

Human Milk Curriculum for High School Students: Science, Nutrition, and Society



DC BREASTFEEDING
COALITION

TABLE OF CONTENTS

Section	Title	Page
I	Mission	3
II	Pre-Test	4
III	Introduction	6
IV	How does it work?	9
	Anatomy and Physiology of Lactation	
V	Benefits of Human Milk Feeding	12
	• <i>Infant</i>	12
	• <i>Birthing Parents</i>	12
	• <i>Partner</i>	13
	• <i>Environment</i>	13
	• <i>Economic</i>	15
VI	Systemic Racism and Human Milk Feeding	18
	• <i>Historical Perspective</i>	18
	• <i>Medical Racism</i>	19
	• <i>Employment and Breastfeeding</i>	20
	• <i>History of Infant Formula</i>	20
VII	Facts and Myths	23
VIII	Project Ideas	24
IX	Glossary	25
X	Post Test	27
XI	Answer key	29
XII	Image Sources	31

Section I: The DC Breastfeeding Coalition's Mission

This curriculum is a project of the DC Breastfeeding Coalition.



DC BREASTFEEDING
COALITION

Our Mission

The DC Breastfeeding Coalition was established to increase the breastfeeding rates of all infants living in the District of Columbia. Working in partnership with maternal and child health professionals, community health organizations, and mother-to-mother support groups, the DC Breastfeeding Coalition seeks to promote, protect and support culturally sensitive programs and activities that build awareness and understanding of the preventive health benefits of breastfeeding. Through its breastfeeding research, advocacy and educational activities, the Coalition seeks to reduce health disparities—particularly among racialized families living in DC communities with less resources.

Breastfeeding Modules

As part of the DC Breastfeeding Coalition's work, we have created a set of teaching and learning modules that we are happy to make freely available to educational and non-profit organizations. In addition to this module designed for high school students, there is also one for 4th graders and one for kindergarten students. These can be found at www.dcbfc.org.

This curriculum was developed by the DC Breastfeeding Coalition

Authors:

Jenny Tender, MD, FAAP, FABM, Dia L. Michels, Mary Revenis, MD, FAAP, Judy Campbell, RNC, IBCLC

Special thanks to:

Claire Romine, Amara Leonard, Chloe Cattaneo, Lila Campbell, M.Ed, Kathleen Logan, RN, CPNP, IBCLC, Sahira Long, MD, IBCLC, FAAP, FABM, Mudiwah A. Kadeshe, RN, MSN, LNC, IBCLC and other members of the DC Breastfeeding

If you use this curriculum, we would appreciate your feedback. Please send all comments to curriculum@dcbfc.org

Copyrighted material. May reproduce free of charge for educational purposes only. Please contact us at curriculum@dcbfc.org to request permission to use for other purposes.

Section II: PRE-TEST

1. If I have a child, I want my baby to be fed:
 - a. Human milk.
 - b. Infant formula.
 - c. Both human milk and infant formula.
 - d. I'm not sure.

2. In what part of the breast is the milk produced?
 - a. The areola
 - b. The alveoli
 - c. The Montgomery Glands
 - d. The nipple

3. What hormone makes milk?
 - a. Thyroid
 - b. Insulin
 - c. Prolactin
 - d. Estrogen

4. What hormone ejects milk?
 - a. Progesterone
 - b. Testosterone
 - c. Thyroid
 - d. Oxytocin

5. Human milk contains
 - a. Antibodies.
 - b. Lactose.
 - c. Living cells.
 - d. All of the above.

6. Babies who are fed human milk are less likely to get:
 - a. Diarrheal illnesses.
 - b. Ear infections.
 - c. Diabetes.
 - d. All of the above.

PRE-TEST

7. Birthing parents who feed human milk are less likely to get:
 - a. Some types of breast cancer.
 - b. Ovarian cancer.
 - c. Heavy bleeding after delivery.
 - d. All of the above.

8. Birthing parents should not feed their milk to their child if they have COVID-19.
 - a. True
 - b. False

9. There are medical reasons a birthing parents in the United States should not feed their child their milk.
 - a. True
 - b. False

10. Formula feeding is bad for the environment.
 - a. True
 - b. False

11. Systemic racism plays an important role in why Black families in the United States are less likely to feed their children human milk than white families.
 - a. True
 - b. False

12. Formula is just as good as human milk because it contains all the same ingredients.
 - a. True
 - b. False

Answers found on page 29.



Section III: INTRODUCTION

Why Should a High School Student Care About Human Milk Feeding?

High school presents a perfect time to learn about human milk feeding as most people decide how they will feed their infant long before they become pregnant. While this decision may seem intensely personal, how you feed your infant is likely to be influenced by deep-seated historical, political, socioeconomic, cultural, and other factors. Learning about the best way to feed an infant may influence one of the most important decisions a new parent makes.



Human milk is the best food for infants and has lifelong benefits for the health of both parents and babies. The World Health Organization and the American Academy of Pediatrics recommend that infants drink only human milk for the first six months of life. After six months, infants should be fed iron-rich foods and continue receiving human milk for at least 24 months.¹² The D.C. Health Department is in full support of these recommendations.

Washington, DC has a high breastfeeding rate overall, but Black women are less likely to feed their infants human milk than women of other races (see table 1).³ Women who do *not* feed their infants human milk are more likely to suffer from medical conditions such as breast cancer, heart disease, and obesity. Their infant is more likely to suffer from asthma, diabetes, ear and intestinal infections and more likely to die from Sudden Infant Death Syndrome (SIDS) (table 2).⁴ These medical conditions are more common in families of color and providing human milk can help protect against these illnesses.

¹ Breastfeeding and the use of human milk. *Pediatrics* 2012;129:e827-e841.

² WHO Infant and young child feeding. <https://www.who.int/news-room/fact-sheets/detail/infant-and-young-child-feeding> Accessed October 23, 2021

³ Anstey EH, Chen J, Elam-Evans LD, Perine CG. Racial and geographic differences in breastfeeding -United States, 2011-2015. *MMWR* 2017;66:723-727.

⁴ US Department of Health and Human Services. *The Surgeon General's call to action to support breastfeeding*. Washington, DC: U.S. Department of Health and Human Services, Office of the Surgeon General, 2011.



The authors of this curriculum acknowledge that not all people who feed their infant human milk identify as women or mothers and/or use she/her pronouns. Therefore, this course uses human milk and chestfeeding (an infant nursing directly on a person's chest) in addition to breastfeeding.

One way to improve human milk feeding rates is to encourage and support this feeding as the norm. However, many teenagers have never seen someone breastfeed and may not know how important it is. The birthing parents are more likely to be successful with human milk feeding if they receive support from their partners and families. That is why human milk feeding education is just as important for male teens. The goal of this curriculum is to make sure that if you or your loved ones become a parent, you will have all the information you need to make or help them make a well-informed decision about how to feed your baby.

Human milk feeding also benefits the planet. When infant formula is used instead of human milk, there are negative consequences for the environment. The production and use of formula leaves a significant carbon footprint from raising dairy cows and creating, packaging, and transporting cases of processed formula.

This human milk feeding curriculum was developed for public use by the D.C. Breastfeeding Coalition. The curriculum is divided into four sections. Your teacher may decide to use the entire curriculum or just individual sections. An optional quiz is available for use at the beginning and end of the curriculum as well as activity ideas.





Table 1: Racial disparities in human milk feeding initiation rates: United States and Washington, DC (2019)⁵

U.S./ DC	Overall %	Hispanic %	White %	Black %	Asian %	AI/AN* %	Multi Racial %	Largest Disparity %
United States	84.1	87.4	85.5	73.6	90.3	76.6	83.1	16.7
DC	84.2	82.5	97.1	71.2	95.5	-	88.7	25.9

AI/AN=American Indian/Alaska Native

Table 2: Excess Infant Health risks Associated with Not Breastfeeding⁶

Infant disease	Excess Risk (%)
Ear infections	100
Eczema	47
Diarrhea and vomiting	178
Hospitalization for lower respiratory tract infections (pneumonia/bronchiolitis) in the first year	257
Asthma, with a family history of asthma	67
Childhood obesity	32
Type 2 diabetes mellitus	64
Acute lymphocytic leukemia	23
Sudden Infant Death Syndrome	56

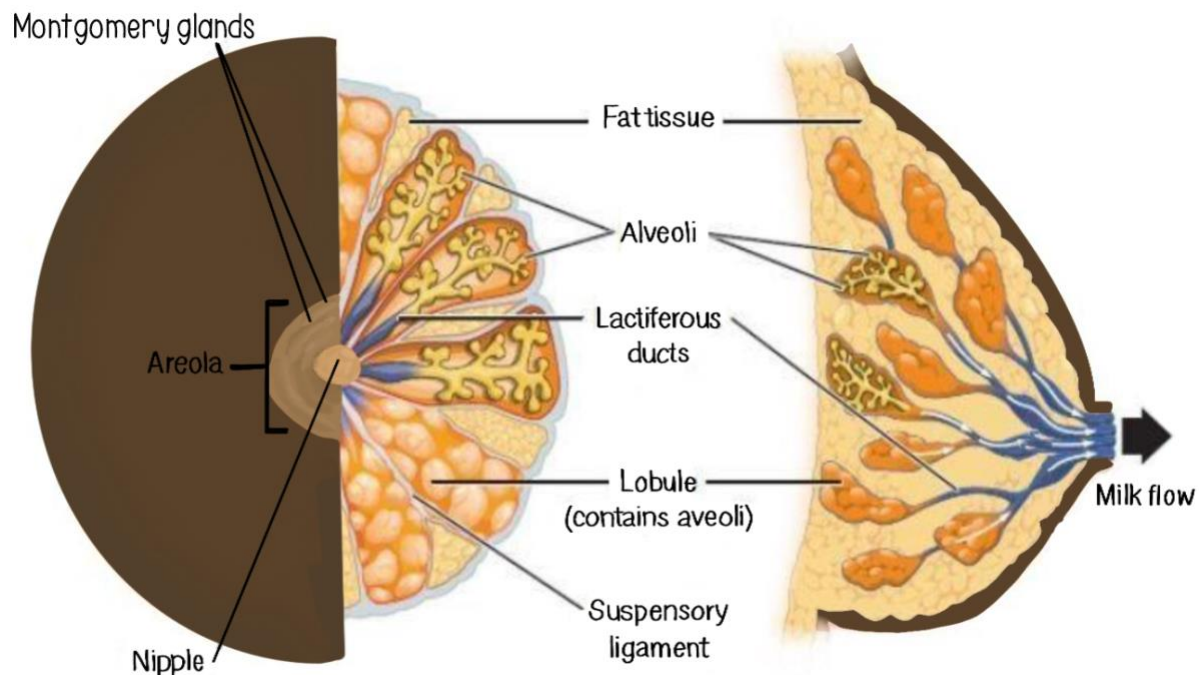
⁵ Chiang KV, Li R, Anstey EH, Perrine CG. Racial and Ethnic Disparities in Breastfeeding Initiation – United States, 2019. *MMWR* 2021;70(21):769–774.

⁶ The Surgeon General's Call to Action to Support Breastfeeding. Office of the Surgeon General (US); Centers for Disease Control and Prevention (US); Office on Women's Health (US). Rockville (MD): Office of the Surgeon General (US); 2011.

Section IV: HOW DOES IT WORK?

SECTION 1: Anatomy and Physiology of Human Milk Feeding

Figure 1: Anatomy of the breast



The outside of the breast contains the nipple and a darker area around the nipple called the areola. The areola color can be pink to brown. The areola contains small bumps called **Montgomery glands** that **secrete** an oily liquid which cleans and moisturizes the areola and nipple. The Montgomery glands also produce a scent that is unique to each birthing parent. The infant can identify their parent from 20 feet away just from their scent.

Hormones cause the breast to enlarge during pregnancy and develop **lactocytes**. Lactocytes are the cells that produce milk. Multiple lactocytes form a balloon-like structure called an alveolus (Figure 2). Multiple alveoli form a **lobule**, and multiple lobules form a **lobe** (Figure 1). Figure 3 shows how lactocytes produce or transport components of milk (from tiny blood vessels called capillaries). The milk components enter the center of the alveolus, called the alveolar lumen. The milk travels from the alveolar lumen, into the **lactiferous ducts**, and exits the nipple.



Figure 2: Multiple lactocytes make up the alveolus

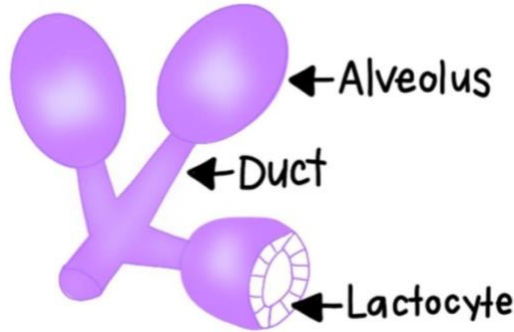
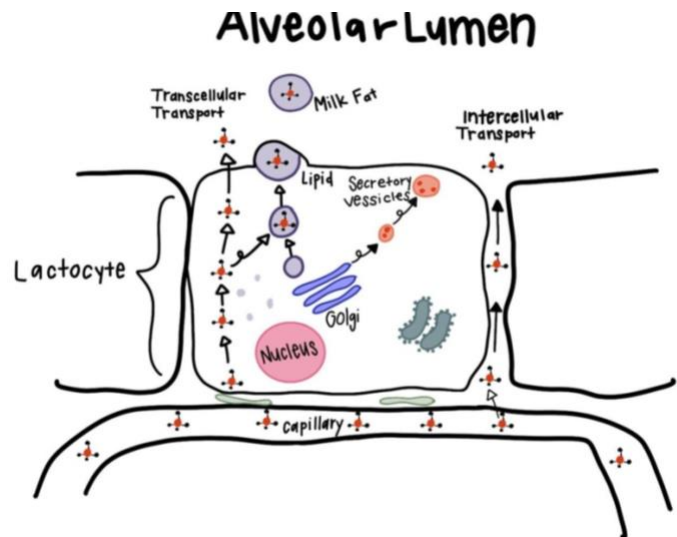


Figure 3: The lactocyte and the production and transportation of milk components into the alveolar lumen



What gets into the milk, and what the baby absorbs into their body, depends on many factors. Most medicines, such as antibiotics, do not pass into the milk in large enough amounts to affect the baby. However, there are some substances that can pass into the milk and affect the baby. A parent should check with a health care provider, board certified lactation consultant (IBCLC) or lactation specialist to make sure whatever the parent is taking is safe to use while human milk feeding.

After the baby is born and the placenta is delivered, the body begins to produce prolactin. **Prolactin** is the hormone that stimulates the lactocytes to produce milk, and **oxytocin** is a hormone that causes the milk to be ejected from the breast. Milk production will start shortly after the baby is born, even if the birthing parent does not plan to feed the baby human milk.

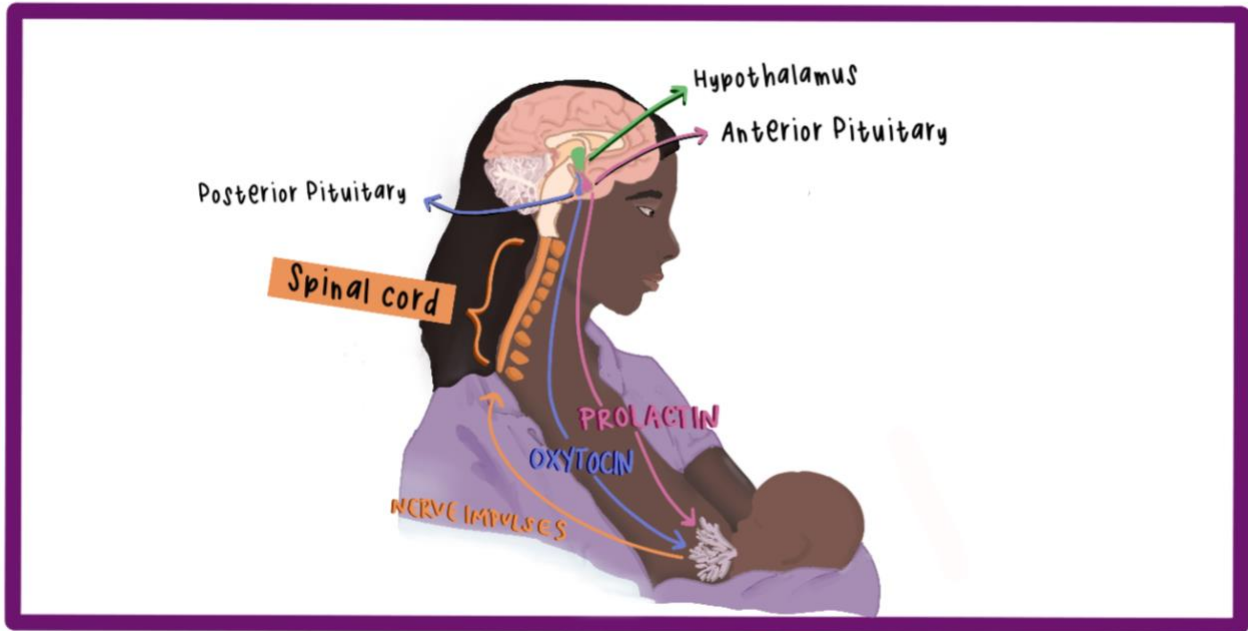
In the first few days after birth, the breasts produce only a small amount of a powerful milk called **colostrum**. This small amount of yellow, sticky milk is perfect for a newborn baby's tiny stomach. Colostrum is packed with antibodies that protect babies from infections and help them poop.

When the baby is around four days old, the colostrum changes to more mature milk. The amount of mature milk a birthing parent produces depends on how much milk the baby drinks or how much is expressed with a pump. This is called "supply and demand" and ensures the baby gets the amount of milk they need. For example, if the parent has twins, the babies will drink a lot of milk, and the birth parent will make enough milk for both. A baby needs to feed frequently (8 to 12 times in 24 hours) to stimulate the breasts to make



plenty of milk. This is why it is best for the baby to drink human milk only. When a baby skips human milk feedings to drink formula, the breasts will eventually make less milk.

Figure 4: The physiology of feeding human milk



The reflex for milk production is shown in the diagram above.

The infant suckles on the breast/chest or the parent uses a pump, which sends nerve impulses to the spinal cord, then up the spinal cord to part of the brain called the hypothalamus. The hypothalamus sends a message to the anterior pituitary to release the hormone prolactin and to the posterior pituitary to release the hormone oxytocin into the blood stream. These hormones travel to the breast where prolactin stimulates the lactocytes to make human milk and oxytocin stimulates the breast to eject milk.



Section V: BENEFITS OF HUMAN MILK FEEDING

Human milk feeding has benefits for both parents and babies.

For the Infant

Human milk is well-designed and contains water, fat (for brain and eye development), protein, vitamins, minerals, amino acids and carbohydrates (lactose). It is packed with antibodies, living cells, and other nutrients to help protect the infant. A person's milk is specific for their baby so if the birth parent gets an infection (like influenza or COVID-19), they will make antibodies that pass through their milk and protect the infant. Human milk also contains the right type of sugars (oligosaccharides) to help healthy bacteria grow in the intestines. A healthy **intestinal biome** is crucial in maintaining good health.

Children who drink human milk are healthier and are less likely to have ear, respiratory, and intestinal infections, asthma, obesity, diabetes, and are also less likely to die from **Sudden Infant Death Syndrome** (SIDS). In fact, infants fed human milk in the U.S. are at least 20% less likely to die in the first year of life than formula fed infants.

Human milk also adapts to the baby's needs. When a baby is born prematurely, the milk has more nutrients to meet the requirements of the infant.

For the Birth Parent



Most people know that human milk is the best form of nutrition for the baby. However, human milk feeding provides immediate and long-lasting benefits for the parent giving birth as well. They are less likely to have heavy bleeding from the uterus after having their infant. Oxytocin not only causes the milk to eject from the breasts, but also causes the uterus to contract which prevents **hemorrhaging** (heavy bleeding) after birth.

Oxytocin also helps people feel more relaxed, decreases anxiety, and increases bonding with the baby. Parents who feed their baby their human milk take longer to start menstruating again after birth and can be protected from becoming pregnant (another form of contraception is still needed). People who feed their baby human milk are less likely to develop breast and ovarian cancer, heart disease, and high blood pressure.



Almost all birthing parents can and should feed their baby human milk. There are only a few reasons they should not feed their baby their milk. These include the baby having a rare disease, such as **galactosemia**, the birth parent having active tuberculosis, taking a few medications such as **chemotherapy** (to fight cancer) or using some types of street drugs and/or unprescribed drugs (such as cocaine, heroin, or fentanyl). After discussing with their medical provider, birth parents in the U.S. who are HIV positive may breastfeed under some circumstances.

Some people may not have accurate information about breastfeeding. If they are just feeding human milk, most birthing parents make plenty of milk for their babies. Babies are not allergic to their parent's milk. Parents do not need to eat a special diet when milk feeding or avoid specific foods. They can continue human milk feeding after returning to work or school. When the baby is latched-on (attached) correctly to the breast, human milk feeding should not hurt. If a parent has any challenges with human milk feeding, there are health care providers, **lactation consultants and counselors** (milk feeding experts) who can help.

Even if a parent is not able to provide milk for a long time, it is still important to feed babies human milk as long as they are able to. Every drop of human milk a baby receives helps them stay healthy. If necessary, the parent may supplement human milk with formula.

Partner

Providing human milk is beneficial for the partner of the birthing parent as well. The family will save money by not needing to buy formula and bottles. This will also save time as there will be less formula to prepare and fewer bottles to wash. Babies who are fed human milk are sick less often, resulting in fewer medical visits and the parents missing fewer days of work.

Environmental

Human milk is one of the few foods produced and delivered to the consumer without any pollution, unnecessary packaging, or waste. In fact, human milk has been called the most environmentally friendly food available. It produces almost zero waste, greenhouse gases, or a water footprint.

Water is needed both to process infant formula at a factory and to mix with the formula powder at home. Even if you choose a non-dairy based formula, it will still leave an ecological footprint. Cultivation of soy plants and palms for palm oil used for infant formula uses a lot of water. In addition, unhealthy metals (such as aluminum, cadmium, and other metals) may be used in the



production of baby formula. It is estimated that the aluminum content of infant formulas is between 10 to 40 times higher than the aluminum content in human milk.

Some people debate the environmental effects of cloth vs. disposable diapers, but the environmental impact of formula feeding may be even greater. Cow's milk is needed to make most infant formulas, and they require large amounts of water and food to produce milk. Farmers must grow plants for the cows to eat and often use pesticides and fertilizers to help them grow faster. Methane gas is released when cows pass gas and is second behind carbon dioxide in contributing to the greenhouse effect and global warming; cow gas and stool account for 20 percent, or at least 100 million tons of the total annual global methane emissions.

Processing infant formula consumes a huge amount of energy. Cows must be milked, and the milk must then be **skimmed, processed, pasteurized, homogenized**, dried, and packaged. Manufacturing the bottles and rubber nipples also use large amounts of energy in addition to plastic, rubber, silicon, packaging, and paper.

Producing the packaging for infant formula creates toxins and uses paper, plastic, and tin. The 550 million cans (or more) of infant formula sold each year to feed U.S. babies alone uses at least 86,000 tons of tin and 364,000 tons of paper.

Producing powdered formula uses a lot of water. More than 4000 liters (16,907 cups) of water are needed to produce just one kg (2.2 pounds) of formula powder.⁷ The formula then needs to be transported from the manufacturing facilities to stores where people must drive to purchase it.

Human milk feeding parents experience an average of 14 months delay in menstruation after birth (called lactational amenorrhea). Even something as natural and normal as menstruation creates a byproduct. Producing menstrual pads and tampons requires fibers, bleaches, packaging materials, and fuels, and adds a large amount to landfills.

Through lactational amenorrhea, human milk feeding has a powerful effect on reducing the birth rate. It does require exclusive breastfeeding for at least 6 months and not using of pacifiers. This natural child spacing has several benefits. It helps the birthing parent recover from the physical demands of

⁷ Linnekar, A., Gupta, A., Bidla, N., & Dadhich, J. P. (2015, January). *Formula For Disaster*. gifa.org. <https://www.gifa.org/wp-content/uploads/2015/01/FormulaForDisaster.pdf>.



pregnancy and childbirth. It can also decrease the risk of overpopulation which is particularly important in areas with limited resources. To decrease the risk of another pregnancy, other forms of contraception (birth control) should be used as well.

Economic

Some families receive free formula when their baby is born. Formula companies do this to promote formula and discourage parents from human milk feeding. Even with a few free cans, feeding formula is very expensive. A can of powdered formula costs about \$18-\$20 and lasts two to four days, depending on the age of the infant. A family could buy three roasted chickens each week for the same amount of money.

Special types of formula cost even more. In addition, families also need to purchase bottles, nipples, brushes, and other items. For families who qualify, [the Special Supplemental Nutrition Program for Women, Infants, and Children \(WIC\)](#) (a federal government program that provides nutritional and health support to low-income families), will help cover the cost of formula. WIC does not cover all the costs and parents often need to purchase extra formula every month along with additional supplies.

Human milk feeding may be less expensive than bottle or formula feeding, but not completely free. Parents who feed with human milk need to eat an average of 500 calories more per day, provide vitamin D to their infants, and if they are separated from their infant (e.g. employment, school), they may need to use a pump, storage bags, bottles, and nipples. Some hourly employees may not be paid for the time they use to express milk. Parents may need to pay for help from a lactation consultant. Most insurance companies will pay for breast pumps and lactation consultations, and WIC will provide additional vouchers to pay for the parent's food.

Infants who are fed formula are less healthy and often need more doctor's appointments. Parents need to take off more days to take their child to their health care provider and care for their sick child.

Apart from the individual cost, there are also medical costs to society when infants are fed formula. It is estimated that if 90% of American infants are fed with human milk, the U.S. could save \$3 billion in medical costs and \$14 billion due to early deaths each year.⁸

⁸ Bartick MC, Schwarz EB, Green BD, et al. Suboptimal breastfeeding in the United States: Maternal and pediatric health outcomes and costs. *Matern Child Nutr* 2017;13:e12366.



Table 3: Estimated Annual Cost of Feeding with Formula vs. Human Milk

Item	Formula	Human Milk	Total Cost for WIC/Medicaid Formula-fed Infant	Total Cost for WIC/Medicaid Human Milk Fed Infant
Formula cost	\$1,700	None	1 additional can/month = \$175	0
1 year of extra food for parent	-	Extra 500 cals/day = \$750	-	\$258 *
Bottles/nipples/storage bags	\$50	\$95 (+ bags)	\$50	\$50
Accessories: Brushes, warmer	\$50	\$50	\$50	\$50
Manual breast pump	-	\$50	-	0
Electric breast pump (if needed)	-	\$200	-	0
Vitamin D	-	\$72	-	0
Lactation Consultant (if needed)	-	\$150	-	0
Nursing bra, pads, pillows	-	\$150	-	\$100
2 extra days missed work/school for infant illnesses**	\$280	-	\$280	-
Additional health care provider visits	2 visits = \$100 co-pays, meds, transportation	-	Transportation \$20	Transportation \$20
Unpaid time expressing milk**	-	\$4,550		\$4,550
Total: paid breaks	\$2180	\$1367	\$400	\$478
Total: unpaid breaks		\$5917		\$5028

*WIC gives additional food vouchers to breastfeeding parents and pays for lactation support and many breastfeeding supplies.

**If unpaid: \$17.50/hour minimum wage x 16 hours

***If unpaid breaks: \$17.50/hour minimum wage x up to 1 hour total (30 minutes x 2



Interested in working to support lactating parents? There are many ways to get involved! **People who work for WIC** have a big impact on babies and new parents. They provide support and resources for newly lactating parents and can even offer food vouchers. Education requirements and certifications may vary by state and position. WIC also employs **breastfeeding peer counselors**, people who share their breastfeeding experience with other new parents and are part of a great support system. You can contact your local WIC to find out more! You can become a **lactation consultant**. Lactation consultants work with new parents to troubleshoot breastfeeding issues, and don't necessarily need a bachelor's degree to do their work but do need to complete some college-level courses. They are board-certified through the International Board of Lactation Consultant Examiners. You can also become a certified lactation counselor, which requires less college-level coursework. **Speech therapists** can make sure premature infants are ready to feed. Some parents donate their milk to human milk banks. **Milk bank technicians and support staff** work to make sure the milk is stored and transported safely. You can become a **physician** who works with mothers and children such as pediatricians, neonatologists, and obstetricians. Becoming a physician takes a long time, and requires a bachelor's degree, a medical school degree, completing residency, and board certification. You can also study to become a **pediatric nurse**, which requires a bachelor's degree and additional certifications depending on the level of the nursing degree. **Scientists** can work on better understanding the biochemistry of human milk. Engineers can make equipment such as breast pumps to help with lactation.



Section VI: SYSTEMIC RACISM AND HUMAN MILK FEEDING

History of Human Milk Feeding in the U.S.

Human milk feeding for the African American community in the U.S. has a disturbing history and may influence how African Americans view human milk feeding now. Some Black enslaved people were forced to feed their white owners' children, a practice known as wet nursing (Figure 5). The children of the enslaved people were frequently sold or required to live separately from their mothers and fed cow's milk mixed with unclean water. The result of this was that while most white babies thrived, many Black infants died from malnutrition.

The impact this horrific practice has on African American families today is summarized below.

As Dr. Victoria Green, Nekisha Killings, MPH, and Dr. Camille Clare, wrote in *The Historical, Psychosocial, and Cultural Context of Breastfeeding in the African American Community*:

“The tradition of wet nursing for African American women is inherently linked to white supremacy, slavery, medical racism and the physical, emotional, and mental abuse that enslaved African American women endured. Thus, the decision to human milk feed and the act of milk feeding may remain deeply affected by the generational trauma of wet nursing during slavery.”⁹



Figure 5: Enslaved woman wet nursing

⁹ Green, Victoria L., Nekisha L. Killings, Camille A. Clare, et al. “The Historical, Psychosocial, and Cultural Context of Breastfeeding in the African American Community.” Mary Ann Liebert, Inc., publishers, February 12, 2021 <https://www.liebertpub.com/doi/full/10.1089/bfm.2020.0316>



Medical Racism

How does medical racism impact the birthing parent's and infant's health? Systemic racism begins before the baby is even born. Black women suffer from more frequent and more severe pregnancy complications than white women,¹⁰ regardless of their income level. Tragically, in the U.S., Black women are more than three times more likely to die from pregnancy complications than white women. The toll of racism puts Black American women at a higher risk of high blood pressure during pregnancy, mental health conditions, and giving birth to an infant prematurely.¹¹

Not all pregnant people identify as women; transgender, intersex and nonbinary people experience more barriers receiving quality health care and support for human milk feeding.

The effect of systemic racism continues after the baby is born. The death rate for Black infants is more than twice that of infants born to white parents.¹² One study of 1.8 million infants showed that Black infants were twice as likely to live if they received care from a Black physician rather than a white physician.¹³ White medical providers may not even realize they are providing biased care, but statistics have shown that Black families have much better medical outcomes when treated by Black physicians. We need to have more diversity in the medical field and ensure Black physicians are treated with the same level of respect as white physicians.

How else does medical racism impact breastfeeding? Black infants are more likely to be born prematurely, which can make it more difficult to provide breast milk. In part because of hospital policies and medical racism, Black infants are nine times more likely to be given formula than white infants in the hospital.¹⁴ When a newborn is given formula in the hospital, it can affect a mother's confidence in her ability to breastfeed, decrease her milk supply, and make it more difficult for an infant to latch on to the breast.

¹⁰ The Center for Disease Control Pregnancy Mortality Surveillance System (PMSS)
<https://www.cdc.gov/reproductivehealth/maternal-mortality/pregnancy-mortality-surveillance-system.htm> Accessed May 1, 2021.

¹¹ The Center for Disease Control Pregnancy Mortality Surveillance System (PMSS)
<https://www.cdc.gov/reproductivehealth/maternal-mortality/pregnancy-mortality-surveillance-system.htm> Accessed May 1, 2021.

¹² Centers for Disease Control and Prevention Infant Mortality.
<https://www.cdc.gov/reproductivehealth/maternalinfanthealth/infantmortality.htm> Accessed May 1, 2021.

¹³ Greenwood BN, Hardeman RR, Huang L, Sojourner A. Physician–patient racial concordance and disparities in birthing mortality for newborns. *PNAS* 2020; 117: 21194-21200.

¹⁴ McKinney CO, Hahn-Holbrook J, Chase-Landsdale PL, et al. Racial and Ethnic Differences in Breastfeeding. *Pediatrics* July 2016, e20152388.



Employment and Breastfeeding

Structural racism contributes to African American and Latinx women being more likely to work low-wage jobs and even more than one job than white women. Parents who are employed full-time are half as likely to breastfeed at 6 months than parents who are unemployed.¹⁵ Adequate paid parental leave from all jobs could help people breastfeed for a longer time. As of 2021, the U.S. has one of the lowest breastfeeding rates in the world, including Canada, the United Kingdom, Italy, and Australia, and is one of just a few nations that does not guarantee paid maternity leave.

Studies have found that parents in low-wage jobs do not receive the support they need in the workplace to pump milk. Low-income workers are half as likely as middle-income workers and one-third as likely as high-income workers to receive reasonable break times and a clean, private space for pumping. If parents are not able to pump their milk at work, they are more at risk for breast infections, their milk supply will decrease, and their infants may need to drink formula.

Even though there are national and D.C. laws (The 2010 Affordable Care Act and the Child's Right to Nurse Human Rights Amendment Act of 2007) that guarantee people be given break times to express milk in a clean, private location, many employers do not provide these accommodations.

The History of Infant Formula

The production and marketing of infant formula began in 1865 as new technologies and refrigeration became increasingly available. Prior to its development, babies who did not receive human milk usually died. Unfortunately, it did not take long after this life-saving substance was invented for companies to realize that enormous profits could be made by convincing people who were able to breastfeed to withhold breastmilk and purchase infant formula.

¹⁵ Ryan AS, Zhou W, Arensberg, MB. The effect of employment status on breastfeeding in the United States. *Womens Health Issues* 2006;16(5): 243–251.



Infant formula promotion to the Black community has been particularly horrific. Formula companies in the 1930s and 1940s marketed infant formula as the choice of the elite, “the substance for sophisticates.”¹⁶ In 1946, Annie Mae Fultz, a biracial, African American-Native American woman, gave birth to the world’s first known identical quadruplets. The Fultz quadruplet girls became instantly famous. The white physician who delivered the girls realized that he could make money by exploiting them. He first took away the parents’ right to name the girls and gave them all the first name Mary and each a middle name of one of his relatives. Next, he negotiated with formula companies and sold the rights to use the Fultz girls to advertise for PET Milk formula. PET Milk (a brand of human formula) directed their marketing to the African American community and convinced them that their formula was at least as healthy as human milk (Figure 6). This resulted in many African American women feeding their infants formula instead of breastfeeding.¹⁷



Figure 6: PET formula advertisement using the Fultz quadruplets

An even more devastating formula marketing practice occurred in the 1970s in Africa, Asia, and Latin America (and other economically disadvantaged areas) where Nestlé began an aggressive campaign to sell infant formula. Nestlé convinced families that formula was the best modern way to feed an infant, gave free samples, and even dressed up sales representatives as nurses. After the families received formula gift packages and the mother’s milk supply had decreased, the families had no choice but to continue purchasing infant formula. Most families could not afford this and watered down the formula, often with unsanitary water. This resulted in 1.5 million babies dying each year from malnutrition and disease.

¹⁶ Green VL, Killings NL, Clare CA. The historical, psychological and cultural context of breastfeeding in the African American community. *Breastfed Med* 2021;16:116-120

¹⁷ Freeman A. *Skimmed: Breastfeeding, race and injustice*. Stanford CA: Stanford University Press, 2021.



A 1974 booklet entitled “The Baby Killer” (Figure 7) exposed Nestlé’s despicable campaign.¹⁸ An international boycott of Nestlé began in 1977, and because of the formula company’s horrific marketing, the World Health Organization passed the International Code of Marketing of Breastmilk Substitutes in 1981. The US did not sign onto this Code until 1994 and has no laws to enforce it. This is why formula companies still spend hundreds of millions of dollars each year advertising infant formula in the U.S.

Despite the terrible effect of systemic racism on breast/chestfeeding rates for Black families in the US, more and more Black families have received support from WIC, health providers, families, and friends to overcome barriers and decide to breastfeed. Now, more than 75% of Black infants in the US receive the benefits of human milk.¹⁹

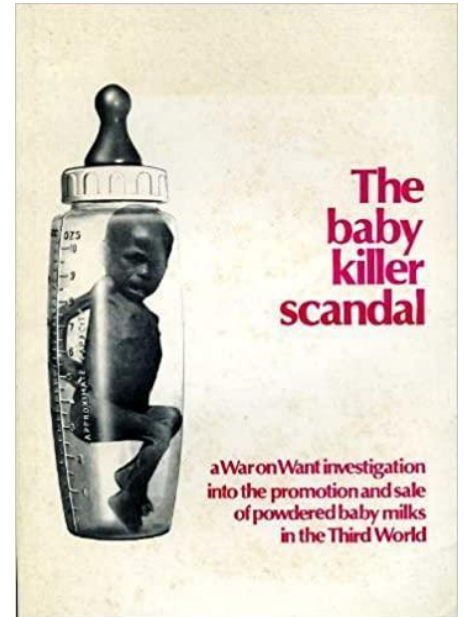


Figure 7: The Baby Killer Booklet

Summary

Human milk is a powerful vital first food for infants. It has a long list of well-established benefits for parents, infants, and the environment. Even in the U.S, formula-fed babies are less likely to survive and be healthy. Human milk is more affordable than formula feeding. Systemic racism and formula advertising have negatively affected human milk feeding rates in Black communities. WIC breastfeeding peer counselors, lactation consultants, workplaces and healthcare providers are all working to counter the structural racism that can impact a women’s breastfeeding decision. Learning about breastfeeding at a young age is the first step in creating a culture where all babies and families receive the health benefits of breastfeeding.

¹⁸ Muller M. The Baby Killer. British NGO War on Want, 1974.

¹⁹ Center for Disease Control and Prevention: Breastfeeding Rates. National Immunization Survey. https://www.cdc.gov/breastfeeding/data/nis_data/index.htm Accessed June 10, 2022.



Section VII: FACTS AND MYTHS

Myth	Fact
Breastfeeding hurts	In the beginning, breastfeeding may feel a bit uncomfortable, but it should not feel painful. If a baby is positioned on the breast correctly, breastfeeding should not hurt. If breastfeeding continues to be painful, seek help from a healthcare provider or a lactation specialist.
Women with small breasts can't breastfeed	Women with all sizes of breasts can breastfeed successfully.
Many mothers do not produce enough milk	Almost all mothers can produce enough milk as long as they only feed breastmilk until breastfeeding is well established. The mother's milk will decrease if she breastfeeds infrequently and/or feeds her baby formula.
Breastfed babies are clingy	Breastfed babies are usually held a lot which helps with bonding and making the baby feel secure. Some babies will ask for more contact than others whether they are breastfed or not.
Breastfeeding makes breasts sag	Breastfeeding is often blamed for a loss in breast tissue support, but pregnancy itself is the cause. During pregnancy, the ligaments supporting the breast tissue stretches which can cause the breasts to sag. This may happen to women whether they formula feed or breastfeed.
Infant formula is very similar to breast milk	Infant formula does not contain the antibodies, living cells, enzymes, or hormones present in breast milk. Breast milk is a living fluid, designed for each individual baby and changes over time. No other substance on Earth compares to it!
Black women don't breastfeed	Oh yes, they do! In the U. S. today, 75% of all new Black moms breastfeed. Here's a list of some famous Black women who breastfed their babies. Michelle Obama Beyoncé Laila Ali Serena Williams

Section VIII: PROJECT IDEAS

1. Write your legislator in support of
 - a. Workplace laws to protect all breastfeeding mothers
 - b. Paid parental leave and its importance for breastfeeding
 - c. Your own idea to support breastfeeding families
2. Call your insurance company and find out what breastfeeding supplies and support they cover.
 - a. Do they pay for pumps and if so, which type, as breast pumps vary greatly in quality and effectiveness?
 - b. Do they cover board certified lactation consultation services (IBCLC)?
 - c. Other lactation supplies (breast pads, breastfeeding bras)?
3. Interview a family member about how they fed their infant and why
4. Create a brochure for teen parents about breastfeeding
5. Create a list of pros/cons of breastfeeding



Section IX: GLOSSARY

- **Alveoli:** Small cavities or sacs found in the mammary gland. Mammary alveoli are the site of milk production and storage in the mammary gland. (single: alveolus)
- **Antibodies:** A large protein used by the immune system to fight infections
- **Capillaries:** The smallest blood vessels that carry nutrients to cells
- **Chemotherapy:** Medicine to treat cancer
- **Colostrum:** The small amount of first milk that is rich in nutrients and antibodies. It usually only lasts a few days before more mature milk is produced.
- **Doula:** A trained companion who provides guidance and support during labor
- **Equity:** Fairness and justice. Equity recognizes that we do not all start from the same place and adjustments may be necessary to account for these imbalances.
- **Galactosemia:** A hereditary disorder that affects the body's ability to get rid of a type of sugar.
- **Hemorrhaging:** A heavy loss of blood
- **Homogenized:** A process of reducing fat globules in milk to extremely small particles and distributing it evenly throughout the milk.
- **Intestinal biome:** The microbes, including bacteria, archaea, viruses, and fungi, found in the intestines.
- **Lactiferous ducts:** These ducts carry the milk from the lobe to the outside of the nipple.
- **Lactocytes:** The milk producing cells in the breast.
- **Lactation Support Person:** A health professional who has undergone education, training, and may have passed examinations to provide milk feeding support to the birthing parent.
- **Lipids:** Substances, such as fats and oils that do not dissolve in water.
- **Lobe:** Multiple lobules form a lobe.
- **Lobule:** Multiple alveoli form a lobule.
- **Midwife:** A person trained to assist the birthing parent in childbirth.
- **Montgomery glands:** Glands on the areola that look like small bumps. They secrete fluid to clean and lubricate the areola and nipple.
- **Oxytocin:** A hormone released from the posterior pituitary that causes the milk to eject from the breast. It also causes the uterus to contract.
- **Pasteurized:** A process that uses heat or irradiation to sterilize (kill microorganisms) in a product (milk) to make it safe to drink and stay fresh longer
- **Physiology:** The study of how living organisms function



- **Processed:** A processed food is any food that has been altered in some way during preparation. For example, an apple is processed into an apple bar or cow's milk is processed into infant formula.
- **Prolactin:** A hormone released from the anterior pituitary that stimulates milk production
- **Secrete:** To produce and discharge
- **Skimmed:** Milk with the cream removed
- **Sudden Infant Death Syndrome (SIDS):** The sudden death of an infant younger than one year old without a known reason and typically occurring during sleep.
- **WIC:** The Special Supplemental Nutrition Program for Women, Infant and Children is a government program to provide food, nutritional counseling, and referrals to low-income pregnant parents and children up to age 5.



Section X: POST-TEST

1. If I have a child, I want my baby to be fed:
 - a. Human milk.
 - b. Infant formula.
 - c. Both human milk and infant formula.
 - d. I'm not sure.
2. In what part of the breast is the milk produced?
 - a. The areola
 - b. The alveoli
 - c. The Montgomery Glands
 - d. The nipple
3. What hormone makes milk?
 - a. Thyroid
 - b. Insulin
 - c. Prolactin
 - d. Estrogen
4. What hormone ejects milk?
 - a. Progesterone
 - b. Testosterone
 - c. Thyroid
 - d. Oxytocin
5. Human milk contains
 - a. Antibodies.
 - b. Lactose.
 - c. Living cells.
 - d. All of the above.
6. Babies who are fed human milk are less likely to get:
 - a. Diarrheal illnesses.
 - b. Ear infections.
 - c. Diabetes.
 - d. All of the above.

POST-TEST

7. Birthing parents who feed human milk are less likely to get:
 - a. Some types of breast cancer.
 - b. Ovarian cancer.
 - c. Heavy bleeding after delivery.
 - d. All of the above.

8. Birthing parents should not feed their milk to their child if they have COVID-19.
 - a. True
 - b. False

9. There are medical reasons a birthing parents in the United States should not feed their child their milk.
 - a. True
 - b. False

10. Formula feeding is bad for the environment.
 - a. True
 - b. False

11. Systemic racism plays an important role in why Black families in the United States are less likely to feed their children human milk than white families.
 - a. True
 - b. False

12. Formula is just as good as human milk because it contains all the same ingredients.
 - a. True
 - b. False

Section XI: ANSWER KEY

1. If I have a child, I want my baby to be fed:
 - a. **Human milk.**
 - b. **Infant formula.**
 - c. **Both human milk and infant formula.**
 - d. **I'm not sure.**

2. In what part of the breast is the milk produced?
 - a. The areola
 - b. **The alveoli**
 - c. The Montgomery Glands
 - d. The nipple

3. What hormone makes milk?
 - a. Thyroid
 - b. Insulin
 - c. **Prolactin**
 - d. Estrogen

4. What hormone ejects milk?
 - a. Progesterone
 - b. Testosterone
 - c. Thyroid
 - d. **Oxytocin**

5. Human milk contains
 - a. Antibodies.
 - b. Lactose.
 - c. Living cells.
 - d. **All of the above.**

6. Babies who are fed human milk are less likely to get:
 - a. Diarrheal illnesses.
 - b. Ear infections.
 - c. Diabetes.
 - d. **All of the above.**

ANSWER KEY

7. Birthing parents who feed human milk are less likely to get:
 - a. Some types of breast cancer.
 - b. Ovarian cancer.
 - c. Heavy bleeding after delivery.
 - d. All of the above.**

8. Birthing parents should not feed their milk to their child if they have COVID-19.
 - a. True
 - b. False**

9. There are medical reasons a birthing parents in the United States should not feed their child their milk.
 - a. True**
 - b. False

10. Formula feeding is bad for the environment.
 - a. True**
 - b. False

11. Systemic racism plays an important role in why Black families in the United States are less likely to feed their children human milk than white families.
 - a. True**
 - b. False

12. Formula is just as good as human milk because it contains all the same ingredients.
 - a. True
 - b. False**



DC BREASTFEEDING
COALITION

Section XII: IMAGE SOURCES

Cover image: DC Breastfeeding Coalition

Pages 6, 7, 12, 17, 24 26 and 31: DC Breastfeeding Coalition

Page 9, Figure 1: Created by Lily Tender

Page 10, Figures 2 and 3: Created by Lily Tender

Page 11, Figure 4: Created by Lily Tender

Page 16: Florida Breastfeeding Coalition; *Get Pumped!*

Page 18, Figure 5: Photograph copyright Museum of Fine Arts, Boston

Page 21, Figure 6: shorturl.at/oJQ23; image courtesy of Tonya A. Bostic, daughter of late Mary Ann Fultz Bostic. Accessed April 9, 2022

Page 22, Figure 7: www.waronwant.org

Acknowledgements:

Special thanks to Claire Romine, Amara Leonard, Chloe Cattaneo, Lila Campbell, M.Ed., and members of the DC Breastfeeding Coalition for their assistance with editing and design.

