# NUTRITION DURING LACTATION

CHAPTER 6 NUTD 238

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# Lactation Physiology

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### Functional units of the mammary gland

Structure	Function/ Definition	
Mammary Gland	Source of milk for offspring	
Alveoli	Round-shaped cavity present in the breast	
Secretory Cells	Responsible for secreting milk components into the ducts	
Myoepithelial Cells	Specialized cells that line the alveoli and that can contract to cause milk to be secreted into the duct	
Oxytocin	A hormone produced during letdown that causes milk to be ejected into the ducts	

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**ILLUSTRATION 6.2** Breast of a mature woman, before pregnancy and during lactation.

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# Mammary gland development

• Puberty- maturation of the ovaries- release of estrogen and progesterone- stimulate breast development

#### Table 6.3 Hormones contributing to breast development and lactation

Hormone	Role in Lactation	Stage of Lactation
Estrogen	Ductal growth	Mammary gland differentiation with menstruation
Progesterone	Alveolar development	After onset of menses and during pregnancy
Human growth hormone	Development of terminal end buds	Mammary gland development
Human placental lactoger	n Alveolar development	Pregnancy
Prolactin	Alveolar development and milk secretion	Pregnancy and breastfeeding (from the third trimester of pregnancy to weaning)
Oxytocin	Letdown: ejection of milk from myopithelial cells	From the onset of milk secretion to weaning

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- Estrogen stimulates development of the glands that make milk
- Progesterone allows the tubules to elongate and the cells that line the tubules (epithelial cells) to duplicate





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# Lactogenesis (milk production)

### • Three stages:

- Lactogenesis I: begins during the last trimester of pregnancy. Milk begins to form- lactose and protein increase; extend to first few days postpartum
- 2. *Lactogenesis II:* begins **2-5 days postpartum**; increased blood flow to the mammary gland; significant changes in milk composition and amount
- 3. Lactogenesis III: begins after 10 days; milk composition is stable

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# Hormonal control of lactation

- <u>Prolactin</u>: stimulates **milk production**; suckling stimulates its release; stimulated by stress, sleep, and sexual intercourse
  - This hormone is suppressed last 3mos of pregnancy by prolactin- inhibiting factor released by the hypothalamus
- <u>Oxytocin</u>: stimulation by suckling or nipple stimulation; leads to **milk letdown** 
  - Also leads to shrinking of uterus

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## Milk secretion

- The secretory cell in the breast uses five pathways for milk secretion
- *Lactose* is made in the secretory cells and secreted into ducts
- Water, Na, K, and Cl are able to pass through alveolar cell membranes by diffusion
- Milk fat (TG)- from the mother's blood and from new fatty acids produced in the breast
  - Fats are made soluble in milk by addition of a protein carrier to form milk-fat globules which are then secreted into the ducts
- Immunoglobulin A is captured from the mother's blood and taken into the alveolar cells- secreted into the milk ducts

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## Letdown reflex

**Suckling-** stimulate nerves- reach hypothalamus- release <u>oxytocin</u> from <u>posterior pituitary gland-</u> contraction of myoepithelial cells surrounding secretory cells- milk released into ducts

• Milk letdown can happen by hearing a baby cry, sexual arousal, and thinking about nursing

#### Illustration 6.4 The letdown reflex.

milk production.

milk ejection.

Oxytocin stimulates

An infant suckling at the breast stimulates the pituitary to release the hormones prolactin and oxytocin.



Both hormones act on the reproductive organs:

- Prolactin inhibits ovulation.
- Oxytocin promotes uterine contractions.

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# Human milk composition

### • Exclusive BF for 6months after birth

- Human milk composition is changeable:
  - Over a single feeding
  - Over a day
  - According to the age of the infant or gestation at delivery
  - Presence of infection in the breast
  - With menses
  - Maternal nutritional status

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## Colostrum

- First milk- produced during Lactogenesis II
- Thick, yellow
- Infants may drink only 2-3 tsp of colostrum/ feeding in the first 2-3 days
- Colostrum provides about 580-700 kcal/L and is higher in protein and lower in carbohydrates and fat than mature milk
- Secretory immunoglobulin A and lactoferrin (antimicrobial activity) are the primary proteins present in colostrum
- The [] of mononuclear cells, a specific type of WBC from the mother that provides immune protection, is highest in colostrum

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#### Table 6.4 Compositions of 100 mL colostrum (days 1–5 postpartum) and mature milk (day 15 postpartum)

Contents	Colostrum	Mature Milk
Calories (kcal)	55	67
Fat (g)	2.9	4.2
Lactose (g)	5.3	7.0
Total protein (g)	2.0	1.1
Secretory IgA	0.5 <sup>a</sup>	0.1
Lactoferrin	0.5	0.2
Casein	0.5	0.4
Calcium (mg)	28	30
Sodium (mg)	48	15
Vitamin A (µg retinol equivalents)	151	75
Vitamin B <sub>1</sub> (µg)	2	14
Vitamin B <sub>2</sub> (µg)	30	40
Vitamin C (µg)	6	5

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### Water content

- BM is **isotonic** with plasma
- Water content is enough for infant- do not need to drink water- even in hot weather up until 6 months of age
- Water allows suspension of the milk sugars, proteins, immunoglobulin A, Na, K, citrate, Mg, calcium, Cl, and water-soluble vitamins

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# Energy

- Human milk provides ~0.65 kcal/mL- *E content varies* with its fat and to a lesser degree, protein and carb composition
- Breastfed infants consume fewer calories than infants fed <u>human milk substitutes (HMS)</u>
- Reason for difference is unclear- may have to do with:
  - Composition of BM
  - Inability to see the volume of feedings when providing human milk
- Differences in the suckling at the breast compared to an artificial nipple M Aqeel & S Muhanna **UDENTS-HUB.com**

# Lipids

- 3-5% in mature milk
- Provide half of the E of human milk
- <u>Foremilk</u>: beginning of feeding; lower in fat
- <u>Hindmilk:</u> end of feeding; higher in fat

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### Effect of maternal diet on fat composition

- type of fat varies- depend on maternal diet
  - E.g., increased PUFA intake- higher PUFA levels in milk
- Amount of fat in milk can vary during a day, during a feeding, content differs between mothers
- Energy range from ~21- 26 calories/oz

### • DHA:

- Amount increases in milk with <u>maternal supplementation</u>
  - Evidence of developmental advantages for infant
  - Increase in levels occurs during last months of pregnancy- pre-term babies can benefit from high DHA content in milk

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# Trans fatty acids and cholesterol

### • Trans FA:

• Mother's diet-> milk

### • Cholesterol:

- Breastfed infants have higher intakes of cholesterol and higher levels of serum cholesterol than infants fed HMS
- Cholesterol intake from BM- related to lower cholesterol levels later in life

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### Protein

- The protein content of mature BM is relatively low (0.8– 1.0%) compared to cow's milk
- [protein] in milk depends on <u>age of infant</u> rather than on dietary intake or serum levels in mother
  - More variable content because hormones that guide protein synthesis change with time
- Proteins have a variety of antiviral and antimicrobial effectsprevent inflammation

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# Whey and Casein proteins

### • <u>Whey:</u>

• Soluble in water (after precipitation of casein by enzymes, or acid)

• Include serum proteins, enzymes, immunoglobulins, minerals, hormones, or vitamin-binding proteins e.g., lactoferrin- carries Fe in a form that is easy to absorb

#### • <u>Casein:</u>

- Major protein in milk
- Casein,  $Ca_3(PO_4)_2$ , Mg, and citrate- *white milk*

#### • NON PROTEIN NITROGEN

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# Milk carbohydrates

• Major carb- lactose: enhances calcium absorption

• Glucose, polysaccharides, oligosaccharides, protein bound carbs

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# Oligosaccharides

- Second largest carbohydrate component
- Stimulate the growth of *bifidus* bacteria in the gut
- Prevent the binding of pathogenic microorganisms to the gutprevent infection and diarrhea
- Inhibit the growth of *E. coli* and other harmful bacteria

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## Fat-soluble vitamins

### • <u>Vitamin A:</u>

- Colostrum [vit A] higher than mature milk- yellow color of colostrum
- Some in form of beta carotene

### • <u>Vitamin D:</u>

- Most in form 25-OH<sub>2</sub> vitamin D and vitamin D3
- Vary with amount in <u>maternal diet</u> and <u>exposure to sun</u>

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#### • <u>Vitamin E:</u>

- Alpha tocopherol <u>decreases from</u> colostrum to transitional milk to mature milk
  - Beta and gamma tocopherol levels remain stable
- Levels in BM are sufficient to meet the needs of a full-term infant/
  - levels in pre-term milk are the same or higher than that in term milk but are still <u>not enough to meet the needs of a pre-term infant</u>

#### • <u>Vitamin K:</u>

- 5% of BF infants are at risk of deficiency/ little vitamin K in BM
- does not cross the placenta to the developing baby! And the gut is sterile
- Cases of deficiency in exclusively BF infants who did not receive vitamin K at birth

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## Water soluble vitamins

- Depend on maternal diet/ supplement use
- Except for, Vitamin B12 and folic acid: (less influenced by maternal intake)
  - Bound to whey protein
  - Hormone levels and age of the infant are more likely to alter BM content of these vitamins than maternal intake

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- B12 deficiency, or low levels of B12 in milk- reported for women:
  - Who have had gastric bypass surgery
  - Consume vegan diets
  - Have latent pernicious anemia
  - Who are malnourished

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## Minerals

• Highly bioavailable to the infant

- Mineral content is less than that in cow's milk
  - The lower [mineral] of BM is easier for the kidneys to handlemajor benefit
- Exclusively BF infants are at low risk for anemia, despite the low conc. Of iron in the human milk

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# Minerals

• Zinc:

- Bound to protein; high bioavailability in comparison to cow's milk and HMS
- Levels are maintained even in cases of deficiency in maternal intake
- Intake and requirement of infants decrease after first few months

#### • Trace minerals:

- Copper, selenium, chromium, manganese, molybdenum, nickel, and fluorine
- Present in the human body in small []
- Essential for growth and development
- Levels in milk are not altered by the mother's diet or supplement use (except fluoride)

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## Taste of BM

- Slightly sweet and it carries the flavors of compounds ingested, such as mint, garlic, vanilla, and alcohol
  - Transfer of flavor compounds is selective and in relatively low amounts
- Exposing infants to a variety of flavors in milk may contribute to their interest in it and their acceptance of new flavors in solid foods

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# Benefits of BF to mothers

- Increases levels of oxytocin- stimulates uterine contractions, minimizes maternal postpartum blood loss, and helps the uterus to return to non-pregnant size
- Breastfeeding delays ovulation (*due to release of prolactin*), longer duration between pregnancies- prevents pregnancy esp if there is exclusive BF; menstrual cycle has not returned
- Increased self confidence and closeness to baby
- Lower risk of breast and ovarian cancer and rheumatoid arthritis

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## Nutritional benefits of BF to the infant

- Composition provides optimal nutrition to the infant/ matches requirements for infant growth and development
- Relatively low protein content meets needs without stressing immature kidneys
- Whey protein- soft, easily digestible

- Good amounts of fat: EFA, SFA, MCTG, cholesterol
- PUFAs-DHA: for optimal development of the CNS: present in some HMS formulas
- Minerals are protein bound and highly bioavailable- meet needs with minimal demand on maternal reserves

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## Immunological benefits to the infant

- Macrophages (WBCs) engulf bacteria and fungi; lactoferrin, and immunoglobulin A and G
- Neutrophils (WBCs): protect against infections
- T, B lymphocytes: protect against organisms in the GIT

- Immunoglobulins: predominant form- secretory immunoglobulin A: protects against viruses
- Bifidus *factor-supports growth of Lactobacillus bifidus*: probiotic bacterium that stimulates antibody production and enhances phagocytosis of antigens

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# Benefits of BF

## Lower infant mortality in developing countries

#### Fewer acute illnesses

- Lower incidence of diarrhea with exclusive BF
- Lower incidence of GIT infections
- Lower ear infections

## **Reduction in chronic illness**

- Reduce risk of celiac disease, inflammatory bowel disease
- Low asthma
- Less allergies

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# Benefits of BF

## **BF and childhood overweight**

- BF infants typically leaner than HMS fed infants at 1 year
- Small reduction in risk of OW in children >3yrs who were breastfed

## • Potential mechanisms include:

- Metabolic programming, may be related to leptin, ghrelin, and other neuro-metabolic messengers delivered in BM
- Learned self-regulation of E intake

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# Benefits of BF

#### **Cognitive benefits:**

- Increase in cognitive ability
- Gains increase with duration of BF

#### Analgesic effects

• May be used to reduce infant discomfort during minor invasive procedures

#### Socioeconomic benefits

- Decrease in medical costs
- Better work productivity: mothers not missing work due to infant illness
- 101 reasons to breastfeed
  - <u>https://www.sa.sc.edu/healthycarolina/files/2014/04/101-Reasons-to-Breastfeed.pdf</u>

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# BM supply and demand

- Typical production: 600ml/ day in the month postpartum
- Continues to increase to ~750–800ml/d by 4-5 months postpartum

## • **Demand for milk is affected by:**

- Infant weight and age
- Caloric density of the milk
- Increases with twins, triplets
- Increases by increased frequency of infant suckling
- Can be increased by pumping milk
- Milk synthesis is related to infant demand
  - The removal of milk from the breast  $\rightarrow$  signal to make more milk
  - Most women are able to increase their milk production to meet infant demand

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## Size of the breast and milk production

- The size of a woman's breast <u>does not</u> determine the amount of milk production tissue
- Size of the breast <u>does</u> limit storage because of limitations in the expansion of the ducts
  - Daily milk production <u>is not related to the total milk</u> <u>storage capacity</u> within the breast
- Women with small breasts can produce the same amount of milk as women with large breasts
  - Larger breasts-may be able to feed infant less frequently to deliver the same volume of milk compared with a woman with smaller breasts

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# Frequency of feeding and amount of milk produced

• Feeding frequency is not consistently related to milk production

- The rate of milk synthesis is highly variable between breasts and between feedings
- The breast responds to the degree of emptying during a feeding: response is a link between maternal milk supply and infant demand
  - Amount of milk produced in 24hrs and the total milk withdrawn in that 24hr period are highly related
  - i.e., breast is fully emptied  $\rightarrow$  synthesis is high

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# Mechanism of supply and demand

- Mechanism of supply and demand may be related to protein *feedback inhibitor of lactation (FIL)*
- FIL is an active whey protein that inhibits milk secretion*affects milk quantity not quality* (inhibits all milk components equally)

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### **MORE FIL = SIGNAL TO MAKE LESS MILK**

# More Frequent feeds leads to less FIL accumulation and increased milk production

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Nipple

(How often milk is removed from the breast)

**Montgomery Glands** 

**Mammory Duct** 

(Feedback inhibitor to Lactation)

When milk is not removed from the breast frequently due to supplementation, scheduling feeds or long periods between feeds, the active whey protein FiL (feedback inhibitor to lactation) builds up and stops milk production.



(Body produces milk to meet the demand)

SUPPLY

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# Pumping/ expressing milk

- Needed for many reasons- maternal or infant illness or separation
- Women can express milk using several different methods:
  - Manually
  - Hand pumps
  - Commercial electric pumps

- Electric pumps are efficient: may increase prolactin more than hand expression or hand pumping
- Insufficient milk production is a common problem among women who express milk
- Research: *8-12 or more* milk expressions/day to stimulate an adequate production of milk

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- Women who are able to establish an adequate volume of milk (>500 ml/d) in the first 2 wks postpartum are more likely to have enough milk for infant at 4-5 wks postpartum
  - Recommendation to nurse/ pump early and frequently to build a good milk supply

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## BF after reduction or augmentation surgery

- **Breast reduction**: may be at risk for unsuccessful lactation
  - Evidence of lower BF rates and duration and greater perception of insufficient milk supply
- Type of surgery- location and amount of breast tissue removed and the damage to remaining tissue-important determinants of ability to breastfeed
  - Incision around areola may damage ducts
- <u>Breast augmentation</u>: compression of the ducts in the breast may lead to poor milk production

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## Effect of silicone breast implants on BF

- The American Academy of Pediatrics does not consider silicone implants a reason not to breastfeed
- Silicone [] in milk is not elevated
- Effect is like that of saline implants: compression of ducts leading to poor milk production

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## The breastfeeding infant

#### **Optimal duration of BF**

- Exclusive for 6 months: fewer GI infections than HMS fed infants
- Up to 2 years with complementary food
- Infants fed cow's milk <6months suffer nutritionally significant losses of Fe via intestinal blood loss

#### <u>Reflexes</u>

- 18 weeks gestation: fetus starts sucking
- 28 weeks gestation: gag reflex is developed
- 34 weeks gestation: the suck has adequate pace and rhythm

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## Reflexes

- <u>Oral search reflex:</u> infant opening his/ her mouth wide in proximity to the breast while thrusting the tongue forward
- <u>Rooting reflex</u>: results in the infant turning to the side when stimulated on the side of the upper or lower lip
- → These are important for successful BF in addition to other factors including <u>appropriate positioning</u> and <u>adequate maternal letdown</u> and <u>milk production</u>

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# Preparing the breast for BF

- Breasts and nipples begin to be sore in the 1<sup>st</sup> trimestertenderness usually decreases by the end of the 1<sup>st</sup> trimester
- Enlargement of the breast and nipple are evident by the end of the 1<sup>st</sup> trimester and continue throughout pregnancy
- By the 3<sup>rd</sup> trimester, Montgomery glands- sebaceous glands that produce oils to lubricate the nipple and areola, become pronounced and the nipples darken
- Gentle massage is recommended to get women accustomed to handling their breasts and prepare them for expressing milk

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• Women with flat or inverted nipples may be instructed on the Hoffman technique to break up adhesions





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# Presenting the breast to the suckling infant/ mechanic of BF

https://www.youtube.com/watch?v=ybSquGsyTko

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# Identifying hunger and satiety signals

- Hungry infants- bring their hands to their mouth, suck on them, and start moving their head from side to side with their mouth open (rooting reflex)
- Crying is a late sign of hunger
- Feeding begins with non-nutritive sucking .
- **Nutritive** and **non-nutritive** sucks are different:
  - Non-nutritive sucking- quick, shallow suck with no rhythm; amount of milk transfer is usually minimal
  - Nutritive sucking is slower and more rhythmic as the infant begins to suck and swallow

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- Infants should be allowed to nurse as long as they want at one breast (to get both foremilk and hindmilk-satiety)
  - Feeding for shorter periods from both breasts can get larger amounts of foremilk- high lactose content can cause diarrhea
- Infants will stop nursing when full
- <u>Infants who fall asleep</u> before they empty the breast can be kept awake by gently tickling the feet, rubbing the head, and talking to the baby
- The higher fat content of hindmilk may help in signaling satiety If they are still hungry, after burping, they can be offered the other breast.

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# Feeding frequency

- Stomach emptying occurs in about 1.5 hrs for breastfed infants
- 8 to 12 feedings/day are normal for newborn infants
- Different feeding patterns can meet infant needs
  - Feedings distributed over 24hrs
  - Higher amounts during day...

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# **Vitamin supplements for BF infants**

- Vitamin K supplement at birth: 1.0 mg by injection- known to decrease the risk of VKDB
- Exclusively breastfed infants should be given a supplement of 400 IU of vitamin D/ day beginning in the first 2 months of life- risk of rickets
- **Fe** is not needed for BF infants
- Fluoride supplements after 6 months based on situation

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#### **Illustration 6.7** Diagnostic flowchart for failure to thrive.



### <u>Identifying breastfeeding</u> <u>malnutrition</u>

- A normal newborn weight loss of up to 7-10-% can occur in the 1<sup>st</sup> week postpartum- loss of extra fluid;
- wt should be regained within the around 2 weeks after birth
- A loss of >10% should trigger an evaluation of milk transfer to the infant

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- Day 5-7 postpartum, infants who are getting adequate nourishment have wet diapers approximately 6x/d & 3-4 soft, yellowish stools/d
- Urine is pale yellow and dilute
- Stools are loose and seedy
- Infants who are slow gainers and not malnourished are alert, bright, responsive, and develop normally

## Infant failure to thrive signs:

- Apathetic
- Hard to arouse
- Weak cry
- Few wet diapers
- Urine is concentrated
- Stools are infrequent

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## Tooth decay

- Human milk has infection-fighting components that inhibit the formation of dental caries- but they can occur in children who are breastfed
- Frequent nursing at night after 1 year of age is a risk factor for dental caries (does not justify early weaning)
- Dentist visit 6 months after the 1<sup>st</sup> tooth erupts or by 12 months of age

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## Maternal diet

	GRAINS Make half your grains whole	VEGETABLES Vary your veggies	FRUITS Focus on fruits	MILK Get your calcium-rich foods	MEAT & BEANS Choose lean with protein
Birth to 6 Months Mar - Aug Based on a 2400 calorie pattern*	8 ounces a day Aim for at least 4 ounces of whole grains a day	3 cups a day Aim for this much weekly: Dark green veggles - 3 cups Orange veggles - 2 cups Dry beans & peas - 3 cups Starchy veggles - 6 cups Other veggles - 7 cups	2 cups a day Eat a variety of fruit Go easy on fruit juices	3 cups a day Go low-fat or fat-free when you choose milk, yogurt, or cheese	6% ounces a day Choose low-fat or lean meats and poultry. Vary your protein routine—choose more fish, beans, peas, nuts, and seeds.
6 to 12 Months Sep - Feb Based on a 2400 calorie pattern*	8 ounces a day Aim for at least 4 ounces of whole grains a day	3 cups a day Aim for this much weekly: Dark green veggies - 3 cups Orange veggies - 2 cups Dry beans & peas - 3 cups Starchy veggies - 6 cups Other veggies - 7 cups	2 cups a day Eat a variety of fruit Go easy on fruit juices	3 cups a day Go low-fat or fat-tree when you choose milk, yogurt, or cheese	6% ounces a day Choose low-fat or lean meats and poultry. Vary your protein routine—choose more fish, beans, poas, nuts, and seods.
These are only optimates of your name while you breastlead. Chark with your health			Know your limits on fats, sugars, and sodium		

These are only estimates of your needs while you breastleed. Check with your healt care provider to make sure you are losing the weight gained during pregnancy.

The calories and amounts of food you need change over time while you are breastfeeding. Your Plan may show different amounts of food for different months, to meet your changing nutritional needs.

Know your limits o	on fats, sugars, and sod	ium
	OILS Aim for this much:	EXTRAS Limit extras (solid lats and sugars) to this much:
Birth to 6 Months	7 teaspoons a day	380 calories a day
6 to 12 Months	7 teaspoons a day	360 calories a day

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# Nutrition assessment of BF women

Table 6.6Summary of the components of the four<br/>steps of the Nutrition Care Process for<br/>Breastfeeding Women (ADA)

Step 1. Nutrition Assessment for Breastfeeding Women

- Food and nutrient intake
  - Diet history
- Knowledge/attitudes/beliefs
  - Foods that may increase risk of infant colic
  - Adequate energy intake for return to pre-pregnant weight
- Medications, herbs, and supplements
  - Check for safety and compatibility with breastfeeding (see more on herbs and medications in Chapter 7)
  - Need for supplements based on inadequate intake, missing food groups, or vegan dietary pattern
- Nutrition-related behaviors
  - Excessive dieting or calorie restriction
- Physical activity
  - Return to physical activity after adequate recovery from delivery
- Biochemical data, medical tests, and procedures
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  Gradual return to non-pregnant, non-lactating
- Gradual return to non-pregnant, non-lactating STUDENTS-HUB.com

- Anthropometric measures
  - BMI to return to pre-pregnant or ideal levels
- Client history
  - Medical history, treatments (beast surgeries), use of alternative/complementary medicine, social history

Step 2. Common Nutrition Diagnoses for Breastfeeding Women

- Altered maternal BMI
  - Obesity, underweight, or related to rate of weight loss
- Nutrient inadequacy or excess
  - Vegan
  - Lactose intolerance
- Perceived or real inadequate milk production
- Behavioral-environmental
  - Knowledge deficit
  - Need/qualify for WIC services

Step 3. Common Nutrition Interventions for Breastfeeding Women

- Alter energy intake to achieve ideal weight or weight goal
- Reinforce principles of milk production, early signs of infant hunger, and signs of adequate infant milk ploaded By: anonymous

 Recommend vitamin B<sub>12</sub> for vegans or other supplements if intake is inadequate

Step 4. Common Nutrition Monitoring and Evaluation Plan Components

- Weight change/BMI
- Infant growth
- B<sub>12</sub> status

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## Energy and nutrient needs

- The DRIs for normal-wt lactating women assume that the E spent for milk production is ~500kcal/ day in the first 6 months and 400kcal afterward → other research has different findings
- Women use several mechanisms to meet the E needs of lactation
  - Increase food intake
  - Decrease PA

→ Assessment of adequacy of E intake of BF women should always be made within the context of the mother's overall nutritional status and weight changes and the adequacy of the infant's growth

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## Maternal E balance and milk composition

• **Composition of milk** depends on maternal nutrient intake

 Protein—calorie malnutrition results in an E deficit that reduces the volume of milk produced but does not usually compromise the composition of the milk

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# Weight loss during BF

- Current DRIs are written assuming a weight loss of 0.8 kg/month
- <u>Mechanisms that favor use of maternal fat stores and delivery of</u> <u>nutrients to the breast seem to occur during lactation</u>
  - Despite of these mechanisms, loss by 12 months postpartum is on avg < the amount needed to return to pre-pregnancy weight</li>
     Failure to return to pre-pregnancy wt may be due to changes in energy intake, EE, and fat mobilization

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- Research was done on whether weight loss reduced milk production
- Study findings: women voluntarily reduced their E intake to 68% of their estimated needs for 7 days → no differences in infant intake or milk composition were observed
  - Reduce calories< 1500: decrease in <u>milk volume</u>
- Studies of weight loss during lactation suggest that <u>modest E</u> <u>restriction (500kcal/day)</u> can be accomplished without large decreases in the quality of the maternal diet

- Continue reading on page 179
  - If lowered the intake of sugary and fatty foods → no change except for calcium & vitamin D

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### **Exercise and BF**

- Studies examining the effect of increasing EE on weight and lactation suggest that it is safe
  - Increase in EE and increase in food intake ( to not alter milk composition and volume)
- Evidence: small energy restriction combined with increase in PA may be effective at helping women to lose weight, while improving their metabolic profile and increasing fat losses

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#### Vitamin and mineral supplements

- Institute of Medicine: well-nourished BFeeding women <u>do not</u> <u>need routine vitamin or mineral supplementation</u>
  - Supplementation should target specific nutritional needs of individual women
- Should take into account how nutrients are secreted into BM and the potential for nutrient-nutrient interactions in mothers and their infants
  - E.g., women who avoid dairy products completely should use Ca (1200 mg) and vitamin D (10µg) supplements

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### <u>Fluids</u>

- There is no evidence that increasing fluid intake will increase milk production or that a short-term fluid deficit results in a decrease in milk production
- Fluid demands rise during BF- drink enough fluids to keep urine pale yellow
- Recommendation: 3.4 L for women 19–30 yrs

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### **Alternative diets**

- **Vegans**: dietary plan should include adequate intake of calories, protein, Ca, vit D, B12, Fe, and Zn
- **Vegetarians**: intake of protein are adequate- when E intake is adequate
- Vitamin- mineral supplements should be used when dietary intake is inadequate

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## Infant colic

- Crying >3hrs a day for more than 3 days a week, for at least one week- in a healthy baby
- It usually shows up when the baby is 2-3wks old
- Colic tends to peak around 6 wks, and then improves significantly between 3- 4 months
- By 4 months of age, 80-90% of infants are over colic- the remaining small % might take another month
- Baby's gender and birth order, whether he/she is breast or bottle fed doesn't affect colic

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## Causes of colic

- Exact cause is unknown; some possible causes include:
  - A growing digestive system with muscles that often spasm
  - Gas
  - Hormones that cause stomach pain or a fussy mood
  - Oversensitivity or overstimulation by light, noise...
  - A moody baby
  - A still-developing nervous system
  - An infection

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- Belief that components of maternal diet are related to infant colic
  - <u>Observational trial</u>: mother's consumption of cow's milk, onions, cabbage, broccoli, and chocolate: 

     likelihood of colic in the infant
- A randomized trial assessing maternal avoidance of cow's milk, eggs, peanuts, tree nuts, wheat, soy, and fish  $\rightarrow \downarrow$  in colic symptoms of infants in the first 6 wks of life
- → Exclude only foods that seem to cause problems and replace nutrients that might be lost due to this
  - E.g., excluding dairy foods may limit Ca and vit D intake

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# Factors influencing BF initiation and duration

### • <u>Obesity and BF:</u>

 Overweight and obesity prior to pregnancy and excess weight gain during pregnancy → shorter duration of BF: may be related to ↓ prolactin responses early postpartum

• <u>SES:</u>

• Low-income women often lack the education, support, and confidence to interpret the mixed messages on infant feeding practices

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#### Obstacles to the initiation and continuation of BF

- Insufficient prenatal breastfeeding education
- Lack of support
- Health care provider apathy and misinformation
- Inadequate health care provider lactation management training
- Early hospital discharge
- Lack of routine follow-up care and postpartum home health visits
- Maternal employment, especially in the absence of workplace facilities and support for BF

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- Lack of broad societal support
- Media portrayal of bottle-feeding as the norm
- Unfounded concern that BF causes breast sagging
- Commercial promotion of infant formula through distribution of hospital discharge packs, coupons for free or discounted formula, and advertisements

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#### Lack of Knowledge

While breastfeeding is considered a natural skill, some mothers may need education and guidance. Providing accurate information can help prepare mothers for breastfeeding.

#### **Lactation Problems**

Without good support, many women have problems with breastfeeding. Most of these are avoidable if identified and treated early, and need not pose a threat to continued breastfeeding.

#### **Poor Family and Social Support**

Fathers, grandmothers, and other family members strongly influence mothers' decisions about starting, continuing, and accommodating breastfeeding.

#### Social Norms

Many people see breastfeeding as an alternative rather the routine way to feed infants.

#### ILLUSTRATION 6.9 Key barriers to breastfeeding.

#### Embarrassment

The popular culture's sexualization of breasts compels some women to conceal breastfeeding. Improving support for women to breastfeed can help them better accommodate the demands of everyday life while protecting their infants' health.

#### **Employment and Child Care**

Employed mothers typically find that (1) returning to work and (2) lack of maternity leave are significant barriers to breastfeeding.

#### **Health Services**

Health care systems and health care providers can improve mothers' breastfeeding experiences by pursuing and obtaining the training and education opportunities they need in order to fully support their patients.

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## BF promotion, facilitation, and support

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- Role of the health care system:
  - Power to promote and model optimal BF practices during prenatal care, at delivery, and after discharge
- Prenatal BF education and support:
  - Culturally competent prenatal BF education that is given frequently in person can have a significant positive influence on BF rates

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# Table 6.7 The Best Start three-step breastfeeding counseling strategy<sup>147</sup>

- Ask open-ended questions to identify the woman's concerns.
  - Dietitian: "What have you heard about breastfeeding?"
  - Client: "I hear it's best for my baby, but all my friends say it really hurts!"
- 2. Affirm her feelings by reassuring her that these feelings are normal.
  - Dietitian: "You know, most women worry about whether it will hurt."
- 3. Educate by clarifying how other women like her have dealt with her concerns. Avoid overeducating or giving the impression that breastfeeding is hard to master.
  - Dietitian: "Did you know that it is not supposed to be painful, and if you are having discomfort, there are people who can help make it better?"

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- **Strategy**: peer counselors and peer group discussions with at least one or two women who have successfully breastfed
- Role of surrounding network- spouse, mother, father, grandmothers, friends
- Positive msgs about BF through posters, magazines, and literature in the waiting room...etc
  - No ads for bottle feeding
- BF is a learned skill- process associated with success is called "confident commitment"
  - 1. Confidence in the process of BF
  - 2. Confidence in the ability to breastfeed
- 3. Commitment to making breastfeeding work despite obstacles

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# TABLE 6.10 World Health Organization's international/UNICeF code on the marketing of breast milk substitutes

- No advertising of breast milk substitutes
- No free samples or supplies
- No promotion of products through health care facilities
- No company sales representative to advise mothers
- No gifts or personal samples to health workers
- No gifts or pictures idealizing formula feeding, including pictures of infants, on the labels of the infant milk containers
- Information to health workers should be scientific and factual
- All information on artificial feeding, including labels, should explain the benefits of breastfeeding and the costs and hazards associated with formula feeding
- Unsuitable products should not be promoted for babies
- Manufacturers and distributors should comply with the Code's provisions even if countries have not adopted laws or other measures

source: Adapted from "World Health Organization International Code of Mar-<sup>N</sup> keting of Breast-milk Substitutes. Geneva, Switzerland: 1981.<sup>155</sup> STUDENTS-HUB.com
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# Lactation support in hospitals and birthing centers:





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In an effort to promote, protect, and support breastfeeding in hospitals and birthing centers worldwide, the World Health Organization (WHO) and UNICEF established the Baby-Friendly Hospital Initiative (BFHI) in 1992 (www.babyfriendlyusa.org).<sup>147</sup> This initiative focuses on 10 evidence-based components of hospital care that impact on breastfeeding success (Table 6.11). The Baby-Friendly

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### Table 6.10 The Baby-Friendly Hospital Initiative 10 steps to successful breastfeeding

- Have a written breastfeeding policy that is regularly communicated to all health care staff.
- 2. Train all staff in skills necessary to implement this policy.
- 3. Inform all pregnant women about the benefits and management of breastfeeding.
- 4. Help mothers initiate breastfeeding within half an hour of birth.
- 5. Show mothers how to breastfeed and how to sustain lactation, even if they should be separated from their infants.
- 6. Feed newborn infants nothing but breast milk, unless medically indicated, and under no circumstances provide breast milk substitutes, feeding bottles, or pacifiers free of charge or at low cost.
- Practice rooming-in, which allows mothers and infants to remain together 24 hours a day.
- 8. Encourage breastfeeding on demand.
- 9. Give no artificial pacifiers to breastfeeding infants.
- Help start breastfeeding support groups and refer mothers to them.

SOURCE: World Health Organization, "Protecting, Promoting and Supporting Breast-feeding: The Special Role of Maternity Services," A Joint WHO/UNICIF Statement. Geneva, Switzenand, 1989.

# **Breastfeeding in Palestine**

- only 29% of children aged less than six months are exclusively breastfed, a lower level comparing to the global percentage of 43% and 35% in Middle East and North Africa
- In addition to <u>delay of breastfeeding initiation</u> and <u>inadequate</u> <u>duration of breastfeeding</u>

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# WHO/UNICEF Baby-Friendly Hospital Initiative (BFHI)

- was adopted in Palestine in 2010
- 26 health facilities are currently implementing this initiative and 6 of them were designated as 'Baby-Friendly' hospitals

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#### TABLE 6.11 10 steps to successful breastfeeding

- 1. Have a written breastfeeding policy that is routinely communicated to all health care staff.
- 2. Train all health care staff in the skills necessary to implement this policy.
- 3. Inform all pregnant women about the benefits and management of breastfeeding.
- 4. Help mothers initiate breastfeeding within half one hour of birth.
- 5. Show mothers how to breastfeed and how to maintain lactation, even if they are separated from their infants.
- 6. Give infants no food or drink other than breast milk, unless medically indicated.
- Practice rooming-in, allow mothers and infants to remain together 24 hours a day.
- 8. Encourage breastfeeding on demand.
- Give no artificial pacifiers or artificial nipples to breastfeeding infants.
- 10. Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or birth center. Uploaded By: anonymous

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### Lactation support after discharge

- Breastfeeding support is essential in the 1<sup>st</sup> few weeks after delivery, as lactation is being established
- Younger women and women with lower SES are more likely to stop BF by 4 wks postpartum and cite:
  - Sore nipples
  - Inadequate milk supply
  - Feeling that the infant is not satisfied

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- Lactation consultants: provide education and management to prevent and solve BF problems and to encourage a social environment that effectively supports the BF mother—infant dyad
- A pediatrician, nurse, HC practitioner should see all breastfeeding mothers and their newborns when the newborn is 2-4 days of age
  - Revisit major concerns by mother/ discuss new concerns

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### The workplace

#### Barriers:

- Lack of on-site day care
- Insufficiently paid maternity leave
- Rigid work schedules
- Employers who lack knowledge about BF
- Breastfeeding duration is adversely affected by employment
- The number of hours mothers work/ day is inversely associated with the likelihood that the mother will continue to breastfeed

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- <u>Research findings</u>: women who continue to breastfeed once returning to work miss less time from work because of babyrelated illnesses, and have shorter absences when they do miss work, compared with women who do not breastfeed
- <u>Choices when returning to work:</u>
  - Express BM during the day into sterile containers, refrigerated or frozen
  - BF during breaks and lunch- time hrs
  - Train the body to produce milk during specific time (at home)

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# The community

### • Barriers may include:

- Lack of access to reliable and culturally appropriate sources of information and social support
- Cultural perception of bottle feeding as the norm
- Aggressive marketing of BM substitutes
- Laws that prohibit breastfeeding in public

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- Legislation is used to:
  - Protect a woman's right to breastfeed
  - Regulate breast pumps
  - Provide incentives to employers who provide breastfeeding support
- Legislation addresses issues such as a woman's right to breastfeed in public and express milk at work

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# Public food and nutrition programs/ model BF promotion programs

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