

**GUIDELINE 4:** Breastfeeding is enhanced when positive breastfeeding messages are incorporated in relevant educational activities, materials, and outreach efforts.

**Suggestions for Implementation**

1. It is important that positive breastfeeding messages are used in:

- participant orientation programs and materials
- printed and audiovisual materials for professional audiences
- printed, audiovisual, and display materials for potential clients

*Rationale:* Including positive breastfeeding messages promotes breastfeeding as the preferred infant feeding choice and reinforces WIC's position on breastfeeding.

**GUIDELINE 5:** Breastfeeding is enhanced when activities are evaluated on an annual basis.

**Suggestions for Implementation**

1. It is important that evaluation include measures of incidence and duration such as:

- incorporation of data collection into current WIC systems
- sample surveys
- Center for Disease Control surveillance systems
- state surveillance systems
- birth certificate information

*Rationale:* Since few data are available, data collection will help identify and direct further breastfeeding promotion efforts for this population. Assessment of successful strategies will help agencies measure progress toward meeting the health objectives for the Nation.

2. It is important that questions regarding breastfeeding attitudes and the WIC program's breastfeeding support activities are included in the annual participant survey.

*Rationale:* Collecting data on breastfeeding attitudes and WIC-related promotion activities about breastfeeding will help state and local agencies design more effective breastfeeding promotion programs.

3. If more indepth information on the incidence and duration of breastfeeding is desired, it is important that information be collected on at least the following categories:

- exclusive breastfeeding
- patterns of combined breastfeeding and formula feeding (e.g., mostly breastfeeding)
- equal parts breastfeeding and formula feeding

- mostly formula feeding
- exclusive formula feeding

*Rationale:* Collecting data on breastfeeding patterns gives a better picture of WIC's population. This will help States better focus their breastfeeding promotion activities.

**GUIDELINE 6:** Breastfeeding is enhanced when appropriate breastfeeding education and support is offered to all pregnant WIC participants.

**Suggestions for Implementation**

1. It is important that a breastfeeding protocol is established to:

- integrate breastfeeding promotion into the continuum of prenatal nutrition education
- include an initial assessment of participant knowledge, concerns, and attitudes related to breastfeeding
- provide breastfeeding education and support sessions to each prenatal participant based on the above assessment
- define the roles of all staff in the promotion of breastfeeding
- define situations when breastfeeding is contraindicated

*Rationale:* Making informed choices regarding the best method of infant feeding is dependent on staff's ability and efforts to address women's needs and concerns throughout the prenatal period.

2. It is important to develop a mechanism to incorporate positive peer influence into the prenatal period, such as:

- peer counselors
- an honor roll of successful breastfeeding WIC participants
- an opportunity to watch other WIC participants breastfeed

*Rationale:* Positive peer influence has been shown to be a factor in a woman's decision to breastfeed.

3. It is important to include the participant's family and friends in breastfeeding education and support sessions.

*Rationale:* Assistance and emotional support from family and friends are helpful to a woman's initiation and continuation of breastfeeding.

4. It is important to encourage the mother to communicate her decision to breastfeed to appropriate hospital staff and physician.

*Rationale:* To overcome potential barriers due to hospital and physician practices, women should be aware of the need to request the services that will facilitate successful breastfeeding; e.g., baby put to the breast within first hour after delivery.

**GUIDELINE 7:** Breastfeeding is enhanced when policies allow breastfeeding women to receive all WIC services regardless of their breastfeeding patterns.

**Suggestions for Implementation**

1. It is important that eligible women who meet the definition of breastfeeding\* be certified to the extent that caseload management permits.

*Rationale:* Breastfeeding women are among the highest priority groups of WIC participants.

2. It is important that breastfeeding women receive a food package consistent with their nutritional needs.

*Rationale:* Breastfeeding women have the highest nutritional needs of any category of women participants and should receive a food package to meet those needs.

3. It is important that breastfeeding women receive support and assistance in order to maintain or increase breastfeeding.

*Rationale:* All breastfeeding women regardless of breastfeeding pattern need ongoing support so that they feel positive about their breastfeeding experience.

**GUIDELINE 8:** Breastfeeding is enhanced when policies allow breastfeeding infants to receive a food package consistent with their nutritional needs.

**Suggestions for Implementation**

1. It is important that the use of supplemental formula for breastfed infants be minimized.

*Rationale:* Support that encourages breastfeeding is more effective than offering more formula than the baby is currently using. Clear support which continues to build confidence would include praise and encouragement for her current level of breastfeeding.

2. It is important that vouchers are not issued to exclusively breastfed infants. If a food instrument must be distributed to enroll the infant, consider printing a positive breastfeeding message on the voucher.

*Rationale:* A blank voucher emphasizes that the breastfeeding dyad may not be receiving as much food as the formula feeding dyad and makes the mother feel as though she is missing out on some of the food available to her. A voucher with even a small amount of formula on it sends a message to the mother that she is expected to supplement. A positive breastfeeding message will reinforce the importance of breastfeeding.

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\* Proposed definition: The practice of feeding a mother's breast milk to her infant(s) on the average of at least once a day.

3. It is important to encourage the issuance of vouchers for powdered formula to breastfeeding mothers who wish to supplement.

*Rationale:* Powdered formula can be prepared in as small a quantity as needed. However, the minimum amount of the concentrated fluid formula that can be prepared is 26 ounces. This amount must be used within 48 hours which could encourage more supplementation than originally intended.

4. It is important that breastfeeding women receive information about the potential impact of formula on lactation and breastfeeding before formula is given.

*Rationale:* Breastfeeding mothers may not fully understand the impact formula supplementation has on breast milk supply. This is especially important during the first few critical weeks when the milk supply is being established.

5. It is important that formula vouchers or samples be given only when specifically requested.

*Rationale:* Offering formula to a breastfeeding woman undermines her confidence that she can breastfeed successfully, particularly in the first few weeks. She also may find it difficult to refuse the free formula even though she had not planned to use it.

**GUIDELINE 9:** Breastfeeding is enhanced when breastfeeding support and assistance is provided throughout the postpartum period, particularly at critical times when the mother is most likely to need assistance.

#### **Suggestions for Implementation**

1. It is important to develop a plan to provide women with access to locally available breastfeeding support programs, making sure support is available early in the postpartum period and throughout lactation to:

- include professional support, such as management of lactation problems, hotline contacts, and telephone counselors
- include peer support, such as peer counselors and resource mothers

*Rationale:* Professional support programs assist the mother experiencing lactation problems to resolve questions and problems with lactation management. Peer support programs use individuals who have successfully breastfed an infant and who express a positive, enthusiastic viewpoint of breastfeeding.

2. It is important to provide or identify education and support for breastfeeding women in special situations. Consider:

- supporting working mothers, mothers returning to school, and hospitalized mothers and infants
- offering support programs at times in keeping with the mother's schedule

*Rationale:* Breastfeeding mothers who are separated from their infants need support programs which include situation-specific information and support.

3. It is important that postpartum contacts with breastfeeding women provide positive reinforcement for the continuation of breastfeeding. Consider:

- using appropriate posters and messages placed in the clinic waiting and nutrition education areas
- including a special breastfeeding message encouraging the continuation of breastfeeding on food instruments

*Rationale:* Encouragement from professional staff and peers can provide motivation to succeed at breastfeeding.

4. It is important to coordinate breastfeeding support with other health care programs such as:

- Maternal and Child Health
- Family Planning
- Hospitals
- Indian Health Service
- Community health care providers

*Rationale:* Collaborative relationships result in consistent messages supporting breastfeeding, more efficient services, and decreased lactation problems, and reach a larger number of women. These efforts will have a more far-reaching effect as the incidence of breastfeeding increases.

**APPENDIX I**  
**INNOCENTI DECLARATION**

**INNOCENTI DECLARATION**  
**ON THE PROTECTION, PROMOTION AND SUPPORT OF BREASTFEEDING**

**RECOGNIZING THAT**

**Breastfeeding is a unique process that:**

- provides ideal nutrition for infants and contributes to their healthy growth and development;
- reduces incidence and severity of infectious diseases, thereby lowering infant morbidity and mortality;
- contributes to women's health by reducing the risk of breast and ovarian cancer, and by increasing the spacing between pregnancies;
- provides social and economic benefits to the family and the nation;
- provides women with a sense of satisfaction when successfully carried out; and that

**Recent research has found that:**

- these benefits increase with increased exclusiveness<sup>1</sup> of breastfeeding during the first six months of life, and thereafter with increased duration of breastfeeding with complementary foods, and
- programme interventions can result in positive changes in breastfeeding behaviour;

**WE THEREFORE DECLARE THAT**

As a global goal for optimal maternal and child health and nutrition, all women should be enabled to practice exclusive breastfeeding and all infants should be fed exclusively on breast milk 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. This child-feeding ideal is to be achieved by creating an appropriate environment of awareness and support so that women can breastfeed in this manner.

Attainment of the goal requires, in many countries, the reinforcement of a "breastfeeding culture" and its vigorous defence against incursions of a "bottle-feeding culture." This requires commitment and advocacy for social mobilization, utilizing to the full the prestige and authority of acknowledged leaders of society in all walks of life.

Efforts should be made to increase women's confidence in their ability to breastfeed. Such empowerment involves the removal of constraints and influences that manipulate perceptions and behaviour towards breastfeeding, often by subtle and indirect means. This requires sensitivity, continued

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<sup>1</sup> Exclusive breastfeeding means that no other drink or food is given to the infant; the infant should feed frequently and for unrestricted periods.

vigilance, and a responsive and comprehensive communications strategy involving all media and addressed to all levels of society. Furthermore, obstacles to breastfeeding within the health system, the workplace and the community must be eliminated.

Measures should be taken to ensure that women are adequately nourished for their optimal health and that of their families. Furthermore, ensuring that all women also have access to family planning information and services allows them to sustain breastfeeding and avoid shortened birth intervals that may compromise their health and nutritional status, and that of their children.

All governments should develop national breastfeeding policies and set appropriate national targets for the 1990s. They should establish a national system for monitoring the attainment of their targets, and they should develop indicators such as the prevalence of exclusively breastfed infants at discharge from maternity services, and the prevalence of exclusively breastfed infants at four months of age.

National authorities are further urged to integrate their breastfeeding policies into their overall health and development policies. In so doing they should reinforce all actions that protect, promote, and support breastfeeding within complementary programmes such as prenatal and perinatal care, nutrition, family planning services, and prevention and treatment of common maternal and childhood diseases. All healthcare staff should be trained in the skills necessary to implement these breastfeeding policies.

#### OPERATIONAL TARGETS:

**All governments by the year 1995 should have:**

- appointed a national breastfeeding coordinator of appropriate authority, and established a multisectoral national breastfeeding committee composed of representatives from relevant government departments, nongovernmental organizations, and health professional associations;
- ensured that every facility providing maternity services fully practices all ten of the "Ten Steps to Successful Breastfeeding" set out in the joint WHO/UNICEF statement *Protecting, promoting and supporting breast-feeding: the special role of maternity services*;
- taken action to give effect to the principles and aim of all *Articles of the International Code of Marketing of Breast-milk Substitutes* and subsequent relevant World Health Assembly resolutions in their entirety; and
- enacted imaginative legislation protecting the breastfeeding rights of working women and established means for its enforcement.

#### WE ALSO CALL UPON INTERNATIONAL ORGANIZATIONS TO:

- draw up action strategies for protecting, promoting, and supporting breastfeeding, including global monitoring and evaluation of their strategies;
- support national situation analyses and surveys and the development of national goals and targets for action; and
- encourage and support national authorities in planning, implementing, monitoring, and evaluating their breastfeeding policies

**APPENDIX J**  
**WHO/UNICEF'S TEN STEPS TO SUCCESSFUL BREAST-FEEDING**  
**AND CHECKLIST FOR EVALUATING THE ADEQUACY OF SUPPORT FOR BREAST-FEEDING**  
**IN MATERNITY HOSPITALS, WARDS, AND CLINICS**

**TEN STEPS TO SUCCESSFUL BREAST-FEEDING**

Every facility providing maternity services and care for newborn infants should:

1. Have a written breast-feeding policy that is routinely communicated to all health care staff.
2. Train all health care staff in skills necessary to implement this policy.
3. Inform all pregnant women about the benefits and management of breast-feeding.
4. Help mothers initiate breast-feeding within a half-hour of birth.
5. Show mothers how to breast-feed, and how to maintain lactation even if they should be separated from their infants.
6. Give newborn infants no food or drink other than breast milk, unless *medically* indicated.
7. Practise rooming-in—allow mothers and infants to remain together—24 hours a day.
8. Encourage breast-feeding on demand.
9. Give no artificial teats or pacifiers (also called dummies or soothers) to breastfeeding infants.
10. Foster the establishment of breast-feeding support groups and refer mothers to them on discharge from the hospital or clinic.

**WHO/UNICEF'S CHECKLIST FOR EVALUATING THE ADEQUACY OF SUPPORT FOR BREAST-FEEDING IN MATERNITY HOSPITALS, WARDS, AND CLINICS\***

The following check-list has been prepared for use by the competent authorities in countries—health and nutrition policymakers; managers of maternal and child health and family planning services; clinicians, midwives, nursing personnel and other support staff in maternity services and facilities for the care of newborn infants; health workers' organizations; and mothers' support groups. It is intended to be a suggestive rather than exhaustive inventory of the kinds of practical steps that can be taken within and through maternity services to protect, promote and support breast-feeding, and should be used in conjunction with the main text of the joint WHO/UNICEF statement. Under ideal circumstances, the answer to all of the questions in the check-list will be "Yes." A negative reply may indicate an inappropriate practice or routine that should be modified in accordance with the statement.

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\* Hereinafter collectively referred to as "health care facilities."



### **Policy**

1. Does the health care facility have an explicit policy for protecting, promoting and supporting breast-feeding
2. Is this policy communicated to those responsible for managing and providing maternity services (for example in oral briefings when new staff are employed; in manuals, guidelines and other written materials; or by supervisory personnel)?
3. Is there a mechanism for evaluating the effectiveness of the breast-feeding policy? For example:
  - Are data collected on the prevalence of breast-feeding initiation and breast-feeding at the time of discharge of mothers and their infants from the health care facility?
  - Is there a system for assessing related health care practices and training and promotional materials, including those commonly used by antenatal and postnatal services?
4. Are the cooperation and support of all interested parties, particularly health care providers, breast-feeding counsellors and mothers' support groups, but also the general public, sought in developing and implementing the health care facility's breast-feeding policy.

### **Staff Training**

5. Are all health care staff well aware of the importance and advantages of breast-feeding and acquainted with the health care facility's policy and services to protect, promote and support breast-feeding?
6. Has the health care facility provided specialized training in lactation management to specific staff members?

### **Structure and Functioning of Services**

7. Do antenatal records indicate whether breast-feeding has been discussed with a pregnant woman? Is it noted:
  - Whether a woman has indicated her intention to breastfeed?
  - Whether her breasts have been examined?
  - Whether her breast-feeding history has been taken?
  - How long and how often she has already breast-fed?
  - Whether she previously encountered any problems and, if so, what kind?
  - What type of help she received, if any, and from whom?
8. Is a mother's antenatal record available at the time of delivery?
  - If not, is the information in point 7 nevertheless communicated to the staff of the health care facility?

- Does a woman who has never breast-fed, or who has previously encountered problems with breast-feeding, receive special attention and support from the staff of the health care facility?
9. Does the health care facility take into account a woman's intention to breast-feed when deciding on the use of a sedative, an analgesic or an anaesthetic, if any, during labour and delivery?
- Are staff familiar with the effects of such medicaments on breast-feeding?
10. In general, are newborn infants:
- Shown to their mothers within 5 minutes after completion of the second stage of labour?
  - Shown/given to their mothers before silver nitrate or antibiotic drops are administered prophylactically to the infants' eyes?
  - Given to their mothers to hold and put to the breast within a half-hour of completion of the second stage of labour, and allowed to remain with them for at least one hour?
11. Does the health care facility have a rooming-in policy? That is, do infants remain with their mothers throughout their stay?
- Are mothers allowed to have their infants with them in their beds?
  - If the infants stay in cots, are these placed close to the mothers' beds?
  - If rooming-in applies only during daytime hours, are infants at least brought frequently (every 3-4 hours) to their mothers at night?
12. Is it the health care facility's policy to restrict the giving of prelacteal feeds, that is any food or drink other than breast milk, before breast-feeding has been established?

#### **Health Education**

13. Are all expectant mothers advised on nutritional requirements during pregnancy and lactation, and on the dangers associated with the use of drugs?
14. Are information and education on breast-feeding routinely provided to pregnant women during antenatal care?
15. Are staff members or counsellors who have specialized training in lactation management available full time to advise breast-feeding mothers during their stay in the health care facility and in preparation for their discharge? Are mothers informed:
- About the physiology of lactation and how to maintain it?
  - How to prevent and manage common problems like breast engorgement and sore or cracked nipples?
  - Where to turn, for example to breast-feeding support groups, to deal with these or related problems? (Do breast-feeding support groups have access to the health care facility?)

16. Are support and counselling on how to initiate and maintain breast-feeding routinely provided for women who:

- Have undergone caesarean section?
- Have delivered prematurely?
- Have delivered low-birth-weight infants?
- Have infants who are in special care for any reason?

17. Are breast-feeding mothers provided with printed materials that give relevant guidance and information?

#### **Discharge**

18. If "discharge packs" containing baby- and personal-care products are provided to mothers when they leave the hospital or clinic, is it the policy of the health care facility to ensure that they contain nothing that might interfere with the successful initiation and establishment of breast-feeding, for example feeding bottles and teats, pacifiers and infant formula?

19. Are mothers or other family members, as appropriate, of infants who are not fed on breast milk given adequate instructions for the correct preparation and feeding of breast-milk substitutes, and a warning against the health hazards of incorrect preparation?

- Is it the policy of the health care facility not to give such instructions in the presence of breast-feeding mothers?

20. Is every mother given an appointment for her first follow-up visit for postnatal and infant care?

- Is she informed how to deal with any problems that may arise meanwhile in relation to breast-feeding?

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*Source: World Health Organization. (1989). Protecting, promoting, and supporting breast-feeding: The special role of maternity services [a joint WHO/UNICEF statement]. Geneva, Switzerland: World Health Organization.*

**APPENDIX K**  
**RESEARCH ON HUMAN LACTATION AND BREASTFEEDING**  
**SUPPORTED BY THE NATIONAL INSTITUTES OF HEALTH,**  
**U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES\***

**PHYSIOLOGY OF LACTATION**

- "Effect of Lactation on Bone," M. F. Sowers, University of Michigan, Ann Arbor, MI.
- "Effects of Exercise on Lactation Performance in Humans," K. G. Dewey, University of California, Davis, CA.
- "Evaluation of Lactation Performance," K. J. Motil, Baylor College of Medicine, Houston, TX.
- "Human Mammary Cell Growth and Function in Defined Media," R. G. Ham, University of Colorado at Boulder, Boulder, CO.
- "Milk Production in Mothers of Preterm Infants: Single vs. Bilateral Pump," D. Jurdi-Haldeman, Case Western Reserve University, Cleveland, OH.
- "Novel Evaluation of Lactation Performance," C. Garza, Cornell University at Ithaca, Ithaca, NY.
- "Nutrient Transfer into Human Milk," K. J. Motil, Baylor College of Medicine, Houston, TX.
- "Physiological Factor Affecting Human Lactation," M. C. Neville, University of Colorado Health Sciences Center, Denver, CO.
- "Prematurity and Lactation: Role of Prolactin," R. Ehrenkranz, Yale University, New Haven, CT.
- "The Effect of Smoking on Lactation," P. M. Kuhnert, Case Western Reserve University, Cleveland, OH.
- "Vitamin A Transport During Lactation," A. C. Ross, Medical College of Pennsylvania, Philadelphia, PA.
- "X-Ray Structural Studies of Lactoferrin," E. N. Baker, Massey University, Palmerston North, New Zealand.

**MATERNAL NUTRITION ASPECTS**

- "Alcohol Consumption, Lactation, and Breast Cancer Risk," R. MacMahon and P. A. Newcomb, Harvard University, MA, and University of Wisconsin, Madison, WI.
- "Antenatal Education and Women's Choice of Infant Feeding Method," M. Franklin, Case Western Reserve University, Cleveland, OH.
- "Effect of Lactation and Diet on Calcium Metabolism," B. L. Specker, Children's Hospital Medical Center, Cincinnati, OH.

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*Source:* Federal Human Nutrition Research and Information Management System, 1989.

\* Research on human lactation and breastfeeding supported by the Maternal and Child Health Bureau, DHHS, through its special projects of regional and national significance (SPRANS) program is described in the seventh chapter (see page 44).

"Levels of Dietary Intake for Various Nutrients," C. W. Callaway, National Academy of Sciences, Washington, DC.

"Maternal B-6 Deficiency," T. R. Guilarte, Johns Hopkins University, Baltimore, MD.

"Maternal Calorie Restriction on Breast Milk Production," L. B. Dusdieker, University of Iowa, Iowa City, IA.

"Maternal Zinc Status During Lactation Growth of the Breast Fed Infant," M. K. Hambridge, University of Colorado Health Sciences Center, Denver, CO.

"Sex Hormone Effects on Intestinal Calcium Absorption," M. L. Thomas, University of Texas Medical Branch, Galveston, TX.

"Studies of Zinc Absorption During Pregnancy and Lactation," M. K. Hambridge, University of Colorado Health Sciences Center, Denver, CO.

"Zinc Absorption in Pregnant and Lactating Women," M. K. Hambridge, University of Colorado Health Sciences Center, Denver, CO.

#### INFANT PHYSIOLOGY

"Amino Acid Interrelations in Human Metabolic Disease," L. Sweetman, University of California, San Diego, CA.

"Effects of Human Milk Associated Growth Modulators on Neuronal Development," J. A. Sturman, Institute for Basic Research in Developmental Disabilities, New York, NY.

"Maturation of Intestinal Host Defenses," A. W. Walker, Children's Hospital, Boston, MA.

"Nutrition and Metabolism—Abetalipoproteinemia," D. R. Illingworth, Oregon Health Sciences University, Portland, OR.

"Vitamin A Transport System," D. E. Ong, Vanderbilt University, Nashville, TN.

#### INFANT NUTRITION ASPECTS

"Body Composition of Infants Fed Human Milk or Similac with Iron," W. J. Klish, Baylor College of Medicine, Houston, TX.

"Effects of Perinatal Factors on Breast Feeding Outcomes," L. R. Cronenwett, Dartmouth College, Hanover, NH.

"Epidemiology of Infant Feeding Dynamics," B. M. Popkin, University of North Carolina, Chapel Hill, NC.

"Human Milk in Preterm Infants: Effects of Supplementation," E. E. Ziegler, University of Iowa, Iowa City, IA.

"Human Requirement for Biotin," D. M. Mock, University of Iowa, Iowa City, IA.

"Human Zinc Deficiency," M. K. Hambridge, University of Colorado Health Sciences Center, Denver, CO.

"Navajo Infant Feeding Project," A. L. Wright, University of Arizona, Tucson, AZ.

"Role of Human Milk in Infant Nutrition and Health," L. K. Pickering, University of Texas Health Sciences Center, Houston, TX.

"Selenium Nutriture of the Neonate," R. Ehrenkranz, Yale University, New Haven, CT.

"Vitamin D Requirement of Infants," B. W. Hollis, Medical University of South Carolina, Charleston, SC.

"Zinc Absorption in Very Low Birth Weight Preterm Infants," M. K. Hambridge, University of Colorado Health Sciences Center, Denver, CO.

#### COMPOSITION OF HUMAN MILK

"Human Milk BAL—Structure and Physiological Function," C. Wang, Oklahoma Medical Research Foundation, Oklahoma City, OK.

"Human Milk Selenium Content and Distribution," M. F. Picciano, University of Illinois Urbana-Champaign, Champaign, IL.

"Milk Enzymes, Origin and Distribution," M. Hamosh, Georgetown University, Washington, DC.

"Significance of Folate-Binding Proteins in Human Milk," A. C. Antony, Indiana University-Purdue University, Indianapolis, IN.

"Sources of Human Milk Fat," K. J. Motil, Baylor College of Medicine, Houston, TX.

#### EFFECT OF ENVIRONMENTAL EXPOSURES

"Human Exposure to Halogenated Aromatic Compounds," W. J. Rogan, National Institute of Environmental Health Sciences? (NIEHS), Research Triangle, NC.

"Meperidine and Local Anesthetics in Breastmilk," E. H. Phillipson, Case Western Reserve University, Cleveland, OH.

#### IMMUNOLOGICAL ASPECTS

"Image Analysis System: Role of Human Milk in Protection of Infant Against Diarrheal Disease," D. S. Newburg, Eunice Kennedy Shriver Center for Mental Retardation, Waltham, MA.

**APPENDIX L**  
**RESEARCH ON HUMAN LACTATION AND BREASTFEEDING SUPPORTED**  
**BY THE U.S. DEPARTMENT OF AGRICULTURE**

**PHYSIOLOGY OF LACTATION**

"Beneficial Effects of Human Milk on the Intestine of Infants," B. L. Nichols, Baylor College of Medicine, Houston, TX.

"Effects of Nutritional Insufficiency on Cellular Maturation and Function," B. L. Nichols, Baylor College of Medicine, Houston, TX.

"Functional Role of Human Milk Proteins," W. Hutchens, Baylor College of Medicine, Houston, TX.

"Protein Metabolism in Lactating Women," B. L. Nichols, Baylor College of Medicine, Houston, TX.

**MATERNAL NUTRITION ASPECTS**

"Amino Acid Needs for Reproduction and Growth," T. Davis and F. P. Horn, Baylor College of Medicine, Houston, TX.

"Bioavailability of Vitamin B-6 and Interaction with Minerals," R. D. Reynolds, Agricultural Research Service, Beltsville, MD.

"Dietary Lipid Requirements for Optimal Development and Health," D. Hachey and F. P. Horn, Baylor College of Medicine, Houston, TX.

"Influence of Trace Element Nutriture on Physical Performance and Body Composition," L. M. Klevay, Agricultural Research Service, Grand Fork, ND.

"Maternal and Dietary Determinants of Infant Selenium Nutrition," M. F. Picciano, Human Resources/Family Studies, University of Illinois, Urbana, IL.

"Maternal and Infant Nutrition," C. Garza, Cornell University, Ithaca, NY.

"Maternal versus Infant Factors Related to Lactational Performance," K. G. Dewey, Agricultural Experimental Station, University of California, Davis, CA.

"Metabolic Fate of Omega-3 and Omega-6 Polyunsaturated Fatty Acids," R. O. Adlof, Northern Regional Research Center, Peoria, IL.

"The Role of Dietary Fat in the Production of Human Milk Fat," B. L. Nichols, Baylor College of Medicine, Houston, TX.

"Vitamin A and Lactation," K. M. Rasmussen, Nutrition Sciences, Cornell University, Ithaca, NY.

"Vitamin and Mineral Nutritional Assessment in Pregnancy and Lactation," A. Kirksey, Agricultural Experimental Station, Purdue University, West Lafayette, IN.

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Source: Federal Human Nutrition Research and Information Management System, 1989.

#### **INFANT PHYSIOLOGY**

"Amino Acid Responses of Infants Fed Human Milk or Artificial Formulas," B. L. Nichols, Baylor College of Medicine, Houston, TX.

"Development of a Model for Assessing the Functional Significance of Feeding Human Milk," B. L. Nichols, Baylor College of Medicine, Houston, TX.

"Energy Contribution of Specific Food Components," F. P. Horn and P. L. Klein, Baylor College of Medicine, Houston, TX.

"Energy Needs and Expenditure During Growth and Reproduction," W. P. Sheng, Baylor College of Medicine, Houston, TX.

"Measurement of Energy Expenditure of Infants," B. L. Nichols, Baylor College of Medicine, Houston, TX.

"Measurement of Human Energy Expenditure Using 2H2180 Labeled Water," B. L. Nichols, Baylor College of Medicine, Houston, TX.

"Proteolytic Degradation of Human Milk Lactoferrin in Infants," B. L. Lonnerdal, Agricultural Experimental Station, University of California, Davis, CA.

"Studies of Body Composition," B. L. Nichols, Baylor College of Medicine, Houston, TX.

#### **INFANT NUTRITION ASPECTS**

"Bioavailability and Function of Minerals," C. M. Weaver, School of Consumer and Family Science, Purdue University, West Lafayette, IN.

"Comparison of Nutrient Intake and Growth of Breast- Versus Formula-Fed Infants," K. G. Dewey, Agricultural Experimental Station, University of California, Davis, CA.

"Determination of Nutrient Intake of Infants Receiving Human Milk and Solid Foods," B. L. Nichols, Baylor College of Medicine, Houston, TX.

"Maternal and Infant Nutrition," C. Garza, Cornell University, Ithaca, NY.

#### **COMPOSITION OF HUMAN MILK**

"Biotin in Human Milk," D. M. Mock, University of Iowa, Iowa City, IA.

#### **HUMAN MILK BANKS**

"Processing and Storage of Human Milk: Deaeration, Flexible Packaging, and Rapid Heating Methods," R. R. Eitenmiller, Agricultural Experiment Station, University of Georgia, Athens, GA.