU in the immediate postpartum period and their infants were given four 50,000 IU doses at birth and with their vaccinations. As a result of this preventative approach, all of the infants began the crucial period from six to 11 months with satisfactory vitamin A status.

- Encouraging households, and particularly mothers, to consume fortified foods. This is another valuable strategy that is largely (and in some cases completely) overlooked by nutrition programs.[13]

- Encouraging mothers to initiate breastfeeding immediately after delivery and to breastfeed exclusively for about six months.

### Infants Aged Six Months and Older

After the sixth month of life, breastmilk is no longer adequate to meet the infant's vitamin A requirements. At this time, complementary foods that are rich in vitamin A should be introduced. Breastfeeding infants aged six to eight months need a complementary diet that provides vitamin A at a level of 5 µg of retinol per 100 kilocalories.[14] Experts estimate that in developing countries, complementary foods should provide a median energy value of 275 kilocalories daily. Practically speaking, small quantities of vitamin A-rich foods (1½ tablespoons of carrots or orange sweet potatoes) are ad-

[9] Ag Bendech M, Chauliac M and Malvy DJM. Assessment of dietary intake at home and outside the home in Bamako (Mali).

[10] INRSP/University of Oslo. Résultats préliminaires d'une enquête sur la consommation alimentaire des adultes dans un village du cercle de Bafoulabé Bamako, February 2000.

[11] Sachdev HPS, Krishna J, Puri RK, Satyanayana L, Kumar S. Water supplementation in exclusively breastfed infants during summer in the tropics. Lancet 1991, vol 337 (8747): 929-932.

[12] Humphrey JH, Rice AL. Vitamin A supplementation of young infants. Lancet 2000, Vol 356: 422-424.

[13] Ag Bendech M with Acakpo A, Aguayo A, Baker S, Diène SM, Lathen L and Ouédraogo A. Les pratiques prometteuses et les leçons apprises dans la lutte contre la carence en vitamine A dans les pays de l'Afrique subsaharienne. USAID/HKI/OCCGE/Linkages/Basics, 2000.

[14] WHO/IRD. Complementary feeding of young children in Africa and the Middle East . Editors: MC Dop, D Benbouzid, S Trèche, B. de Benoist, A verster and F Delpeuch. WHO Geneva, 1999.

equate to meet vitamin A requirements. Analysis of current complementary feeding practices in the subregion shows that breastfeeding remains the sole source of vitamin A for children aged six months to two years, in proportions that vary from country to country. In fact, the complementary foods these children consume are low in vitamin A, since they generally consist of the family meal or starchy porridges prepared at home. Fruits and vegetables are absent from their diet. The most frequently recommended alternative is preventative administration of vitamin A supplements twice a year. This strategy has been implemented in some countries but must be coupled with other efforts such as food fortification and nutrition education.

## Conclusion

The scientific information now available must be translated into practical steps in our day-to-day practice in order to help infants and young children get the maximum benefit from breastfeeding. The overview of the link between vitamin A and breastfeeding presented in this paper demonstrates the need to consider strategies for improving vitamin A status in nutrition programs generally and in breastfeeding programs in particular. In short, we know that:

- Vitamin A concentration in human milk drops when reserves and dietary intake are low.
- Improving the mother's vitamin A intake can quickly restore vitamin A concentration in her milk production.
- Low vitamin A levels in milk have a direct impact on the infant's growth and development.
- Vitamin A reserves are generally low in infants, increasing their dependence on a regular, adequate supply of vitamin A in breastmilk and/or in complementary foods.
- Approximately 50% of children in developing countries suffer from subclinical vitamin A deficiencies, leaving them at high risk of morbidity and mortality.

The best milk for an infant is its mother's milk. Breastfeeding is a universal natural imperative that plays a critical role in a child's health and survival. To illustrate this point, we would like to recall the words of H. Smith.[15] As early as 1774, he said, "When infants have no food other than mother's milk, they gain strength every day and brave illnesses of all kinds."

To enhance the benefits of breastfeeding, especially as regards vitamin A, we propose the following practical steps:

- Promote exclusive breastfeeding of infants from birth to age six months.
- Promote consumption of vitamin A-rich foods by women of child-bearing age, especially pregnant and nursing women.
- Administer high doses of vitamin A (200,000-300,000 IU) to post-partum women as soon after childbirth as possible.

[15] In Rossant Lyonel. L'alimentation du nourrisson. *Que sais-je?* series, Presses Universitaires de France, 1996.

- Once a child has reached the age of six months, routinely recommend introducing vitamin A-rich complementary foods in addition to breastfeeding, and begin to administer vitamin A capsules every four to six months.

- Promote fortification of foods with vitamin A.

Translated by Lillian Clementi

# The Economic Value of Human Milk in Francophone Africa

# Why Safe Replacement of Breastmilk is Not an Option for the Vast Majority of West African Infants

# A PROFILES Analysis for Nutrition Policy Communication

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## Introduction and Objectives

A vast body of evidence has accrued to establish the health and demographic benefits of breastfeeding. Breastfeeding benefits the health and nutritional status of both the mother and the child, protecting infants and young children against disease and death, providing optimal nutrition for child physical growth and cognitive development, delaying the return of menses, and enhancing child spacing.

Breastfeeding also provides significant immediate economic benefits. These immediate economic benefits are both direct and indirect. Direct benefits derive from the lower cost of human milk relative to breastmilk substitutes. Indirect benefits result from lower morbidity-related costs in breastfed children relative to bottle-fed children and from the lower costs in family planning services resulting from the fertility reduction associated with lactation.

The health and fertility benefits of breastfeeding have been at the forefront of policy communication and advocacy efforts to protect, promote, and support breastfeeding. However, awareness of the economic cost of sub-optimal breastfeeding practices and the immediate economic benefits of breastfeeding are crucial from a policy perspective. Such immediate economic benefits can now be quantified with some precision.

The purpose of this analysis is twofold:

a) To estimate the quantity of human milk currently consumed by children 0-35.9 months of age in the eight francophone countries (Benin, Burkina Faso, Côte d'Ivoire, Guinea, Mali, Niger, Senegal, and Togo) of the Economic Community of West African States (ECOWAS) under the technical guidance of the Regional Center for Research on Nutrition and Food Sciences (Centre Regional de Recherche pour l'Alimentation et la Nutrition, CRAN); and

b) To explore the potential monetary cost of safe breastmilk replacement to governments and households.

## Methods

The estimation of the quantity of human milk currently consumed by children 0-35.9 months of age in the countries included in our analysis was based on: a) the distribution of children by age group (0-5.9 months, 6-11.9 months, 12-23.9 months, and 24-35.9 months) in each country; b) the distribution of current breastfeeding practices (exclusive breastfeeding, partial breastfeeding, or no breastfeeding) by age group in each country; and c) the average daily intake of human milk by breastfed children of a given age group and breastfeeding practice (exclusive breastfeeding or partial breastfeeding).

The total daily amount of breastmilk consumed by children 0-35.9 months in a given country daily ($TM_{0-35.9}$) was calculated using the following equation:

$$\mathbf{TM_{0-35.9}} = (N_{0-5.9} * EBF_{0-5.9} * M_{0-5.9}) + (N_{0-5.9} * PBF_{0-5.9} * M_{0-5.9}) + (N_{6-11.9} * PBF_{6-11.9} * M_{6-11.9}) + (N_{12-23.9} * PBF_{12-23.9} * M_{12-23.9}) + (N_{24-35.9} * PBF_{24-35.9} * M_{24-35.9})$$

Where:

N = Number of children in a given age-group
EBF = Exclusive breastfeeding rate in children of a given age-group
PBF = Partial breastfeeding rate in children of a given age-group
M = Average daily intake of human milk by breastfed children of a given age-group and breastfeeding practice (exclusive breastfeeding or partial breastfeeding).

### Distribution of Children by Age Group

The distribution of children by age group was estimated using the 1998 United Nations Medium Population Projection. The use of a common demographic database allowed for greater consistency and comparability across countries. Table 1 shows the projected number of children 0-5.9 months, 6-11.9 months, 12-23.9 months, and 24-35.9 months per country in the year 2000. In the year 2000, the projected population of children 0-35.9 months old in the eight countries included in our analysis is over 8.3 million, with more than 2.9 million infants (0-11.9 months old).

**Table 1. Distribution of Children (0-35.9 Months Old) by Age Group and Country According to the 1998 United Nations Medium Population Projection for the Year 2000**

| | Number of infants 0-5.9 months old | Number of infants 6-11.9 months old | Number of children 12-23.9 months old | Number of children 24-35.9 months old | Total number of children 0-35.9 months old |
|---|---|---|---|---|---|
| Benin | 118,277 | 115,414 | 233, 922 | 196, 983 | 664,596 |
| Burkina Faso | 244,135 | 234,867 | 446,380 | 423,989 | 1,349,371 |
| Côte d'Ivoire | 258,013 | 249,317 | 477,724 | 457,432 | 1,442,486 |
| Guinea | 142,427 | 137,406 | 264,844 | 254,988 | 799,665 |
| Mali | 248,583 | 242,600 | 448,326 | 429,255 | 1,368,764 |
| Niger | 219,663 | 212,626 | 406,994 | 390,994 | 1,230,277 |
| Senegal | 173,587 | 169,132 | 327,867 | 317,875 | 988,461 |
| Togo | 88,706 | 86,012 | 166,272 | 160,470 | 501,460 |
| **Total** | **1,493,391** | **1,447,374** | **2,772,329** | **2,631,986** | **8,345,080** |

### Distribution of Current Breastfeeding Practices by Age Group

Information on current breastfeeding practices (exclusive breastfeeding and partial breastfeeding) was derived from the latest survey conducted by the Demographic and Health Surveys (DHS) program, the most comprehensive source of national household-level breastfeeding and infant feeding data in the eight countries included in the analysis.

Table 2 presents detailed information on the total size of each national DHS sample and the number of infants and young children included in each of the age groups relevant to our analysis.

**Table 2. Date of DHS Data Used in the Analysis and Sample Size by Age Group and Country**

| | Date of latest DHS | Number of infants 0-5.9 months included in survey sample | Number of infants 6-11.9 months included in survey sample | Number of children 12-23.9 months included in survey sample | Number of children 24-35.9 months included in survey sample | Total number of children 0-35.9 months included in survey sample |
|---|---|---|---|---|---|---|
| Benin | June-August 1996 | 520 | 502 | 871 | 1290 | 3,183 |
| Burkina Faso | November-January 1998/99 | 640 | 536 | 1019 | 830 | 3,025 |
| Côte d'Ivoire | June-November 1994 | 664 | 606 | 1104 | 959 | 3,333 |
| Guinea | February 1999 | 674 | 425 | 920 | 985 | 3,004 |
| Mali | November-April 1995/96 | 1053 | 986 | 1562 | 1639 | 5,240 |
| Niger | March-July 1997/98 | 867 | 780 | 1431 | 1327 | 4,405 |
| Senegal | January-April 1997 | 780 | 588 | 1328 | 1170 | 3,866 |
| Togo | February-May 1998 | 670 | 699 | 1135 | 1191 | 3,695 |
| **Total** | — | **5,868** | **5,122** | **9,370** | **9,391** | **29,751** |

Altogether, these DHS data consist of national representative samples of about 30,000 children 0-35.9 months old. They were collected between 1994 and 1999 using comparable questionnaires, survey procedures, and methodological approaches. The use of an internationally agreed upon body of data allowed us to examine breastfeeding practices (exclusive breastfeeding and partial breastfeeding) across countries in a comparative framework and to examine individual country results in a regional context.

An infant was classified as exclusively breastfed when fed only breastmilk (including milk expressed or from a wet nurse) in the 24 hours prior to the interview. This means that the infant received no other liquid (not even water), semi-solid foods, or solid foods. The definition of exclusive breastfeeding allowed the infant to receive drops or syrups (vitamins, minerals or medicines). An infant was classified as partially breastfed when fed breastmilk (including breastmilk expressed or from a wet nurse) as well as solid, semi-solid, or liquid foods, including non-human milk.

Table 3 presents exclusive breastfeeding and partial breastfeeding rates by age group and country.

**Table 3. Exclusive Breastfeeding and Partial Breastfeeding Rates by Age Group According to the Latest Demographic and Health Survey (DHS) in Each Country**

| | Exclusive breastfeeding rate in infants 0-5.9 months old | Partial breastfeeding rate in infants 0-5.9 months old | Partial breastfeeding rate in infants 6-11.9 months old | Partial breastfeeding rate in children 12-23.9 months old | Partial breastfeeding rate in children 24-35.9 months old |
|---|---|---|---|---|---|
| Benin | 0.100 | 0.896 | 0.896 | 0.846 | 0.509 |
| Burkina Faso | 0.055 | 0.944 | 0.985 | 0.926 | 0.488 |
| Côte d'Ivoire | 0.030 | 0.964 | 0.985 | 0.738 | 0.164 |
| Guinea | 0.113 | 0.876 | 0.905 | 0.865 | 0.275 |
| Mali | 0.083 | 0.914 | 0.963 | 0.682 | 0.207 |
| Niger | 0.008 | 0.985 | 0.995 | 0.786 | 0.119 |
| Senegal | 0.105 | 0.889 | 0.968 | 0.732 | 0.062 |
| Togo | 0.104 | 0.888 | 0.990 | 0.900 | 0.219 |

Table 3 shows that although breastfeeding is almost universal in the countries included in our analysis, with 99% of infants 0-5.9 months old breastfed, only a small proportion are exclusively breastfed (exclusive breastfeeding rates in this age group range from 0.8% in Niger to 11.3% in Guinea). Most children continue to breastfeed during the second year of life (partial breastfeeding rates in this age group range from 68.2% in Mali to 92.6% in Burkina Faso). It is worth mentioning that an estimated 25% of children 24-35.9 months old are still breastfed.

### Amount of human milk consumed by breastfed children according to age and breastfeeding practice

The volume of milk consumed by breastfed children varies over the course of lactation. Factors influencing frequency, intensity, or duration of child's sucking determine breastmilk output. Different investigators have tried to estimate the volume of human milk production in different settings. Most of these studies present data for children up to 24 months of age and show that the volume of milk intake among healthy breastfed children ranges from 450 to 1200 g/day, with an average intake of about 750 to 800 g/day.

In 1998, the World Health Organization (WHO) conducted a comprehensive review of the existing literature to estimate the average breastmilk intake in breastfed children living in developing countries as a function of the child's age and breastfeeding mode (exclusive breastfeeding or partial breastfeeding). All studies in developing countries since 1980 were included in the review if they provided quantitative information on breastmilk consumption. A complete list of these studies and reported data for the amounts of breastmilk consumed in relation to child age and feeding mode appear in the final report of the technical consultation.

Table 4 summarizes the average daily breastmilk intake (mean $\pm$ standard deviation) by children 0-23.9 months old living in developing countries, based on WHO's meta-analysis. Breastmilk intakes are presented as a function of child's age and breastfeeding mode (exclusive breastfeeding or partial breastfeeding).

**Table 4. Average Daily Intakes (ml/day) of Breastmilk in Breastfed Children Living in Developing Countries by Age Group and Breastfeeding Mode**

| | 0-2.9 months | 3-5.9 months | 6-8.9 months | 9-11.9 months | 12-23.9 months |
|---|---|---|---|---|---|
| Exclusive breastfeeding | 714 ± 131 | 784 ± 128 | 776 ± 141 | — | — |
| Partial breastfeeding | 617 ± 168 | 663 ± 155 | 660 ± 153 | 616 ± 172 | 549 ± 187 |

Source: Complementary Feeding of Young Children in Developing Countries: A Review of Current Scientific Knowledge (WHO, 1998)

The use of WHO's data on average daily intakes of breastmilk posed two challenges for our analysis. First, the age groups in the WHO meta-analysis (three-month age groups for infants) are different from those reported by the DHS program in its national household-level breastfeeding data (two-month age groups for children 0-35.9 months of age). Second, WHO's meta-analysis provides no information on the average daily intake of breastmilk by children 24-35.9 month old, yet a significant proportion of West African children in this age group are still breastfed, as illustrated in Table 3.

To address the first challenge, we decided to use an average breastmilk intake of 714 ml/day for all exclusively breastfed infants 0-5.9 months old (lowest end of average breastmilk intake for exclusively breastfed infants 0-5.9 months old); an average daily intake of 617 ml for all partially breastfed infants 0-5.9 months (lowest end of average breastmilk intake for partially breastfed infants 0-5.9 months); and an average intake of 616 ml/day for all partially breastfed infants 6-11.9 months (lowest end of average breastmilk intake for partially breastfed infants 6-11.9 months) (see Table 5). This approach obviously underestimates the real volume of breastmilk consumed by children 0-23.9 months of age. Our calculations should therefore be considered a conservative estimate of the real volume of human milk produced by lactating mothers in the countries included in our analysis.

To address the absence of information on breastmilk intake in breastfed children 24-35.9 months in WHO's meta-analysis, we used the average intake of 254 ml/day reported by Hatloy and Oshaug for this age-group.

**Table 5. Average Daily Intake (ml/day) of Breastmilk in Breastfed Children Living In Developing Countries by Age Group and Breastfeeding Mode used in Our Analysis**

| | 0-5.9 months | 6-11.9 months | 12-23.9 months | 24-35.9 months |
|---|---|---|---|---|
| Exclusive breastfeeding | 714 | — | — | — |
| Partial breastfeeding | 617 | 616 | 549 | 254 |

### Net Monetary Value of Breastmilk

The net monetary value of human milk was calculated using the following equation:

$$Nval_{BM} = Gval_{BM} - Pval_{BM}$$

Where:

$Nval_{BM}$ = Net monetary value of breastmilk
$Gval_{BM}$ = Gross monetary value of breastmilk
$Pval_{BM}$ = Monetary value of breastmilk production

#### Gross Monetary Value of Breastmilk

The imputed gross monetary value of breastmilk at the national level was estimated as the monetary value of commercial breastmilk substitutes required for replacing the human milk currently consumed by children 0-35.9 months of age. The economic value of human milk is compared with the replacement value of infant formula. In addition to the cost of commercial breastmilk substitutes, the additional cost of water, fuel and minimum equipment (bottles and teats) was factored in the analysis.

To estimate the cost of breastmilk substitutes required to safely replace the human milk currently consumed in the countries included in our analysis, two teams of public health nutritionists in Togo and Burkina Faso were asked to quantify the average cost of replacing one liter of human milk with breastmilk substitutes, using brands of infant formula most frequently purchased in the country. The resulting costing exercise yielded estimates of 2.10 US$ and 1.75 US$ for the infant formula needed to replace one liter of human milk and 0.27 US$ and 0.22 US$ for the cost of water, fuel, teats and bottles needed per liter of human milk replaced. A conservative estimate puts the replacement cost of one liter of human milk at 1.97 US$ (1.75 US$ for the infant formula and 0.22 US$ for water, fuel, teats, and bottles).

#### Monetary Value of Breastmilk Production

The production of breastmilk requires an additional caloric intake by the lactating mother. The Subcommittee on Nutrition during Lactation (Food and Nutrition Board of the Institute of Medicine at the National Academy of Science in the United States) recommends that breastfeeding women be provided with a balanced diet comparable to that of non-lactating/non-pregnant women, with the addition of the caloric cost of milk production. The calculated caloric cost of producing one liter of human milk is 940 kcal.

For the purposes of our analysis we have assumed that all lactating mothers in francophone West Africa should receive an additional caloric intake of 940 kcal per liter of breastmilk produced. It should be noted that this approach overestimates the real cost of human milk production. Under ideal circumstances women store two to four kilograms of extra tissue during pregnancy in preparation for lactation. Although these stores may provide a source of energy and nutrients for lactation, laying down these stores also has a nutritional cost. The suggested 940 additional kcal per liter of breastmilk produced should therefore cover the nutritional needs of lactating women whether during or in preparation for lactation.

To estimate the cost of breastmilk production, the same teams of public health nutritionists in Togo and Burkina Faso were asked to quantify the cost of providing 940 additional kcal to a lactating mother to achieve a balanced diet using local foods. The resulting costing exercise yielded estimates of 0.20 and 0.25 US$ per 940 kcal. Again, using conservative estimates, we calculated a cost of 0.25 US$ per 940 additional kcal.

## Results

Table 6 shows the current daily breastmilk consumption by children 0-35.9 months old in the countries included in our analysis. Table 7 shows the current annual breastmilk consumption per country in children 0-35.9 months old by age group and breastfeeding mode.

**Table 6. Current Breastmilk Consumption (Liters per Day) by Age Group and Breastfeeding Mode in Children 0-35.9 Months Old**

| | Exclusively and partially breastfed 0-5.9 month old infants | Partially breastfed 6-11.9 month old infants | Partially breastfed 12-23.9 month old children | Partially breastfed 24-35.9 month old children | Total Children 0-35.9 months old |
|---|---|---|---|---|---|
| Benin | 73,832 | 63,701 | 108,646 | 25,467 | 271,647 |
| Burkina Faso | 151,783 | 142,508 | 226,928 | 52,554 | 573,773 |
| Côte d'Ivoire | 158,990 | 151,276 | 193,556 | 19,055 | 522,876 |
| Guinea | 88,472 | 76,601 | 125,770 | 17,811 | 308,654 |
| Mali | 154,917 | 143,912 | 167,861 | 22,569 | 489,260 |
| Niger | 134,754 | 130,323 | 175,624 | 11,818 | 452,518 |
| Senegal | 108,229 | 100,851 | 131,759 | 5,006 | 345,845 |
| Togo | 55,189 | 52,454 | 82,155 | 8,926 | 198,723 |
| **Total** | **926,165** | **861,626** | **1,212,299** | **163,207** | **3,163,297** |

**Table 7. Current Breastmilk Consumption (Million Liters per Year) by Age Group and Breastfeeding Mode in Children 0-35.9 Months Old**

| | Exclusively and partially breastfed 0-5.9 month old infants | Partially breastfed 6-11.9 month old infants | Partially breastfed 12-23.9 month old children | Partially breastfed 24-35.9 month old children | Total Children 0-35.9 months old |
|---|---|---|---|---|---|
| Benin | 27.0 | 23.3 | 39.7 | 9.3 | 99.3 |
| Burkina Faso | 55.5 | 52.1 | 82.9 | 19.2 | 209.7 |
| Côte d'Ivoire | 58.1 | 55.3 | 70.7 | 7.0 | 191.1 |
| Guinea | 32.3 | 28.0 | 46.0 | 6.5 | 112.8 |
| Mali | 56.6 | 52.6 | 61.3 | 8.2 | 178.8 |
| Niger | 49.2 | 47.6 | 64.2 | 4.3 | 165.4 |
| Senegal | 39.5 | 36.9 | 48.1 | 1.8 | 126.4 |
| Togo | 20.2 | 19.2 | 30.0 | 3.3 | 72.6 |
| **Total** | **338.4** | **314.8** | **443.0** | **59.6** | **1,155.9** |

All eight countries show high levels of human milk production. Lactating women in francophone West Africa are currently producing over 3 million liters of breastmilk per day or over 1.1 billion liters per year. The highest level of production (total breastmilk consumption in children 0-35.9 months old/total number of children 0-35.9 months old) is that of Burkina Faso (425 ml/child/day), while the average production in Senegal

is the lowest (350 ml/child/day). Estimated human milk production is highest for infants and accounts for 56% of the total production. For young children (12-23.9 months) the figure is 38%. This means that children 0-23.9 months consumed 95% of the total breastmilk produced for children 0-35.9 months old.

Table 8 shows the potential daily breastmilk consumption per country in children 0-35.9 months of age if breastfeeding practices were optimal. For the purposes of our analysis, optimal breastfeeding was defined as exclusive breastfeeding of all infants 0-5.9 months and continued breastfeeding with appropriate complementary foods for all children 6-23.9 months (with current breastfeeding rates in children 24-35.9 months remaining unchanged). Table 9 shows the potential annual breastmilk consumption by age group and breastfeeding mode per country under such conditions. Table 10 shows breastmilk production "lost" as result of current sub-optimal breastfeeding practices in children 0-35.9 months old (the difference between potential production if breastfeeding practices were optimal and current production).

**Table 8. Potential Breastmilk Consumption (Liters per Day) by Age Group and Breastfeeding Mode in Children 0-35.9 Months Old if Breastfeeding Practices Were Optimal**

| | Exclusively and partially breastfed 0-5.9 month old infants | Partially breastfed 6-11.9 month old infants | Partially breastfed 12-23.9 month old children | Partially breastfed 24-35.9 month old children | Total Children 0-35.9 months old |
|---|---|---|---|---|---|
| Benin | 84,450 | 71,095 | 128,423 | 25,467 | 309,435 |
| Burkina Faso | 174,312 | 144,678 | 245,063 | 52,554 | 616,607 |
| Côte d'Ivoire | 184221 | 153579 | 262,270 | 19,055 | 619,126 |
| Guinea | 101,693 | 84,642 | 145,399 | 17,811 | 349,545 |
| Mali | 177,488 | 149,442 | 246,131 | 22,569 | 595,630 |
| Niger | 156,839 | 130,978 | 223,440 | 11,818 | 523,075 |
| Senegal | 123,941 | 104,185 | 179,999 | 5,006 | 413,131 |
| Togo | 63,336 | 52,983 | 91,283 | 8,926 | 216,529 |
| **Total** | **1,066,281** | **891,582** | **1,522,009** | **163,207** | **3,643,079** |

**Table 9. Potential Breastmilk Consumption (Million Liters per Year) by Age Group and Breastfeeding Mode in Children 0-35.9 Months Old if Breastfeeding Practices Were Optimal**

| | Exclusively and partially breastfed 0-5.9 month old infants | Partially breastfed 6-11.9 month old infants | Partially breastfed 12-23.9 month old children | Partially breastfed 24-35.9 month old children | Total Children 0-35.9 months old |
|---|---|---|---|---|---|
| Benin | 30.9 | 26.0 | 46.9 | 9.3 | 113.1 |
| Burkina Faso | 63.7 | 52.9 | 89.5 | 19.2 | 225.3 |
| Côte d'Ivoire | 67.3 | 56.1 | 95.8 | 7.0 | 226.2 |
| Guinea | 37.2 | 30.9 | 53.1 | 6.5 | 127.7 |
| Mali | 64.9 | 54.6 | 89.9 | 8.2 | 217.6 |
| Niger | 57.3 | 47.9 | 81.6 | 4.3 | 191.1 |
| Senegal | 45.3 | 38.1 | 65.8 | 1.8 | 151.0 |
| Togo | 23.1 | 19.4 | 33.4 | 3.3 | 79.1 |
| **Total** | **389.6** | **325.8** | **556.1** | **59.6** | **1331.2** |

**Table 10. Breastmilk Production "Lost" as Result of Sub-optimal Breastfeeding Practices in Children 0-35.9 Months Old**

| | Liters per day | Million liters / year |
|---|---|---|
| Benin | 37,7891 | 13,8 |
| Burkina Faso | 42,834 | 15.6 |
| Côte d'Ivoire | 96,250 | 35.1 |
| Guinea | 40,891 | 14.9 |
| Mali | 106,370 | 38.8 |
| Niger | 70,557 | 25.8 |
| Senegal | 67,286 | 24.6 |
| Togo | 17,806 | 6.5 |
| **Total** | **479,782** | **175.1** |

Our analysis shows that the potential consumption of human milk by children 0-35.9 months old if optimally breastfed would be more than 3.6 million liters per day or more than 1.3 billion liters per year. The comparison of these figures with current level of human milk consumption yields a "productivity lost" of human milk of about 480 thousand liters per day or more than 175 million liters per year.

Table 11 shows the annual national and per-capita monetary value of breastmilk currently consumed by children 0-35.9 months old in the countries included in the analysis. It also compares the monetary value of breastmilk with the Gross National Product (GNP) and per-capita GNP in each country.

**Table 11. Monetary Value of Breastmilk Currently Consumed by Children 0-35.9 Months Old**

| | Net monetary value of breast milk currently consumed by children 0-35.9 months old (million US$ per year) | Gross National Product (GNP) in 1999 (million US$) | Net monetary value of breast milk currently consumed by children 0-35.9 months old (as % of GNP) | Net monetary value of breast milk currently consumed by children 0-35.9 months old (US$ per breastfed child/year) | Gross National Product (GNP) per capita in 1999 (US$) | Net monetary value of breast milk currently consumed by children 0-35.9 months old (as % of GNP per capita) |
|---|---|---|---|---|---|---|
| Benin | 171 | 2,300 | 7.4 | 257 | 380 | 67.6 |
| Burkina Faso | 361 | 2,600 | 13.9 | 267 | 240 | 111.4 |
| Côte d'Ivoire | 329 | 10,400 | 3.2 | 228 | 710 | 32.1 |
| Guinea | 194 | 3,700 | 5.2 | 243 | 510 | 47.6 |
| Mali | 307 | 2,600 | 11.8 | 225 | 240 | 93.6 |
| Niger | 284 | 2,000 | 14.2 | 231 | 190 | 121.7 |
| Senegal | 217 | 4,700 | 4.6 | 220 | 510 | 43.1 |
| Togo | 125 | 1,500 | 8.3 | 249 | 320 | 77.8 |
| **Global** | **1988** | **29,800** | **6.7** | **240** | **388** | **61.5** |

Our analysis shows that the net monetary value of the human milk currently consumed by children 0-35.9 months old is about 2 billion US dollars per year. This represents an average 6.7% of the Gross National Product of the eight countries included in the analysis. At the household level, the average net monetary value of the human milk consumed by a child 0-35.9 months old amounts to 240 US dollars per

year (61.5% of the GNP per capita) or 412 US dollars just in the first year of life (106% of GNP per capita; data not presented).

## Discussion

### Breastfeeding Practices

As in most African countries, breastfeeding is an almost universal practice in francophone West Africa. The percentage of children 0-5.9 months ever breastfed ranges from 98.9% in Guinea to 99.9% in Burkina Faso. This means that nearly all living children born in the six months preceding the survey were breastfed at some time.

The median duration of any breastfeeding is calculated from current breastfeeding status at the moment of the survey (instead of using mothers' reporting of breastfeeding duration of fully weaned children, which is affected by inaccuracies in mothers' recall). The median duration of any breastfeeding ranges from 20.3 months in Côte d'Ivoire to 27.7 months in Burkina Faso. This is consistent with data reporting overall median breastfeeding duration of 21 months in sub-Saharan Africa[6].

The fact that breastfeeding is an almost universal practice and that its median duration is among the longest worldwide does not mean that breastfeeding practices in francophone West Africa are optimal. The World Health Assembly recommends that infants be exclusively breastfed for about the first six months of life. In the countries included in our analysis, exclusive breastfeeding rates in children 0-5.9 months old are very low, ranging from 0.8% in Niger (the lowest exclusive breastfeeding rate 0-5.9 months reported in Africa) to 11.3% in Guinea. Median duration of exclusive breastfeeding is also very short, ranging from 0.4 months in Burkina Faso, Côte d'Ivoire, Guinea, and Niger to 1.5 months in Mali (data not presented).

Exclusive breastfeeding is usually followed by partial breastfeeding. In all eight countries included in our analysis, most infants 0-5.9 months of age are partially breastfed. Partial breastfeeding rates in infants 0-5.9 months old range between 87.6% in Guinea to 98.5% in Niger. Such high rates of partial breastfeeding in young infants are consistent with those reported in other countries in sub-Saharan Africa, the region with the highest rates of partial breastfeeding worldwide in children 0-5.9 months old[6]. These figures indicate that in francophone West Africa, breastfeeding is an almost universal behavior but its practice in the first six months of life is far from optimal.

The World Health Assembly recommends that infants be fed safe and adequate amounts of appropriate complementary foods from about the age of six months with continued breastfeeding up to the age of 24 months and beyond[13]. In the eight countries included in our analysis, partial breastfeeding is an almost universal practice among children 6-11.9 months. Partial breastfeeding rates in this age group range from 89.6% in Benin to 99.5% in Niger. Most children continue to breastfeed through the second year of life. Partial breastfeeding rates in children 12-23.9 months range from 68.2% in Mali to 92.6% in Burkina Faso. These figures are consistent with those reported in other sub-Saharan African countries. Sub-Saharan Africa shows the highest first-year breastfeeding continuation rates (proportion of children 12 to15 months old still breastfeeding) worldwide, with over 90% of children still breastfeeding at this age[6].

Breastfeeding declines as children grow older. Yet in francophone West Africa, a significant proportion of children continue to breastfeed through the third year of life. Partial breastfeeding rates in the third year of life in the eight countries included in our analysis range from 6.2% in Senegal to 48.8% in Burkina Faso. This means that in francophone West Africa, an estimated 25% of children 24-35.9 months old are still breastfed.

**Current Breastmilk Production**

One of the most striking features of our analysis is the high output of human milk in francophone West Africa. Children 0-35.9 months old currently consume over 3 million liters of human milk daily or over 1.1 billion liters per year. This represents an average daily intake of 379 ml per child, with national values ranging from 350 ml per child in Senegal to 425 ml per child in Burkina Faso. Exclusively breastfed infants have greater breastmilk intakes than partially breastfed infants likely because breastmilk intake decreases as the energy intake from complementary foods increases. Estimated human milk production for children 0-23.9 months represents about 95% of the total breastmilk consumption in children 0-35.9 months old. The average daily intake of human milk in children 0-23.9 months old is 528 ml per child, with national values ranging from 497 ml per child in Mali to 563 ml per child in Burkina Faso. These figures confirm that in francophone West Africa, breastmilk is a key source of nutrients for infants and young children.

Human milk is also a key source of safe water. Scientific evidence is now conclusive that infants 0-5.9 months old who are exclusively breastfed do not need supplemental water to maintain water homeostasis, even in dry and hot climates. Even after six months of age, when adequate complementary foods are needed for optimal growth and development, human milk continues to be the best source of safe water for children up to one year of age and beyond. The water requirements of infants in a hot humid climate can be met entirely by human milk. In West Africa, doctors, health workers, and community members often advise mothers to provide supplemental water to their breastfed infants in the belief that extra fluids are essential to maintain water homeostasis. Such water supplementation reduces caloric intake, leads to a decreased milk output and to the premature termination of breastfeeding, and significantly increases the risk of diarrhea, the major cause of infant mortality in the developing world.

The World Health Organization estimates that two million child lives could be saved each year by ensuring access to safe water by all children. If we assume that the water content of human milk represents on average 87% of the total volume[7], our analysis shows that in francophone West Africa, lactating mothers are producing over one billion liters of clean safe water for their breastfed children each year. This represents about 530 ml of clean safe water per child per day. Access to safe water is the major health challenge in the new millennium (World Forum on Water; The Hague, 2000). Human milk represents a life-saving source of safe clean water for infants, particularly in regions like West Africa where in some countries only 28% of the population has access to safe clean water.

Our analysis confirms therefore that in francophone West Africa, human milk is a key source of nutrients and safe water for over 8.3 million children 0-35.9 months of age. However, our analysis also indicates that a significant volume of human milk is lost every year owing to the sub-optimal breastfeeding practices observed in the countries

included in the analysis. As a result, an estimated 175 million liters of human milk are lost every year, including over 152 million liters of clean, safe water. Given the high rates of partial breastfeeding in children 12-23.9 months old (an estimated 81% of children in this age group in the region are breastfed), most of lost breastmilk production is a consequence of the very low rates of exclusive breastfeeding in infants 0-5.9 months old (only an estimated 7.5% of infants 0-5.9 months are exclusively breastfed in the countries included in the analysis).

**Monetary Value of Current Breast Milk Production**

Different approaches have been used to estimate the monetary value of human milk. As a consequence, the monetary value assigned to human milk varies significantly across studies.

In developing countries, studies have often equated the monetary value of human milk with that of cow's milk, canned milk, or with an arbitrarily chosen figure. In a study in Nepal (1994), the monetary value of human milk was equated with that of cow's milk from dairy ($0.27 per liter). In India (1999), total breastmilk production was valued using the price of cow's milk ($0.38 per liter) and canned milk ($0.75 per liter) as equivalents. In Mali (1997) the monetary value of human milk was estimated using an arbitrarily chosen figure ($1 per liter)[9].

In industrialized countries the basis for the estimation of breastmilk's monetary value has often been the price of expressed breastmilk stored in a milk bank. In Norway, women supplying expressed breastmilk to milk banks are paid $19 plus the travel cost to the milk bank. In Sweden, donor mothers are paid $21 per liter of human milk. In Denmark, women are paid $24 per liter for their milk, which is collected from their homes. Moreover, when human milk enters the health care system as a food/medicine, its market value increases significantly. The price of banked milk is $50 per liter In Norway, $40-$48 per liter in the UK and $80 per liter in the US. In Denmark, the cost of dispensing breastmilk to recipient infants is covered by the national welfare system. However, milk banks charge about $90 per liter to hospitals. These figures give an idea of the high economic value placed on human milk in some industrialized countries.

For the purposes of our analyses, the imputed gross monetary value of human milk at the national level was estimated based on the monetary value of commercial breastmilk substitutes required for safe replacement of the human milk currently consumed by children 0-35.9 months of age. In addition to the cost of commercial breastmilk substitutes, the cost of water, fuel, and minimum equipment (bottles and teats) was factored in the analysis to account for some of the direct costs of artificial feeding.

Our approach to estimating the monetary value of human milk is conservative because it only accounts for a few of the direct costs of replacing human milk with infant formula. Moreover, our analysis factors the cost of breastmilk production, that is the cost of providing lactating mothers with a nutritious and balanced diet to support breastfeeding while protecting their health and nutritional status.

Using a simple and conservative methodology, our analysis reveals the outstanding monetary value of human milk in francophone West Africa. If the human milk currently consumed by children 0-35.9 months were to be "safely" replaced with com-

mercial breastmilk substitutes, (e.g. ensuring that all children are fed adequate amounts of breastmilk substitutes so as to limit as much as possible the survival hazards associated with artificial feeding), an annual investment of about 2 billion US dollars would be needed.

The volume and the monetary value of the human milk produced in francophone West Africa should in themselves justify the inclusion of human milk in national and regional food statistics. If human milk were included in national food balance sheets, the Gross National Product (GNP)—a good indicator of the economic activity of the countries included in the analysis—would increase on average by 6.7%, with national increases ranging from 3.2% in Côte d'Ivoire to 14.2% in Niger[3].

Despite the conclusive body of evidence on the benefits of breastfeeding, policy makers in francophone West Africa have never considered human milk an important food resource, at least not important enough to include in national food balance sheets. This has important policy consequences for the survival, health, growth, and development of young children and for the health and status of women. It could also contribute to the decline of breastfeeding practices in West Africa in the current context of urbanization and globalization as it has been observed in regions that have experienced rapid urbanization.

Our analysis also demonstrates that "safe" replacement of human milk is not an option for most West African families. The average replacement cost of the human milk consumed by an infant who is adequately breastfed (exclusively breastfed from birth to about 6 months and partially breastfed thereafter while fed adequate complementary foods) amounts to about $412 per year or $1.13 per day. This expenditure is well beyond the purchasing power of most families in West Africa, a region where—according to the latest World Development Report— between 12% and 61% of families live on less than a dollar per day[17]. To put this $1.13 in perspective, it is worth noting that at the time of this writing, $1.13 allowed a family living in Bamako (Mali) to buy, for example, one-half kilogram of rice, two eggs, three pieces of smoked fish, one loaf of bread, and two mangoes.

## Conclusion

In francophone West Africa, a decline in breastfeeding rates would translate into increased levels of child mortality, morbidity, and malnutrition if safe human milk substitutes were not available and accessible so as to minimize the negative consequences of sub-optimal breastfeeding practices. In theory, countries have two options to safely replace human milk:

a) Produce, process, and distribute adequate amounts of breastmilk substitutes.

b) Import and distribute adequate amounts of commercial breastmilk substitutes.

Currently, the first of these alternatives is not a realistic option for economic, technological, and agricultural reasons. The second alternative would reduce the already limited foreign exchange of the countries included in our analysis, jeopardize national food security, and create dependence. Safe replacement of human milk is therefore not a real option for West African countries.

Similarly at the household level, a deterioration in breastfeeding practices would require that adequate quantities of breastmilk substitutes be available and optimally used to safely replace human milk. Our analysis clearly demonstrates that this is not a realistic option for the vast majority of families in francophone West Africa because of the high cost of adequate quantities of breastmilk substitutes, basic feeding equipment, clean, safe water, and fuel. As a result, wherever the practice of breastfeeding declines, human milk is sub-optimally replaced by breastmilk substitutes, increasing fertility levels and reducing the survival, health, growth, and development potential of children.

The message is clear. Safe replacement of human milk is not an option for the vast majority of families in francophone West Africa. Appropriate policies to promote, protect, and support breastfeeding need to be developed and implemented. We believe that such policy action is more likely to happen when decision makers and their constituencies fully appreciate the economic value of human milk.

## References

1 WHO Collaborative Study Team on the Role of Breastfeeding on the Prevention of Infant Mortality. Effect of breastfeeding on infant and child mortality due to infectious diseases in less developed countries: a pooled analysis. The Lancet, 2000; 355: 451-455.

2 Onyango AW, Esrey SA, Kramer MS. Continued breastfeeding and child growth in the second year of life: a prospective cohort study in Western Kenya. The Lancet, 1999; 354: 2041-2045.

3 Anderson JW, Johnstone B, Remley DT. Breastfeeding and cognitive development: A meta-analysis. Am J Clin Nutr, 1999; 70: 525-35.

4 Kurz KM, Habitcht JP, Rasmussen KM. Influences of maternal nutrition and lactation on length of postpartum amenorrhea. J Trop Pediatr, 1991; 37 suppl 1: 15-18.

5 Rosner AE, Schulman SK. Birth interval among breastfeeding women not using contraceptives. Pediatrics, 1990; 86(5): 747-52.

6 Haggerty PA, Rutstein SO, 1999. Breastfeeding and complementary infant feeding, and the postpartum effects of breastfeeding. DHS Comparative Studies No. 30. Macro International. USA.

7 Lawrence Ruth A, 1998. Breastfeeding. A guide for the medical profession. 5th Edition. Mosby-Year Book, Inc., St. Louis.

8 World Health Organization, 1998. Complementary feeding of young children in developing countries: A review of current scientific knowledge. World Health Organization, Geneva.

9 Hatløy A, Oshaug A, 1997. Human milk: an invisible food resource. J Hum Lact ; 13(4): 299-305

10 Nutrition au Togo. Investissons Aujourd'hui pour un développement durable. PROFILES Nutrition Policy Analysis and Advocacy Workshop. Lomé, Togo. February, 1999.

11 La Nutrition: Clé du développement durable au Burkina Faso. PROFILES Nutrition Policy Analysis and Advocacy Workshop. Ouagadougou, Burkina Faso. January, 2000.

12 Worthington-Roberts BS, 1988. Lactation, human milk and nutritional considerations. In Worthington-Roberts BS, Vermeersch J, Williams SR, editors. Nutrition in pregnancy and lactation. St Louis, Mosby.

13 World Health Assembly, 1994. Infant and child feeding nutrition. Resolution 47.5 of the 47th World Health Assembly, Geneva, May 9. World Health Organization, Geneva.

14 Almroth SG, 1978. Water requirements of breastfed infants in a hot climate. Am J Clin Nutr; 31 (7): 1154-1157

15 Sachdev HPS, Krishna J, Puri RK, Satyanarayana L, Kumar S. Water supplementation in exclusively breastfed infants during the summer tropics. Lancet , 1991; 337:929-933.

16 World Bank. World Development Report 2000/2001. The World Bank Group. Washington DC.

17 Neupane S, 1994. Estimation of the economic value of human milk in Nepal. UNICEF-Nepal.

18 Gupta A, Khanna K, 1999. Economic value of breastfeeding in India. National Medical Journal of India. Vol 12, 3, 999:123-127.

19 International Women Count Network and World Alliance for Breastfeeding Action, 2000. The milk of human kindness. A global factsheet on the economic value of breastfeeding. Crossroads Books.

20 Popkin BM, Bisgrove EZ. Urbanization and nutrition in low income countries. Food and Nutrition Bulletin, 1988; 10: 3-23.

# Code of Marketing of Breastmilk Substitutes Results of a Survey Conducted in Togo and Burkina Faso

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## Introduction

Problems related to nutrition and feeding practices for infants and young children paint a troubling picture in the majority of countries in sub-Saharan Africa. Indicators of nutritional status fall below the standards set by the World Health Organization. It therefore comes as no surprise that countries like Burkina Faso and Togo have a very high prevalence of malnutrition, with infant mortality rates among the highest in the world.

The joint WHO/UNICEF meeting on infant and young child feeding held in Geneva in 1979, led to a growing awareness of one of the most important components of the infant diet: breastfeeding. This awareness spurred a movement that, among other things, resulted in the adoption of the International Code of Marketing of Breastmilk Substitutes by the 34th World Health Assembly (WHA) in 1981.

The International Code of Marketing of Breastmilk Substitutes (the Code) is aimed at protecting and promoting breastfeeding by eliminating all of the inappropriate marketing and distribution practices related to breastmilk substitutes. The Code targets products sold as breastmilk substitutes (milk, milk products, baby foods and juices, feeding bottles and pacifiers).

The Code recognizes that under exceptional circumstances, resorting to an artificial substitute for breastmilk may be justified. Therefore, it does not prohibit the sale of these products nor their appropriate use as a complementary food after six months of age. It does, however, prohibit activities that promote these products by discouraging or casting doubt on the value of breastfeeding.

Although the Code is merely a recommendation, all countries should comply with it, whether or not they have legislation in place that promotes the Code's goals.

## Purpose of the Study

Since the adoption of the Code by WHA in 1981, many countries have proceeded to draw up and adopt specific regulations and legislation to implement the Code within a broader framework of strategies to promote health programs and policies. However, twenty years later, it is obvious that some countries have not gone as far as others in the implementation process. To a great extent, the high prevalence of diarrheal diseases and acute respiratory infections is due to the poor feeding practices of infants and young children. At least in part, these inadequate practices are caused by the aggressive advertising campaigns promoting the consumption of breastmilk substitutes. This is a constant concern for health care systems throughout West Africa.

We examined the aggressive advertising campaigns waged by producers and distributors of breastmilk substitutes and conducted a review of the literature on current feeding practices and their impact on infant health. Our aim was to determine:

- the status of the Code's implementation in countries in our region and
- the extent to which the Code has been applied within our health care system and at specific sales outlets by manufacturers and distributors of food for infants and young children.

With the support of the LINKAGES Project, regional coordination staff at the International Baby Food Action Network (IBFAN) for Francophone Africa and the Regional Center for Research in Nutrition and Food Sciences (CRAN) for Francophone West Africa initiated a study to address these two issues and to review the status of the International Code and its most frequent violations.

The study focused on Burkina Faso, which adopted the applicable legislation in 1993, and Togo, which does not yet have legislation in place on the marketing of breastmilk substitutes. This study will generate recommendations for governmental authorities, decision-makers, administrators and development professionals.

## Study Objectives

The general objective of this study was to help improve feeding practices for infants and young children by promoting breastfeeding and eliminating marketing techniques that idealize artificial feeding.

The specific objectives included:

- Identifying marketing practices within health care systems and at sales outlets that violate the Code
- Determining which manufacturers and products are associated with observed violations of the Code
- Describing practices and behaviors that could hinder the promotion of breastfeeding
- Preparing recommendations for the various individuals and institutions involved

## Methodology and Implementation

The study targeted the following:

- health care systems
- health care workers
- sales outlets

- mothers of infants under six months of age
- public and private media sources

**Sampling**

We used a purposive sampling technique, since we were interested in regions where violations were likely to be found. The following criteria were used:

- Geographically accessible sites
- Sites bordering on adjacent countries in the subregion
- Sites with substantial migration (cultural inter-mixing)

For the health care systems, we used a convenience sampling technique for the health care workers and a random sampling technique for mothers of infants under six months of age. Extensive sampling was applied to the health care systems and sales outlets.

**Distribution of Study Sample**

| Zones | Health care systems | Sales outlets | Health care workers | Mothers | Locations |
|---|---|---|---|---|---|
| Burkina Faso | 18 | 14 | 91 | 52 | 4 |
| Togo | 11 | 20 | 95 | 52 | 6 |
| **Total** | **29** | **34** | **186** | **104** | **10** |

**Data Collection Tools**

Five data collection tools were used, based on IBFAN's previous approaches to monitoring compliance with the Code. They included:

- health care systems questionnaire
- sales outlets questionnaire
- interview guide for mothers of infants under six months of age
- evaluation form to measure knowledge level of health care workers
- survey form (confirmation list) for media such as television, radio and newspapers

**Implementing Data Collection**

A team consisting of a supervisor and three monitors for each country participated in a three-day training session prior to beginning data collection. The team then traveled to the sites, where they remained for 48 to 72 hours. After all the data were collected, a general debriefing was held. Epi-Info software captured and analyzed all of the data, and findings were presented both quantitatively and qualitatively. At a meeting held to

edit and amend the report, many resource people helped to improve the final document.

## Findings

### Consumer Promotion

- Of the 29 health care systems observed, 17% receive donations of follow-up milk, cereals and biscuits. This is a violation of Article 7.4 of the Code, which stipulates that no health care system should receive samples or donations of products within the scope of the Code.

- In Burkina Faso, products were sold at discounted prices. This charitable act on the part of religious organizations violated WHA resolution 39.28, which states that this action can interfere with the initiation or continuation of breastfeeding by mothers who receive the discounted products.

- Some health care system facilities in Burkina Faso are used to promote infant cereals. This is a violation of Article 6.3 of the Code, which stipulates that no health care system facility should be used to promote products within the scope of the Code.

- According to Article 5.1, there should be no advertising or other form of promotion to the general public of products within the scope of the Code. This provision is violated in both countries in newspapers, magazines and journals such as *Parents*, *Enfants* and *Femme Actuelle* that advertise breastmilk substitutes throughout their publications.

- Display cards and huge posters were observed in several cities in Togo and Burkina Faso. Display racks to promote a company's specific products were present at sales outlets.

### Labeling

- In appropriate labeling remains the most significant violation in both countries. Articles 9.1 and 9.2 of the Code stress the need for accurate and comprehensive information on product packaging. This is notably deficient in both Togo and Burkina Faso, where there is a clear difference in the labeling of domestic products and that of imported western products, which in fact are presented more effectively. Domestic products are packaged in plastic pouches, with no guarantee that the product has been properly sealed or stored.

- Package labels are often in inappropriate languages (English, Spanish, Arabic). Examples: *Bébé Roi*, *Nestogeno*, *Cérélac Maïze*.

- Pictures of infants were found on the packaging of products such as *Farinor*, *Bébé Roi*, *Vitaline* and *Viten*.

- Some packages carry almost no information about proper storage conditions or product warnings.

- Finally, the recommended age for consumption is usually four months and older.

**Knowledge Level of Health Care Workers**

- Most of the health care workers interviewed know very little about the Baby-Friendly Hospital Initiative (BFHI) or the Code. In both countries, the study demonstrated that only 16% of health care workers have heard of the Code, 10% have read part or all of it and only 4% have received formal training on the Code. As regards the BFHI, 17% and 12% of health care workers interviewed in Togo and Burkina Faso respectively have received BFHI training.

- Limited formal training on breastfeeding may explain the low percentage of mothers receiving information and advice on breastfeeding during prenatal visits or in the delivery room.

**Mothers' Knowledge Level**

Twenty-one percent of mothers interviewed in Burkina Faso and 53% of those interviewed in Togo had been informed about child feeding practices. This explains in part the low incidence of exclusive breastfeeding, misinformation about the approach to take when introducing complementary foods after six months of age, the high prevalence of childhood diseases and the persistence of harmful traditional practices in the areas of child nutrition, health, growth and development.

**Positive Findings**

- The study showed that 35% of health care systems surveyed in the two countries were labeled "Baby Friendly."

- There are almost no pictures or publications idealizing artificial feeding in the health care systems.

- Visits by representatives of breastmilk substitute companies are very rare (contact between mothers and company representatives was not observed in the health care systems surveyed).

- Radio and television advertising for breastmilk substitutes is nonexistent in the two countries.

- Health care workers successfully orient many mothers in the choice of feeding practices for their young children.

- Another factor that can have a very positive influence on child feeding practices is the almost universal adoption of breastfeeding as a method of feeding children among most mothers interviewed.

### Factors with a Negative Influence on Child Feeding Practices

- Most mothers think that it is appropriate to introduce complementary foods at two to three months of age. Others plan to wait until the child is one year old. The negative effects of early and late introduction influence the child's survival, health, growth and development.

- Force-feeding and the use of purgatives, as well as herbal teas for therapeutic purposes, inhibit the effectiveness of the exclusive breastfeeding approach. The persistence of these traditional practices may be linked to mothers = misunderstanding of the benefits of breastfeeding.

- There is no available information on breastfeeding.

- Lack of access to information on child feeding on the part of some mothers and the influence of key people (mothers-in-law, grandmothers) on child feeding practices or methods can be obstacles to sound child feeding practices.

## Lessons Learned

### Health Care Systems

Evidence suggests that health care systems are adhering to the provisions of the Code:

- There is no advertising for artificial feeding practices.

- Representatives of companies that sell breastmilk substitutes do not have access to mothers.

- Health care workers are rarely visited by company representatives.

- Outside of private health care facilities and humanitarian organizations, donations of products within the scope of the Code are rare.

- However, the lack of IEC supplemental materials on breastfeeding and good nutritional practices raises the basic issue of whether, in the absence of obvious proof thereof, this can be equated with conscious adherence to the Code.

### Health Care Workers

The study showed that health care providers are almost completely unaware of the existence of the Code.

- Very few health care workers have received any formal training on the Code.

- Materials on the Code are not available at health care facilities.

- Health care workers appear to be more familiar with the BFHI, but very few of them have received any training about it.

### Mothers of Infants

- Most mothers did not receive information on breastfeeding during their prenatal visits.

- Some mothers received information at the time of delivery. This may be attributable to the absence of IEC materials promoting breastfeeding and the incomplete follow-up in the BFHI programs.

### Sales Outlets

- Both countries offer an impressive array of products cited by the Code. Many breastmilk substitutes (one out of three) violate the Code. Labeling very often does not comply with the provisions of the International Code.

## Conclusions and Recommendations

### Conclusions

- The International Code is violated in both countries.

- Specific violations occur in terms of packaging and information available on the label.

- Violations by health care facilities are infrequent.

- The local press does not violate the Code. However, magazines and newspapers produced in Europe and distributed in the two countries contain flagrant violations of the Code.

- Health care workers are almost completely uninformed about the Code.

- Very few health care workers have been trained in the Baby Friendly Hospital Initiative.

- Some mothers do not have information on the best way to breastfeed.

These factors may explain the short duration of exclusive breastfeeding and the existence of suboptimal child feeding practices.

### Recommendations

#### For national governments

- Pay close attention to research findings on monitoring compliance with the Code.

- Adopt legislation in Togo.

- Review existing legislation in Burkina Faso.

- Incorporate breastfeeding in general nutrition policies.

- Inform individuals and institutions responsible for infant nutrition and health about the Code and train them in implementing it at all levels.

- Involve all other development professionals and grassroots organizations and groups in promoting awareness of Code compliance.

**Non-governmental Organizations (NGOs)**

- Help to draft and distribute information on the Code.

- Draft additional measures to assist in reviewing the Code.

- Reactivate the BFHI program within the health care system.

- Train and retrain health care workers and support groups on breastfeeding.

- Lobby governmental authorities to revise training curricula for health care workers to include lactation management.

# Study on the International Code of Marketing of Breastmilk Substitutes in West Africa

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## Introduction

The first WHO/UNICEF meeting on feeding practices for infants and young children, held in Geneva from October 9-12, 1979, ushered in a new era in child advocacy:

- In 1980, a worldwide movement to stem the decline in breastfeeding began. Its mission was to promote and protect this practice, which is crucial to infant survival. Six non-governmental organizations founded The International Baby Food Action Network (IBFAN).

- At the 34th World Health Assembly in 1981, the member states of the World Health Organization adopted the International Code of Marketing of Breastmilk Substitutes to protect all aspects of breastfeeding.

- In July 1990, this initiative was bolstered by the Innocenti Declaration in Florence, Italy. The Declaration states: "...all women should be enabled to practice exclusive breastfeeding and all infants should be fed exclusively on breastmilk from birth to 4-6 months of age. Thereafter, children should continue to be breastfed, while receiving appropriate and adequate complementary foods, for up to two years of age or beyond."

- The Baby-Friendly Hospital Initiative is based on the premise that maternity health care workers' attitudes toward mothers play a crucial role in their desire to breastfeed. This initiative has contributed greatly to the growth of breastfeeding.

- In December 1992, the International Congress of Nutrition held in Rome, Italy adopted a declaration and a global plan of action to promote nutrition, including breastfeeding.

## Background on the International Code of Marketing of Breastmilk Substitutes

The following brief summary of the key stages in the development of the International Code of Marketing of Breastmilk Substitutes (the Code) provides insight into the current debate on this topic:

- 1939: a speech entitled "Milk and Murder" is delivered by Cecily Williams, an English physician in Singapore.

- 1968: The term "commerciogenic malnutrition" is coined by Derrick Jelliffe, an English physician posted in Jamaica at the time.

- 1974: First reference to the marketing of breastmilk substitutes appears in a WHO resolution.

- 1978: Second reference to the marketing of breastmilk substitutes appears in a WHO resolution.

- 1979: Joint WHO/UNICEF Meeting on Infant and Young Child Feeding recommends drawing up a code on marketing of breastmilk substitutes.

- 1980: World Health Assembly endorses the idea of asking the Director-General of WHO to draw up the Code.

- 1981: The Code is adopted in the form of a recommendation as "a minimum requirement" and "one of several important actions required in order to protect healthy practices regarding infant and young child feeding."

- 1991: the 44th World Health Assembly adopts resolution WHA44.33, which contains the declaration that inspires the International Health Action Policy and the Nutrition Policy for Infants and Young Children.

- 1996 (May): the 49th World Health Assembly adopts resolution WHA49.15, which "stresses the continued need to implement the International Code of Marketing of Breastmilk Substitutes."

- 1996: World Food Summit in Rome adopts resolutions on household food security and reaffirms commitments of the International Congress of Nutrition to prevent malnutrition.

## Scope of the International Code of Marketing of Breastmilk Substitutes

According to Article 2, the International Code "applies to the marketing, and practices related thereto, of the following products:

- breastmilk substitutes, including infant formula and other milk products;

- Foods and beverages, including bottlefed complementary foods, when marketed or otherwise represented to be suitable, with or without modification, for use as a partial or total replacement of breastmilk;

- Feeding bottles and teats [pacifiers].

- [The Code] also applies to the quality and availability of these products and to information concerning their use."

## The International Code of Marketing of Breastmilk Substitutes Ensures Public Health

Globalization has had an impact on public health in general, and more specifically on the health of infants and young children. A special set of regulations is required for the marketing of breastmilk substitutes in all countries. The usual approach is not appropriate for these products.

According to WHO, direct advertising for breastmilk substitutes has a clear impact on children's health for several reasons:

- It constitutes unfair competition with the healthy and normal practice of breastfeeding, which is not advertised and which remains the most reliable and least costly way to feed infants.
- It leads to uninformed decision-making and undermines the advice of health care workers.
- It introduces cultural practices that are sometimes foreign to the healthy practice of breastfeeding formerly known by mothers.
- It generates new expenses that will have repercussions on other household obligations, specifically health care costs.
- It broadens the market for a certain category of products, regardless of type.

## Coalitions Formed around the International Code of Marketing of Breastmilk Substitutes

Two types of coalitions have formed: those "for" the International Code and those "against" it. After adoption of the Code in 1981, several countries and some multinational companies attempted to challenge certain clauses in the Code. One idea put forth was to adapt the Code to the national realities of each country. Another was to introduce national regulations to weaken the binding nature of the Code and thereby render it less coercive. Those promoting these ideas defended the interests of the private sector. Their efforts failed, thanks to several initiatives led by IBFAN and other civil society groups, such as labor unions and human rights advocates. The coalition in favor of the Code would have to address the issues raised at each World Health Assembly by those who challenged clauses in the Code that would limit their profits. Surveys conducted by IBFAN since 1991 show that clauses in the Code are routinely violated.

## Advocates for the International Code of Marketing of Breastmilk Substitutes

Since its adoption in 1981, several organizations and NGOs have supported efforts to promote optimal breastfeeding and adequate complementary feeding practices. Thanks to training they have received, professionals in the social and health sectors would have promoted exclusive breastfeeding and assisted NGOs like IBFAN in their efforts. In some countries, many people have rallied around leaders in the field of nutrition and established associations to promote breastfeeding. IBFAN chapters have sprung up as a result and are conducting breastfeeding awareness campaigns. Internationally, WHO, UNICEF, UNFPA and USAID-funded projects have supported the worldwide campaign to prevent violations of the Code and have acted as advocates on its behalf. Today, the scientific community is working in conjunction with a highly motivated civil society to implement the Code, the Innocenti Declaration and other national and international legislation that protects and promotes the rights of mothers and children. The future looks bright. The serious problem of "HIV and infant feeding" reminds us of our responsibility to enable people to make informed decisions.

## Status of the International Code of Marketing of Breastmilk Substitutes in West Africa

In Africa, very few countries have drawn up and adopted a national code of marketing of breastmilk substitutes modeled after the Code. Countries that have tried to do so have used interministerial decrees or administrative marketing regulations. Very few countries have passed a law by the national parliament to establish and implement the Code. In francophone West Africa, significant progress has been achieved, thanks to IBFAN and its national chapters. The remaining countries that have not adopted language on this subject are in the process of catching up. This holds true for Togo and Mauritania. In 1999, IBFAN and WHO conducted an evaluation in nine countries (Benin, Burkina Faso, the Central African Republic, Côte-d'Ivoire, Gabon, Guinea Conakry, Mali, Niger and Togo) with the following results:

1. Five out of nine countries (56%) have a national committee to support breastfeeding.

2. Five out of nine countries (56%) also have a national committee to support the Baby-Friendly Hospital Initiative (BFHI).

3. Eight out of nine countries (89%) have a national chapter of IBFAN that works to promote breastfeeding.

4. Seven out of nine countries (78%) have formulated and disseminated a national policy to promote breastfeeding.

5. Seven out of nine countries (78%) have a BFHI Action Plan and are implementing it.

Detailed results of the WHO-IBFAN survey are attached. A country-by-country overview yields some interesting results.

## Extent of Implementation of Measures to Promote the International Code, by Country: Selected Data.

| Country | Adoption of the Code | Number of Baby-Friendly Hospitals | Laws protecting Mothers |
|---|---|---|---|
| Benin | 1997 - decree | **26** | 1. 12 weeks maternity leave<br>2. Mothers on maternity leave receive 2/3 salary<br>3. Two thirty-minute breaks for breastfeeding<br>4. Laws protecting childbearing women |
| Burkina Faso | 1993 - decree | **24** | Same |
| CAR | No (drafted) | **08** | Same |
| Côte-d'Ivoire | 1993 - law | **86** | Same |
| Gabon | No (drafted) | **03** | Same |
| Guinea Conakry | No (drafted) | **09** | Same |
| Mali | No (drafted) | **00** | Same |
| Niger | 1998 - decree | **25** | Same |
| Senegal | No (drafted) | **17** | Same |
| Togo | No (drafted) | **15** | Same |
| Mauritania | No (drafted) | **05** | Same |
| **TOTAL** | **40% have legislation<br>60% have draft legislation** | **218** | **All countries have laws protecting rights related to childbearing** |

## Lessons Learned in Countries with and without Legislation

**a) Countries with legislation in place**. The decisive factor in the adoption of Code legislation often been the presence of a person who believes in the cause of breastfeeding and is committed to promoting it. Technical departments that provide institutional leverage are Maternal and Infant Health Services and Nutrition Services, which are generally part of the Family Health Divisions. On the policy level, the existence of government-sponsored activities to promote women's health prompt supervisory authorities to make statements about the countries' needs in the breastfeeding area. The existence of an IBFAN chapter in a country is another factor that has a positive effect on the development and adoption of the Code. Coalitions that have contributed to the adoption of legislation include WHO, UNICEF and of course, IBFAN action groups. Various international conferences (International Congress of Nutrition and the World Food Summit) have also played important roles. The various conclusions and recommendations adopted by these conferences have helped to disseminate a positive understanding of issues related to breastfeeding.

Obstacles have often been created by the private sector and its representatives in the various countries. Free market reforms and initiatives that encourage "starting your own business" have ultimately caused behavior that discourages the practice of breastfeeding. Private neighborhood "drug dispensaries" have not always facilitated adoption of the Code.

In conclusion, successful efforts to pass legislation have required coalitions of organizations and people of good will.

**b) Countries that do not yet have legislation in place.** It should be said that the legislative process is inherently lengthy and demands physical as well as moral stamina. Committed professionals are at the core of these efforts, and wherever a nutrition department is weak or human resources are lacking, obviously the process is delayed. Countries in the process of developing legislation vary in terms of the progress they have made, but all progress depends on the commitment of authorities at the Ministry of Health to make nutrition-related issues a priority.

Once a law has been drafted, it takes a relatively long period of time before the law is adopted. During this time lag, opponents of the Code have a chance to launch a campaign to narrow the scope of the final text. Another factor that slows down this process is rapid turnover among health training personnel and among district and regional officials. Submission of the text to several levels of decision-makers results in more delays. The lack of breastfeeding advocacy also means that officials do not fully understand the importance of breastfeeding benefits for national development. In Togo and Burkina Faso, recent implementation of the PROFILES approach to analyze nutrition policies and advocate for nutrition has removed these obstacles.

In conclusion, we would like to reiterate that advocacy and professional and civic commitment are the main factors that lead to success. The West African region is in the process of catching up with the aid of the PROFILES approach.

## Overview of Breastfeeding and Nutritional Status in Children from Birth to 35 Months of Age

### Breastfeeding

Breastfeeding practices play a decisive role in determining the nutritional status of children and have an impact on their morbidity and mortality.

**Overview of Breastfeeding in Francophone West Africa**

| | Average length of breastfeeding (months) | Breastfed children aged 0 to 35 months (%) | Children between 6 and 9 months receiving complementary foods (%) | Exclusively breastfed children aged 0 to 4 months (%) |
|---|---|---|---|---|
| Benin | - | 97 | 86 | 13 |
| Burkina Faso | 22.7 | 98.7 | 82.0 | 5.3 |
| Côte d'Ivoire | 20.5 | 97.2 | 65 | 3.7 |
| Cameroon | 18.1 | 97.1 | 72 | 16 |
| Mali | 21.6 | 97 | 32 | 12 |
| Niger | 20.7 | 97.3 | 71 | 1 |
| Senegal | 20.4 | - | 60 | 14 |
| Togo | 24.4 | 97.4 | 89 | 15 |

Source: *Enquêtes Démographiques et de Santé (EDS)* 1991-1998. Macro International Inc.

Less than 10 % of children in francophone West Africa are breastfed exclusively up to the age of four months. Overall, feeding and breastfeeding practices are inadequate and negatively affect children's growth.

### Nutritional Status of Children Aged 0 to 35 Months

**Prevalence of protein-energy malnutrition in West Africa in children 0 to 35 months**

| | Stunting *Height (Age): % <-2SD* | Wasting *Weight (Age): %<-2SD* | Underweight *Weight (Age): %<-2SD* |
|---|---|---|---|
| Benin | **25** | **15** | **29** |
| Burkina Faso | **29** | **13** | **35** |
| Côte d'Ivoire | **25** | **9** | **24** |
| Mali | **30** | **23** | **40** |
| Mauritania | **35.5** | **14.7** | **31** |
| Niger | **41** | **21** | **50** |
| Senegal | **22** | **8.7** | **22** |
| Togo | **22** | **12** | **25** |
| Guinea-Conakry | **32** | **12** | **18** |
| Ghana | **26** | **8** | **27** |
| Nigeria | **43.1** | **9.1** | **35.7** |
| Sierra Leone | **35** | **11** | **29** |
| **Average West Africa** | **30.5** | **13** | **30.5** |

Source: *Enquêtes Démographiques et de Santé (EDS)* 1991-1998. Macro International Inc.

## Selected Violations of the Code at the Country Level

In 1998, IBFAN, WHO and UNICEF published a report on violations of the Code worldwide. Two years later, this report is still highly relevant, as the Code continues to be violated as much as ever, and with greater ease owing to the globalization of the economy.

- Manufacturers of breastmilk substitutes continue to use health care facilities and systems as a forum for promoting their new infant formulas. This is made easier by the extreme underfunding of these facilities, where no one can resist a "free" offer of anything, regardless of its nature or purpose.

- Manufacturers continue to use posters, calendars and gifts to health workers as a way to lure them into doing a better job of promoting breastmilk substitutes.

- Labels that are supposed to ensure that products are used correctly are becoming increasingly complex and sometimes even incomprehensible to consumers; they barely meet prescribed standards.

Companies continue to violate the Code in other ways by giving samples and inducements to mothers and underpaid health workers who live in extreme poverty.

## Conclusion

There is no doubt that massive violations of the Code are occurring in the countries of francophone West Africa. Advertising, labels and every form of marketing infant products constitute violations of the Code. Ignorance of the existence of the Code is sometimes given as a justification or reason for "letting things slide" and continuing to illegally violate the Code. In countries that do not yet have legislation in place, international legal instruments are sufficient to make change possible if awareness is dramatically increased. Recommendations made every year to governments during World Breastfeeding Week should be implemented.

## Bibliography

1. IBFAN. 1998. *Violations et distortions du Code. Rapport mondial sur les violations du Code International de Commercialisation des Substituts du Lait Maternel* [Violations and distortions of the Code. Report on worldwide violations of the International Code of Marketing of Breastmilk Substitutes]. WHO/UNICEF.

2. Ellen J. Sokal, J.D. *Le Manuel du Code* [The Manual of the Code]. Dakar, Enda Editions 1999. *Séries Etudes et Recherches*, no. 202-205.

3. Ministry of Health. Family Health Department, APAIB. 1999. *Rapport final de l'étude sur la surveillance du Code* [Final Report on Study of Monitoring the Code] (Burkina Faso).

4. Francophone IBFAN. *Premiéré réunion régionale en Afrique de l'Ouest* [First regional meeting in West Africa], July 26-30, 1999. Technical Report.

5. Bernard, B., Mboup G. and Ayad, M. (Macro International). *Enquêtes Démographiques et de Santé en Afrique de l'Ouest* [Demographic and health surveys in West Africa] (June 1999).

6. Patricia A. Haggerty and Shea O. Rutstein. Macro International (1999). DHS Comparative Studies, No. 30. Breastfeeding and complementary infant feeding, and the postpartum effects of breastfeeding.

7. WHO/AFRO - IBFAN (1999). *Rapport de l'atelier Interpays de Cotonou sur l'allaitement maternel* [Report on the Cotonou Intercountry workshop on breastfeeding].

8. Kaboré E. Francophone IBFAN (June 2000). *Étude sur le fonctionnement du réseau IBFAN* [Study on the functioning of the IBFAN network]. Consultation report.

# A Policy Analysis Tool for Calculating the Fertility Effects of Breastfeeding

## Selected Examples from West Africa

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## Abstract

This paper describes the technical basis for two alternative methods of estimating the fertility effect of breastfeeding at the population level. These methods have been incorporated into a spreadsheet calculator designed to estimate both the fertility impact of breastfeeding and its economic value, measured in terms of the family planning resources that would be required to achieve the same fertility reduction. Results for nine West African countries (Benin, Burkina Faso, Côte d'Ivoire, Ghana, Guinea, Mali, Niger, Senegal, and Togo) are presented. Using one method, current breastfeeding practices account for average reductions in total fertility of 2.8 to 4.3 live births per woman of reproductive age. Using the alternative method, breastfeeding is estimated to increase the duration of infertility following delivery by 12.5 to 21.2 months. The estimated economic value of these effects ranges from 0.4 US$ to 7.1 US$ per woman of reproductive age per year.

## Background

The many benefits of breastfeeding include improved infant health, increased birth spacing, and maximum efficiency in the use of food and other resources. These benefits have many economic implications that can now be estimated with some precision. Quantifying these benefits is particularly important where the true value of breastfeeding is unappreciated and where appropriate policies and programs to promote and protect breastfeeding are either absent or poorly implemented. Policy reform efforts are more likely to succeed when the benefits of breastfeeding can be measured and expressed in terms that are important to different policy audiences. One such benefit is the increase in child spacing afforded by lactational infertility due to the hormonal effects of suckling and lactation.

The interval from one pregnancy to the next is determined by a wide variety of biological and behavioral factors. Although the effects of breastfeeding on the resumption of menses and on fertility have been extensively documented, the physiological mechanism underlying this relationship remains a subject of speculation. Most of this speculation has focused on the role of prolactin, produced in response to suckling. Although the precise mechanism is unknown, prolactin is thought to inhibit the return of postpartum ovarian function, including follicular development and the production

of gonadotrophic hormones (Stallings et al., 1996) although there is conflicting evidence (Tay et al., 1996). Whatever the mechanism, this inhibition appears to have the effect of not only slowing the return of menses but also reducing the likelihood that menstruation will be accompanied by ovulation and that a fertilized ovum will successfully implant in the uterus (Dobbing, 1985).

The relationship between breastfeeding and fertility is modified by a variety of interacting biological and behavioral factors. It is therefore difficult to quantify the unique contribution of breastfeeding. Adding to the difficulty is that breastfeeding is a complex behavior with many dimensions that may be important, including the frequency, duration and intensity of individual feeds, all of which change over time. These, in turn, depend on the age and nutritional status of the mother, which exert their own influence on fertility (Habicht et al., 1985; Tracer, 1996).

The observed relationship between breastfeeding and fertility (or amenorrhea) is further complicated by the possibility that fertility can influence breastfeeding behavior. In many societies, mothers may stop breastfeeding when they discover that they are pregnant, thus strengthening the relationship between breastfeeding and fertility but confusing cause and effect.

Despite these problems, a number of important efforts have been made to estimate the contribution of breastfeeding to reduction in fertility. Dewey et al. (1996) use data from a randomized intervention trial in Honduras in which mothers were assigned to introduce complementary foods at 4 months while continuing to breastfeed, with or without maintaining breastfeeding frequency, or to exclusively breastfeed for 6 months. The introduction of complementary foods at 4 months had a significant effect on the proportion of mothers who were still amenorrheic at 6 months but this effect was not evident if the mothers maintained breastfeeding frequency. The use of random assignment of feeding mode in the design of this study provides very strong evidence of the effect of complementary feeding at 4 months on the duration of postpartum amenorrhea and confirms that this effect is mainly attributable to the effect on breastfeeding frequency. However, this study cannot be used to quantify the effect of a broader range of breastfeeding behavior (introduction of complementary feeding at other ages, for example) on the duration of amenorrhea.

Using observational data from breastfeeding mothers in Baltimore and Manila, Gray et al. (1990) examine relationships between infant feeding patterns and ovulation as measured by maternal urinary hormone levels. Regression analysis is used to quantify the effects of breastfeeding frequency, duration of suckling episodes and breastfeeds as a proportion of all feeds on the risk of ovulation before and after 6 months. Both before and after 6 months, more frequent breastfeeds, longer duration of breastfeeding episodes and a higher proportion of breastfeeds significantly reduced risk of ovulation. The regression coefficients provided could be used to predict the risk of ovulation and therefore the effect of breastfeeding patterns on fertility, but the data required, including the number and duration of breastfeeding episodes and the number of complementary feeds, are not available in most situations.

Next we describe two studies in the literature that provide methods of quantifying the effect of breastfeeding on fertility, using more readily available data on breastfeeding patterns (Bongaarts, 1978; Habicht et al., 1985).

## Method 1: Estimating the Reduction in Total Fertility Rate

Bongaarts (1978) developed a quantitative framework in which the reduction in fertility due to lactation is estimated by comparing birth intervals in the presence and absence of lactation. Bongaarts divides the birth interval into four components: 1) an infecundable period immediately following delivery "usually measured from birth to the first postpartum menses" (which, in the absence of lactation, is estimated to be 1.5 months), 2) waiting time to conception (5-10 months with an average of 7.5 months for most populations), 3) an average time added due to spontaneous abortions (2 months), and 4) a period of gestation (9 months). He proposes an index of lactational infecundability $C_i = 20/(18.5 + i)$, where i is the duration of lactational infecundability following delivery. In the absence of lactation this period would be 1.5 months and the index $C_i$ would equal 1 (20/(18.5 + 1.5)). As the duration of i increases with increasing lactation, $C_i$ decreases linearly. Bongaarts provides some estimates of i, from a low of 3 months for "contemporary western populations" where the duration of lactation is shortest to 16 for "least developed nations" where lactation is longest. Using these estimates and assuming that the differences in i are attributable solely to lactation, Bongaarts estimates that natural fertility in developing countries is only 58% of what it would be in the absence of lactation ($C_i = 20/(18.5+16) = 0.58$). Bongaarts also provides guidance on how to estimate i directly from breastfeeding duration, using the empirically derived equation:

$$i = 1.5 + (0.56 * L)$$

where L is equal to the duration of lactation, implying a linear relationship between lactation duration and the period of postpartum amenorrhea (PPA) such that each additional month of lactation prolongs the period of PPA by 0.56 months. With information on the duration of lactation, therefore, the contribution of breastfeeding to fertility reduction can be estimated for individual countries.[3]

There are several problems with this framework. It assumes:

1) that PPA can be used as an operational proxy for infecundability because "the return of menses closely coincides with the return of ovulation;"

2) that overall duration adequately captures the effect of lactation on PPA; and

3) that PPA and lactation duration are directly and linearly related over the usual range of lactation duration.

There is evidence that breastfeeding reduces fecundability not only by lengthening the duration of PPA but also by increasing the likelihood of anovulatory menstrual cycles and by reducing the readiness of the uterus for implantation of the fertilized ovum (Dobbing, 1985; Gray et al., 1990). If so, then a model that describes just the relationship between breastfeeding and the return of menses will underestimate the true relationship between breastfeeding and fecundability because it will not capture the additional delay due to reduction in implantation rate following conception. It is also believed that there are factors in addition to lactation (e.g., mother's age and nutritional status) that may influence PPA and are associated with breastfeeding practices, thus confounding the simple relationship between breastfeeding and PPA. There are features of lactation besides overall duration (e.g., the frequency and intensity of the suckling stimulus) that are believed to be more important influences on the period of

[3] The spreadsheet algorithm for calculating this contribution is based on Bongaarts' expression for total fertility rate (TFR) as a function of natural fecundity (FEC) in the absence of any constraints, multiplied by a series of constraining conditions such as coital frequency (C1), contraception (C2), abortion (C3) and lactational infertility (Ci) such that TFR = FEC * C1 * C2 * C3 * Ci. Collapsing all the right hand terms apart from Ci into a single constant K, we get TFR = K * Ci or, substituting from Bongaarts expression for Ci, above, TFR = K * 20/(20 + (0.56*L)) where L = lactation duration. If lactation duration is zero, the right side simplifies to K. K is therefore the total fertility rate when there is no lactation. If the actual total fertility rate and lactation duration are known, the value of K can be calculated as K= TFR/(20/(20+(0.56*L))) and the reduction in total fertility due to lactation as K-TFR. This reduction can be expressed as a proportion of K ((K-TFR)/K), equivalent to the proportion of the total reproductive period that the average woman is protected by lactational infertility. If this proportion is multiplied by the number of women of reproductive age in the population, the product is the absolute number of couple years of protection (CYP) provided each year by current breastfeeding practices. A value can be attributed to this by using the estimated cost of providing the same level of protection using the current mix of modern contraceptive methods.

PPA than overall duration. Finally, in populations where the duration of lactation is typically longer than even the 16 months of PPA cited by Bongaarts (1978) as the high end of the observed range, it is not chronologically possible for a longer duration to influence the return of menses since this event has in most cases already occurred.

## Method 2: Estimating the Postpartum Delay in Ovulation

A physiological and mathematical model that better reflects these realities has been proposed by Habicht et al. (1985). They postulate a conceptual model in which ovulation after delivery depends on a decrease in the level of prolactin (or another hormone) in circulation from the level at delivery to a threshold level that triggers ovulation. The rate of decline in the hormone is a function of breastfeeding practices, distinguishing between full, partial and no breastfeeding[4]. The conceptual framework is represented graphically in Figure 1. Full, partial and no breastfeeding are assumed to occur only in that chronological sequence but any behavior earlier in the sequence can be omitted and ovulation can occur before the sequence is completed. Thus we have the following seven possible permutations:

1. no breastfeeding, beginning at delivery until ovulation occurs

2. partial breastfeeding, beginning at delivery, followed by no breastfeeding until ovulation occurs

3. partial breastfeeding, beginning at delivery until ovulation occurs

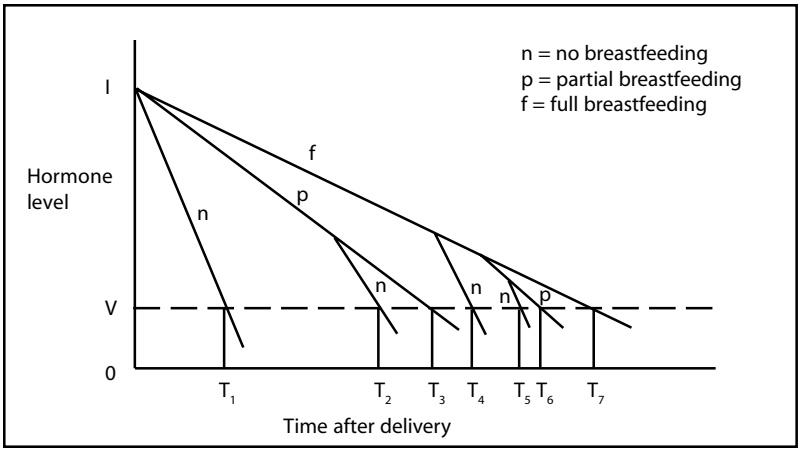
4. full breastfeeding, beginning at delivery, followed by no breastfeeding until ovulation occurs

5. full breastfeeding, beginning at delivery, followed by partial breastfeeding, followed by no breastfeeding until ovulation occurs

6. full breastfeeding, beginning at delivery, followed by partial breastfeeding until ovulation occurs

7. full breastfeeding, beginning at delivery until ovulation occurs.

**Figure 1. Theoretical Relationships between Mode of Feeding (no, partial, or full breastfeeding), Serum Hormone Levels and Duration of Postpartum Infertility ($T_{1-7}$), where I = initial hormone level at delivery and V = threshold hormone level for return of fertility (see text and Table 1) (after Habicht et al., 1985).**




[4] Full breastfeeding is defined as breastfeeding with no other nutritive (caloric) foods in the infants diet. Partial breastfeeding is breastfeeding with some calories also obtained from foods other than breastmilk.

The initial level of circulating hormone at delivery is represented by I and the level at which ovulation is triggered by V. Using data from the Malaysian Family Life survey in a system of simultaneous equations, Habicht et al. estimated the rate of return of ovulation associated with each breastfeeding state. Their results indicate that with no breastfeeding, ovulation resumes in 1.237 months, on average. Ovulation is delayed by an additional 1.189 months for each month of full breastfeeding and by 0.813 months for each month of partial breastfeeding. These coefficients permit estimation of the delay in ovulation that can be attributed to different breastfeeding practices. With a standard error of estimation of "3.6 months, such predictions are highly imprecise for individual women but at a population level they should give unbiased estimates of averages. Thus the time to ovulation after delivery can be expressed as:

$$T_v = \alpha + \beta t_f + \gamma t_p$$

where $T_v$ is the time to ovulation, $\alpha$ is the time to ovulation if there is no breastfeeding, $\beta$ is the delay associated with each month of full breastfeeding, $\gamma$ is the delay associated with each month of partial breastfeeding, $t_p$ is the number of months of partial breastfeeding and $t_f$ is the number of months of full breastfeeding[5]. This formulation only works if the period of partial breastfeeding does not extend beyond the return to ovulation. For the purposes of estimating actual delays, the following formulas were therefore derived:

1. Months of full breastfeeding before ovulation $= t_f$

2. Months of partial breastfeeding before ovulation $= t_p$ if $t_p < ((t_f (1-\beta))-\alpha)/(\gamma-1)$, otherwise ovulation occurs before partial breastfeeding stops and the number of months of partial breastfeeding before ovulation $= ((t_f (1-\beta))-\alpha)/(\gamma-1)$

3. Months of no breastfeeding before ovulation $= 0$ if $t_p < ((t_f (1-\beta))-\alpha)/(\gamma-1)$. Otherwise ovulation occurs after partial breastfeeding stops and the number of months of no breastfeeding before ovulation $= \alpha + (t_f (\beta-1))-(t_p(\gamma-1))$.

Thus, for the seven possible permutations of breastfeeding behavior illustrated in Figure 1, the number of months to ovulation and the delay due to breastfeeding are calculated using the formulas presented in Table 1.

This model also has a number of problems. First, extrapolation beyond the range of breastfeeding behavior represented in the Malaysian sample is probably invalid. For example, although the results suggest that the return of menses could be delayed *for ever* by continuing full breastfeeding (because each month of full breastfeeding is estimated to result in more than a month delay in the return of ovulation), this conclusion is unlikely to hold, being an extrapolation from much more limited durations of full breastfeeding. Second, the model implies that there is no additional advantage to partial breastfeeding beyond a certain age (depending on the duration of full breastfeeding). In fact, although ovulation may occur, on average, after a particular duration of partial lactation, longer durations may extend fertility for some women. For these reasons, the model cannot be used to estimate the *maximum* benefit of full or partial lactation.

[5]Estimates for the coefficients a, b and g are 1.237, 1.189 and 0.813, respectively (Habicht et al., 1985).

Third, the model assumes a chronological sequence of full to partial to no breastfeeding. Although this pattern may prevail in many cases, breastfeeding behavior is usually more complex, with reversals from partial back to full or from no

**Table 1. Seven Possible Permutations of Breastfeeding Behavior and the Formulas Used to Calculate the Time to Ovulation.**

| Sequence of Breastfeeding Behaviors | Months before Ovulation | | | |
|---|---|---|---|---|
| | Full BF | Partial BF | No BF | Total |
| 1. no breastfeeding, beginning at delivery until ovulation occurs | 0 | 0 | $\alpha = 1.237$ | 1.237 |
| 2. partial breastfeeding, beginning at delivery, followed by no breastfeeding until ovulation occurs | 0 | If $T_p \geq ((T_f (1-\beta))-\alpha)/(\gamma-1)$ (=6.6), 6.6, otherwise, $T_p$ | If $T_p \geq ((T_f (1-\beta))-\alpha)/(\gamma-1)$, 0, otherwise, $\alpha+(T_f(\beta-1))+(T_p(\gamma-1))$ | If $T_p \geq ((T_f (1-\beta))-\alpha)/(\gamma-1)$ (=6.6), 6.6, otherwise, $T_p+\alpha+(T_f(\beta-1))+(T_p(\gamma-1))$ |
| 3. partial breastfeeding, beginning at delivery until ovulation occurs | 0 | $-\alpha/(\gamma-1)=6.6$ | 0 | 6.6 |
| 4. full breastfeeding, beginning at delivery, followed by no breastfeeding until ovulation occurs | $T_f$ | 0 | $\alpha+(T_f(\beta-1))$ | $T_f+\alpha+(T_f(\beta-1))$ |
| 5. full breastfeeding, beginning at delivery,followed by partial breastfeeding, followed by no breastfeeding until ovulation occurs | $T_f$ | If $T_p \geq ((T_f (1-\beta))-\alpha)/(\gamma-1)$, $((T_f (1-\beta))-\alpha)/(\gamma-1)$, otherwise, $T_p$ | If $T_p \geq ((T_f (1-\beta))-\alpha)/(\gamma-1)$, 0, otherwise, $\alpha+(T_f(\beta-1))+(T_p(\gamma-1))$ | If $T_p \geq ((T_f (1-\beta))-\alpha)/(\gamma-1)$, $T_f+((T_f (1-\beta))-\alpha)/(\gamma-1)+\alpha+(T_f(\beta-1))+(T_p(\gamma-1))$, otherwise $T_f+T_p$ |
| 6. full breastfeeding, beginning at delivery, followed by partial breastfeeding until ovulation occurs | $T_f$ | If $T_p \geq ((T_f (1-\beta))-\alpha)/(\gamma-1)$, $((T_f (1-\beta))-\alpha)/(\gamma-1)$, otherwise, $T_p$ | 0 | If $T_p \geq ((T_f (1-\beta))-\alpha)/(\gamma-1)$, $T_f+((T_f (1-\beta))-\alpha)/(\gamma-1)$, otherwise $T_f+t_p$ |
| 7. full breastfeeding, beginning at delivery until ovulation occurs [the model predicts that as long as full BF continues, so does amenorrhea] | $\infty$ | 0 | 0 | $\infty$ |

$T_f$ = duration of full breastfeeding
$T_p$ = duration of partial breastfeeding
Coefficients: a = 1.237, b = 1.189, g = 0.813

breastfeeding back to partial. The model should therefore be seen as a simplification of reality. Analyses and reports of Demographic and Health Surveys (DHS) and other sources of information on breastfeeding behavior also generally make the same simplifying assumptions.

Finally, like the Bongaarts model, the return of menses is taken as the return of full fecundability. This should therefore be considered an underestimate of the effect of breastfeeding on fertility since it does not include additional effects on anovulatory cycles or implantation.

Although this model should be verified in other contexts, it currently provides the best theoretical basis for estimating the fertility reduction benefits of breastfeeding. The model suggests that six months of full breastfeeding followed by partial breastfeeding to age 2 years and beyond results in a total duration of postpartum anovulation of 18.7 months, 17.4 months longer than if there were no breastfeeding.

## Results

Application of the Bongaarts and Habicht methods to DHS breastfeeding data from a number of West African countries results in the estimates presented in Table 2, which includes estimates of the economic value of these effects, measured in terms of the expenditure of resources on family planning programs that would be required to achieve the same benefit in terms of fertility reduction. This calculation requires an estimate of the cost per couple year of protection, preferably based on the current mix of modern contraceptive methods used in the country. For consistency, the estimates in Table 2 are all based on a single value of US$18 per couple year of protection.

**Table 2. Economic Value of the Delay in Fertility Due to Breastfeeding in Selected West African Countries.**

| Country | Number of Women of Reproductive Age (x1,000) | Median Duration of BF | | | Effect of Current Breastfeeding Practices | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Bongaarts | | Habicht | |
| | | Full | Partial | Any | Reduction in TFR (live births) | Value ($ million/ year) | Average Delay in Fertility (months) | Value ($million/ year) |
| Ghana | 4,791 | 3.5 | 18.5 | 22.0 | 2.8 | 32.9 | 12.5 | 13.9 |
| Mali | 2,821 | 7.5 | 14.1 | 21.6 | 4.1 | 19.1 | 20.4 | 16.8 |
| Burkina | 2,670 | 4.7 | 22.2 | 26.9 | 4.2 | 18.4 | 14.8 | 11.7 |
| Togo | 1,067 | 3.7 | 20.6 | 24.3 | 3.7 | 7.8 | 12.8 | 3.8 |
| Guinea | 2,820 | 8.3 | 13.9 | 22.2 | 3.4 | 19.5 | 21.2 | 9.7 |
| Niger | 2,364 | 2.1 | 18.5 | 20.6 | 4.3 | 15.6 | 9.6 | 6.8 |
| Benin | 1,452 | 0.6 | 22.2 | 22.8 | 4.0 | 10.2 | 6.6 | 2.5 |
| Senegal | 2,528 | 4.5 | 16.4 | 20.9 | 3.9 | 16.8 | 14.4 | 8.2 |
| Côte d'Ivoire | 3,582 | 3.7 | 16.6 | 20.3 | 2.9 | 23.4 | 12.8 | 10.6 |

Although the Bongaarts and Habicht models measure the fertility effects of breastfeeding in different ways (Bongaarts: reduction in total fertility; Habicht: duration of postpartum infertility), these can be compared in terms of couple years of protection or the family planing resources needed to achieve the same fertility effect. In comparison with the Bongaarts model, the Habicht model gives generally smaller estimates of the reduction in fertility due to breastfeeding. Because of the powerful effect of full breastfeeding in the Habicht model and that of duration of lactation in the Bongaarts model, this difference is smallest when the duration of full breastfeeding is long and/or when the overall duration of lactation is short.

In all countries the impact of breastfeeding as currently practiced on fertility is very significant. Using the Bongaarts model, current breastfeeding practices account for average reductions in total fertility of 2.8 to 4.3 live births per woman of reproductive age. Using the Habicht alternative, breastfeeding is estimated to increase the duration of infertility following delivery by 12.5 to 21.2 months. To achieve the same fertility reduction using modern family planning methods, an expenditure of between US$1.72 to US$7.31 per woman of reproductive age per year would be needed.

## Discussion

Using the Bongaarts model with World Fertility Survey data collected between 1974 and 1984, Thapa et al. (1988) estimate that in Africa breastfeeding reduces fertility by an average of 4 births per women (in line with results reported here) whereas modern contraceptives reduce it by only 0.5 births. Measured in terms of couple years of protection, our results indicate that the economic value of fertility reduction provided by breastfeeding in West Africa ranges from US$1.7 to US$7.3 per women per year.

This is in countries where average yearly per capita expenditure on health care ranges from $2.8 to $15.1 (UNDP, 2000).

For public health decision makers interested in fertility reduction, the current contribution and value of these determinants is of less interest than the potential contribution and what this would cost. If modern contraceptives are already being actively promoted and demand is stable, breastfeeding promotion may offer a more cost-effective fertility reduction strategy. Breastfeeding promotion and the lactational amenorrhea method (LAM) of family planning[6] may be able to reach a different audience, one that might be resistant to the use of modern contraceptives. It has also been speculated that, once introduced to LAM as a family planning method, these otherwise resistant clients would be more likely to move on to another modern contraceptive method once LAM is no longer suitable (after six months or after menses return) In addition to its direct effects on fertility the promotion of breastfeeding and LAM thus offers a "hook" for increasing contraceptive prevalence less expensively than by increasing investment in traditional family planning programs.

The potential impact of breastfeeding promotion and LAM can be gauged by the gap between current breastfeeding practices and optimal breastfeeding. The Bongaarts formulation uses the overall duration of lactation to estimate the fertility impact. As discussed previously, increasing the duration of any breastfeeding beyond current levels in West Africa, already between 20 and 27 months, is unlikely to have a great impact on fertility since by this time menses have already returned. Increasing the duration of exclusive breastfeeding[7], on the other hand, especially in countries where this is much shorter than the recommended 6 months, can be expected to have a much greater impact.

Breastfeeding promotion is a cost-effective intervention for reducing infant mortality and morbidity in a variety of contexts (World Bank, 1993). The fertility effects add substantially to the list of benefits and justify the allocation of family planning resources to breastfeeding promotion efforts. Although cost-effectiveness analysis needs to be undertaken to establish what allocations are justified in each country the fertility benefits will be greatest where uptake of available modern contraceptive services has stabilized at low levels and where the duration of exclusive breastfeeding remains well below 6 months.

## References Cited

Bongaarts J. A framework for analyzing the proximate determinants of fertility. Population and Development Review 4:105-132, 1978.

Dewey KG, Cohen RJ, Rivera LL, Canahuati J, Brown KH. Effects of age at introduction of complementary foods to breast-fed infants on duration of lactational amenorrhea in Honduran women. Am J Clin Nutr 65:1403-1409, 1997.

Dobbing J (ed.). Maternal Nutrition and lactational Infertility. Academic Press, London, 1985.

Gray RH, Campbell OM, Apelo R, Eslami SS, Zacur H, Ramos RM, Gehret JC, Labbok MH. Risk of ovulation during lactation. Lancet 335:25-29, 1990.

Habicht J-P, DaVanzo J, Butz WP, Meyers L. The contraceptive role of breastfeeding. Population Studies 39:213-232, 1985.

Stallings JF, Coates RJ, Panter-Brick C, Worthman CM. Prolactin response to suckling and maintenance of postpartum amenorrhea among intensively breastfeeding Nepali women. Endocr Res 22:1-28, 1996.

Tay CC, McNeilly AS, Glasier AF. Twenty-four hour patterns of prolactin secretion during lactation and the relationship to suckling and the resumption of fertility in breast-feeding women. Hum Reprod 11:950-5, 1996.

[6] LAM provides 98% protection against conception as long as three criteria are met: 1) the mother fully or nearly fully breastfeeds, 2) the infant is younger than six months, and 3) the mother remains amenorrheic.

[7] Although in theory, the fertility benefits of breastfeeding can be obtained by breastfeeding "fully," that is without the addition of any caloric feeds to the diet, but including non-nutritive liquids such as water and tea, in practice *exclusive* breastfeeding is recommended because water and other non-nutritive liquids are unnecessary and potentially dangerous to infant health and survival, especially under conditions of poor hygiene and sanitation.

Thapa S, Short RV, Potts M. Breast feeding, birth spacing and their effects on child survival. Nature 335:679-82, 1988.

Tracer DP. Lactation, nutrition, and postpartum amenorrhea in lowland Papua New Guinea. Hum Biol 68:277-92, 1996.

UNDP. Human Development Report 2000. New York: Oxford University Press, 2000.

World Bank. World Development Report 1993: Investing in Health. New York: Oxford University Press, 1993.

# Recommendations

1. Provide countries with technical assistance to estimate the economic value of human milk for advocacy purposes intended at, but not limited to, the inclusion of human milk in national food balance sheets.

2. Provide countries with technical assistance to estimate the economic value of human milk for advocacy purposes intended at, but not limited to, the inclusion of human milk in national food balance sheets.

3. Include men, and other family and community members in breastfeeding protection, promotion, and support.

4. Strengthen advocacy for the effective implementation in all countries of the recommendations of the International Labor Organization on women's right to maternity and breastfeeding protection.

5. Ensure that in emergency situations, guidelines on optimal breastfeeding and complementary feeding remain the same as in non-emergency situations. National and international bodies are therefore to ensure an enabling environment for optimal infant feeding practices during such emergency situations.

6. Ensure that all countries develop, adopt, and enforce the National Code of Marketing of Breast milk Substitutes.

7. Adapt in every country international guidelines to enable HIV positive mothers to make informed choices on infant feeding.

8. Mobilize the resources necessary to facilitate the implementation of research findings to reduce the risk of mother-to-child transmission.

9. Ensure the effective integration of breastfeeding promotion and vitamin A supplementation programs to achieve synergy and greater survival, growth, and development impact.

10. Encourage countries to adopt a life-cycle approach to nutrition.



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