BREASTFEEDING: PHYSIOLOGICAL AND CULTURAL INFLUENCES

by
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A thesis submitted to the faculty of The University of Mississippi in partial fulfillment of the requirements of the Sally McDonnell Barksdale Honors College.

Oxford
May 2015

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ACKNOWLEDGEMENTS

Thank you to one lady who helped me not only with my thesis but with my pursuit of knowledge in general. Dr. Susan Pedigo, thank you for being understanding and open to my love of all subject areas. You helped me realize that I was limiting my vision, and you helped this thesis become what it is. You allowed me to explore various interests and encouraged me to pursue my academic loves; you were the best thesis advisor I could ask for, and I appreciate your continued support throughout this process. Thank you for instructing me to do more with my life than what I ever thought possible.

ABSTRACT
BREASTFEEDING: Physiological and Cultural Influences
(Under the direction of Susan Pedigo)

Within a biological perspective, breasts are indisputably for the use of nourishment of the young. This can be seen by how mammary glands are used by every other species other than humans. Humans are the only species that also looks at breasts within a cultural perspective, and that perspective is where the debate of breastfeeding occurs. There is really no debate that if given the option to breastfeed, breastfeeding is the best choice for the development of infants due to the fact that breast milk has been adapted for the human physique. In spite of the health benefits associated with breastfeeding and the economic disadvantages that accompany the use of infant formula, social influences have caused a shift in neonatal health in the United States from wet-nursing to breastfeeding to now formula feeding. The method of gathering data about this topic was primarily from previous studies and reports in the same method as a literature review. The findings of this paper support the notion that breastfeeding nourished infants best; however, cultural influences cause mothers to choose bottle-feeding more often due to factors such as an increase of women in the workforce, the sexualization of breasts, and the influence of the formula industry.

TABLE OF CONTENTS:

LIST OF FIGURES AND TABLES

INTRODUCTION

We often take learning for granted but there is nothing more beautiful than one discovering new facts, figures, and concepts that can help make the world a better place. Do I think my thesis will change the world? No, but I hope that it can help open the eyes of at least one person the way it has opened my eyes. I began my thesis by researching lactose intolerance. I was in the midst of taking Biochemistry and the human's inability to digest lactose well past infancy was fascinating to me. The more I researched that topic, the more I realized how much was already known about it; however, this research led me to become interested in human milk and the reasons why infants easily digest it. I realized through my searching that many women do not breastfeed their children even though all the current literature clearly shows that "breast is best" when dealing with infant health. I have always been interested in all subjects and how multiple disciplines lend their hand to one succinct topic. I decided to open up my thesis to psychological and sociological aspects as well as the biochemical and biological points I was already researching. This thesis is written in a book fashion with each chapter having its own distinct topic with the overarching topic being breastfeeding. I just could not limit the different disciplines that went into this thesis, which is why my thesis ended up being written in this manner.

Before I begin talking about my thesis, I want to give you, the reader, a little information about myself in order for you to understand how I wrote my thesis. I am truly passionate about many subjects. These subjects vary from biochemistry to classics and include almost everything in between. Most people with my major do research in a lab. Although I believe lab research is incredibly important to progress knowledge, I also acknowledge that my skills do not necessarily lie in that field. I enjoy seeing how different subjects interact to progress knowledge—one of the reasons I added my second major, psychology. I was blessed to have a thesis advisor who saw those qualities in myself and encouraged me to pursue a topic I enjoyed researching. This quality about myself is what led to distinct chapters with distinct topics that vary from the physiology of breastfeeding to social implications of breastfeeding in the United States culture today. I focused primarily on the United States as that is where I am most familiar with and because we seem to be one of the most problematic countries when dealing with breastfeeding.

My thesis consists of six chapters. The first chapter, "Mammals, Breastfeeding, and Nutrition," focuses on viewing humans within the animal kingdom. We are mammals and people tend to forget that. As mammals, we possess the innate ability to nurture our young just like the other mammals. Although we have evolved greatly as a species and have created many wonderful tools to help our continued survival, we seem to be neglecting our natural abilities that we share amongst other animals. We want to separate ourselves from the term, "animal," as much as possible; however, we lose precious aspects about ourselves when we take away that part of our identity.

The second chapter is entitled, “The Physiology and Biomechanics of Breastfeeding.” This chapter deals with the biomechanics that occur to allow women to breastfeed. Breastfeeding is a multifaceted process that involves many anatomical and hormonal changes. Because many people do not know how lactation occurs, we tend to take the intrinsic ability to produce milk for granted. I wanted to show how complex and awe-inspiring this process is because we do not always realize that breastfeeding is a beautiful process that we have the privilege to participate in. The body goes through many changes during pregnancy and lactation which are often scorned in today’s society. More people need to be made aware that the human body is a complex organism that should be viewed as beautiful even in its natural state.

The third chapter, “Health Consequences of Breastfeeding,” deals with revealing the health benefits that accompany breastfeeding. Breastfeeding provides many benefits for the infant in the short and long-term. Along with these benefits, breastfeeding also has been shown to be beneficial for the mother. Although the general consensus is that breastfeeding provides the best health for infants, there are certain instances when mothers should not breastfeed. It is just as important to be aware of these circumstances as knowing the benefits of breastfeeding. Women sometimes cannot breastfeed due to diseases or medications; however, some women do not make enough milk, which could lead to starving an infant if a mother is insistent about breastfeeding. People need to be aware that not breastfeeding could be the best option for an infant.

The fourth chapter is named, “Shift of Nurturance from Wet Nursing to Formula and the Social Practices that have Influenced this Shift,” and explores

certain social practices that surround breastfeeding. I wanted to show specific reasons why women choose not to breastfeed and the social practices that cause women to choose a bottle over the breast. In this chapter, I decided to give a historical roadmap to show how our society has come to view breastfeeding in the light that it does. The wealthier side of society has historically dictated what feeding method was popular and considered proper; however, in today's society, women from all levels of socioeconomic status are in the working field. This fact poses a conundrum for women who want to breastfeed as it makes it very difficult to accomplish both.

The fifth chapter, "Media and Cultural Influences on the View of Breastfeeding in Today's Society," focuses on social pressures that discourage women from breastfeeding. I explore how the media promotes a certain type of body image not easily obtained naturally. Breastfeeding has become a social taboo that should be kept private, silent, and unseen. Women are taught at a young age to strive for certain ideals in our society which hinder breastfeeding and are exposed to societal pressure as early as they can read. In order for breastfeeding to become a norm, we need to stop striving for an unrealistic body ideal that seems to primarily exist solely by plastic surgery.

The last chapter is entitled, "The Rise of the Formula Industry and Costs Associated with Artificial Feeding," and examines the infant food industry to see the role it has played in promoting the bottle over the breast. Once again, I decided to take a historical route and show how infant formula became popular. Although formula is a marvelous tool that has allowed more infants to survive when their

mothers cannot breastfeed, the formula industry has used many tactics to persuade mothers that formula is better or just as good as breast milk. Besides breast milk providing certain health benefits over formula, formula also increases expenses, both monetary and environmental expenses.

All six chapters are aimed at persuading women to highly consider breastfeeding when pregnant. I believe that education either before pregnancy or early during pregnancy is the proper way to encourage women to breastfeed. Much of this information is not readily available, which inhibits how much women know about breastfeeding. Societal pressures need to become less prevalent and focused on in today's society, and people need to be made aware of the benefits breastfeeding provides varying from improved health of the infant to economic benefits. I hope this thesis provides people with enough information to make an informed decision when deciding how to care for their infant.

CHAPTER I: MAMMALS, BREASTFEEDING, AND NUTRITION

Humans exist within the kingdom Animalia, the phylum Chordata, the class Mammalia, and the order Primates. One of the characterisitcs that make organisms within Mammalia distinct is the ability to produce milk through mammary glands. The name Mammalia actually comes from these mammae whose main function is to nurture infants through the secretion of milk. (Stuart-Macadem 4). Our biological status as mammals intends us to use the breast as the method of nourishment because it is the simple and natural way to feed the young, and breasts should not be viewed in any manner less than that. The first fossil records of mammals appear more than 65 million years ago and analysis of these records show that primates spend longer weaning infants and caring for them, and they have longer pregnancy periods than other orders showing how unique longer infant care is to primates. (Stuart-Macadem 168-170). Breasts provide a very practical and necessary purpose for the infant; they provide the necessary immunological factors that had been provided by the placenta during pregnancy (Stuart-Macadem 170). Breastfeeding is recognized as the best option to obtain optimal health and growth benefits for infants, and it is seen as the best for developmental aspects of infants. The infant-mother relationship is also enhanced through this interaction and could play a role in the emotional development of children. In his famous 1958 study, American

Psychologist Harry Harlow separated infant monkeys from their mother and provided them with two alternatives. The first was a bare wired device that had a bottle, while the second was a clothed device without food then vice versa. Harlow found that the monkeys overwhelmingly chose the clothed mother in both situations, hence, proposing that monkeys would choose comfort over nutrition (Harlow). A mother breastfeeding utilizes the best option of both comfort and nutrition for her infant.

From an evolutionary perspective, breastfeeding provides the mother the best chance for her progeny's survival and, hence, ensures her best reproductive success through three mechanisms. The first of these mechanisms is the idea that breastfeeding produces the best health benefits and fitness for the child, which contributes to the child's survival both in the short-term and long-term. The second mechanism involves the knowledge that breastfeeding promotes the release of two hormones—oxytocin and prolactin—which can encourage maternal affection towards a child. This maternal behavior promotes appropriate care-giving for the child and can help the child formulate feelings of acceptance by the mother, strengthening their bond. The third mechanism deals with the natural contraceptive effect of breastfeeding. Breastfeeding allows a natural spacing of children providing enough time for the mother to focus on the development of the child at hand (Stuart-Macadem 170-171).

The human breast milk is biochemically the best option for nourishing infants, however, the composition of milk is highly variable among women. (Hassiotou 4). A study about variables in milk composition found that breastfeeding

induces changes in the breasts including changes in viable cells isolated from breastmilk found through the use of a Neubauer haemocytometer and fat content found within breastmilk measured using the creamatocrit method (Hassiotou 3). One study found that in the breast that was being used to feed there were marked increases in both milk fat and cell content due to the emptying of the milk; however, in the breast that was not breastfeeding, neither fat, protein, cells, nor cell viability of breastmilk differed drastically with values much less than those of the feeding breast. The same study also found that the relationship between total cell content and fat content was the same across all participants. (Hassiotou 3). Breastfeeding has been found to stimulate "a universal orchestrated change in milk fat and cell content over time (3 hours) in the feeding breast," the breast being stimulated by suckling, "suggesting that this pattern is relatively conserved" (Hassiotou 5). The study found "that a strong association exists between the fat and cell content of breastmilk and an inverse relationship of both these parameters with the degree of breast fullness" which was shown by the increase of fat and cell from pre- to post-feed (Hassiotou 5). Essentially, the fuller a breast is with milk, the less fat and cells are present; and the less full a breast is with milk, the more fat and cells are present. A consistent change in protein concentration during pre- and post-feed was not observed like the changes in milk fat and cell contents. The study also compared milk composition expressed by hand and breast pump. The study found that the composition of milk does not change significantly when expressed by either hand or breast pump (Hassiotou 5).

Although milk from multiple creatures is similar in components, the composition of human milk happens to be the most ideal option for a full-term infant. (Schanler). Protein is one of the major constituents of human milk. The content of protein within human milk is at its largest proportion immediately after birth at approximately 2.3 gm/dL in milk and begins to decrease for the next two to four weeks until it reaches a steady level of approximately 1.8 g of protein per dL (Schanler). Protein accounts for approximately "eight percent of caloric needs in full-term infants," and breastmilk provides sufficient protein content to adequately supply the infant throughout the first year (Schanler). There is less protein in human milk, which means less protein curdles in the stomach aiding in digestion.

Two proteins make up the majority of protein composition in human milk—whey and casein. In fact, about 60-70 percent of protein is in soluble whey fraction and 30-40 percent of protein is in the insoluble casein fraction, and this is compared to the 18 percent whey and 82 percent casein found in bovine milk (Schanler and McGee). Casein coagulates when reacted with stomach acid and forms clumps. When exposed to acid, casein will separate into micelles, which are bundles of individual casein particles. When exposed to a specific enzyme, rennin, or acidic conditions, the particles will clot together and form curds. Because casein is in a higher proportion in cows milk, this allows cows milk to be used to create cheese.

Whey is more beneficial for infant digestion because it is easier for infants to digest than casein. Because whey does not clot when exposed to acid, whey proteins are able to remain intact and protect the stomach (McGee). Whey also contains a lower amount of potentially dangerous amino acids such as phenylalanine, tyrosine,

and methionine—amino acids associated with diseases, such as PKU, that could inhibit an infant's cognitive development. (Schanler). Lactalbumin is the main protein in whey; however, lactoglobulin is the major one in bovine milk. Other components such as lactoferrin, secretory immunoglobulin A (IgA), and lysozyme seem to play defense roles unique to human milk (Lonnerdal 1303-1305).

Lipids consist of approximately half the calories available in breastmilk (Schanler). As lactation is prolonged, the fat and energy contents rise (Schanler). One study found that in human milk expressed by mothers lactating for more than a year, there was a significant increase in lipid content and energy compared to human milk expressed by mothers who lactated for 2-6 months had significantly less fat and energy contents (Mandel e433). Lipids organize themselves into "milk fat globule triglycerides" which allows human milk to facilitate "lipid digestion and absorption" (Schanler). These milk fat globules are digested by gastric lipase that is stimulated by bile salts. Breastmilk "is unique in its content of very long-chain fatty acids arachidonic acid and docosahexaenoic acid, derivatives of the essential fatty acids, linolenic and linoleic acids;" and, these acids "have been associated with improved cognition, growth, and vision" (Schanler). The lipid composition of women's breastmilk varies from woman to woman; however, duration of lactation, time of day, and phase of milk expression are other factors that influence the amount of lipid present (Schanler). Although the lipid content in milk does directly correlate with the energy content, the fat content ingested by the mother does not affect the lipid content in her milk. Milk expressed towards the end of lactation, or during weaning, contains higher lipid content than milk expressed at the beginning,

which follows the idea of the infant growing in size and weight requirements. The next component of milk that makes up approximately 40 percent of the calories in human milk is carbohydrates, primarily of lactose and oligosaccharides. Infants produce the enzyme lactase allowing them to digest lactose more easily and can absorb the lactose. The stimulation of intestinal lactase activity that occurs when ingesting human milk "may promote better utilization of lactose when compared to formula or no feeding" (Schanler).

One of the biggest factors when comparing cow's milk to human milk is the protein difference. The lack of whey protein in cow's milk has been long known; however, this knowledge has led to attempts to incorporate whey into cow's milk to make synthetic formulas dominated by the whey ingredient which began appearing in the 1970s (Sidnell 373). Further improvements to protein composition in formula were found by "an amino acid profile closer to that of breastmilk" (Sidnell 373). Fat content has also been a problem to match when synthesizing formula. Although a vegetable oil blend can be created that fits the fatty acid profile of human milk, there "are isomeric differences between the triglycerides in breastmilk as compared to those in the vegetable oils" (Sidnell 373). Calcium is another constituent of breastmilk that is important for infant growth. Preterm breastmilk contains "approximately 6.25 mmol/L…of calcium (Ca);" however, "preterm formula in a volume of 150 mL/kg per day provides daily intakes of approximately 5 mmol/kg…Ca" (Schanler). The calcium present in human milk is absorbed by infants much better than that present in cows' milk or formula; however, to remedy this

problem, formula companies use additional forms of calcium such as calcium carbonate, calcium chloride and calcium hydroxide as a supplement (Sidnell 376).

CHAPTER II: PHYSIOLOGY AND BIOMECHANICS OF LACTATION

Lactation, the production of milk, occurs from the mammary glands, which are more aptly named breasts. The name "mammary" specifically comes from the "Latin word for breast" (Black 7). The development of the breast does not fully occur until puberty. Although infants are born with nipples and areolae, mammary glands do not begin to grow through the growth of stroma and glandular tissue until puberty. Although breasts can change depending on pregnancy and lactation, the anatomy of the breast is primarily composed of three major components: skin, subcutaneous tissue, and breast tissue (Russo). The breast tissue is primarily composed of stroma, which consists of adipose tissue and connective tissues. The stroma is basically the entire breast excluding the skin, duct system, lactiferous sinus, and lobules. Although the composition and amount of adipose tissue varies from woman to woman, the amount of fatty tissue does not impact the milk fat composition or volume of milk (Black 10). There are multiple components of the mammary tissues, which are exocrine glands, which are ductal-tubular-alveolar structures (Black 9). The duct system in the breast helps transport the milk from the lobules, where the milk is made, to the lactiferous sinus, which is where the milk is stored right before being excreted by suckling of the nipple (Black 10-22). **Figure A** shows the anatomy of the breast and illustrates the secretory system and its parts.

The image shows how the lobules connect to lactiferous ducts and how the lactiferous ducts connect to the lactiferous sinus.

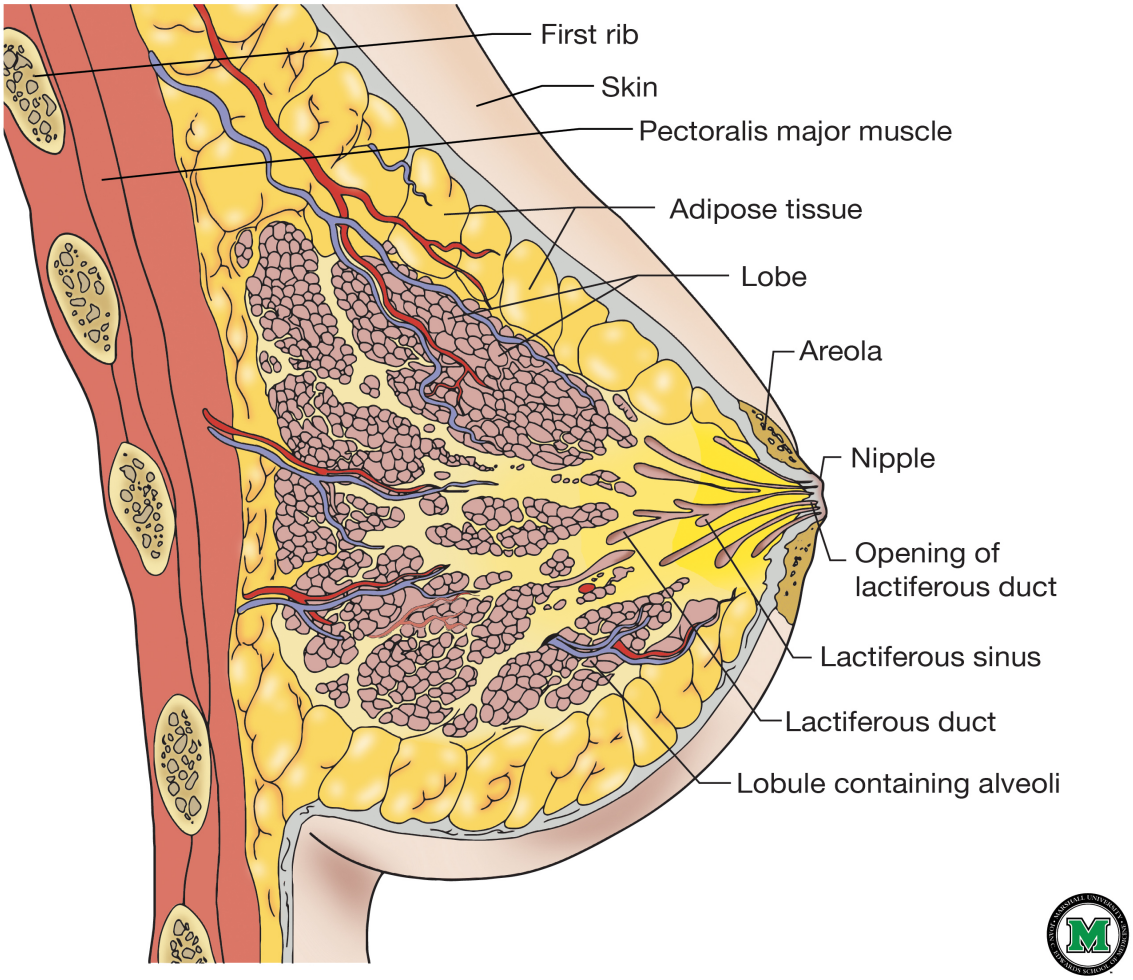

Figure A: Anatomy of the Breast. This image illustrates the basic anatomy of the female breast. The major components involved in lactation are the lobules, lactiferous duct, and the lactiferous sinus. [Image from: MUSOM Graphic Design http://musom.marshall.edu/graphicdesign/ibooks/Reproductive%20Normal.html#prettyPhoto[pp_gal]/6/]

The simplest components of the secretory system are sacklike aveoli that, along with epithelial cells and other smaller parts, make up the lobules of the breast. Alveoli are surrounded by the epithelial cells and a capillary system that helps

transport the necessary hormones to the lobules for milk production. **Figure B** shows the anatomy of the breast with a frontal view; and, it also illustrates how the alveoli are contained within the lobules. **Figure C** shows a detailed image of the lobule itself showing how the alveoli are surrounded by the epithelial cells and the space where milk will be produced eventually.

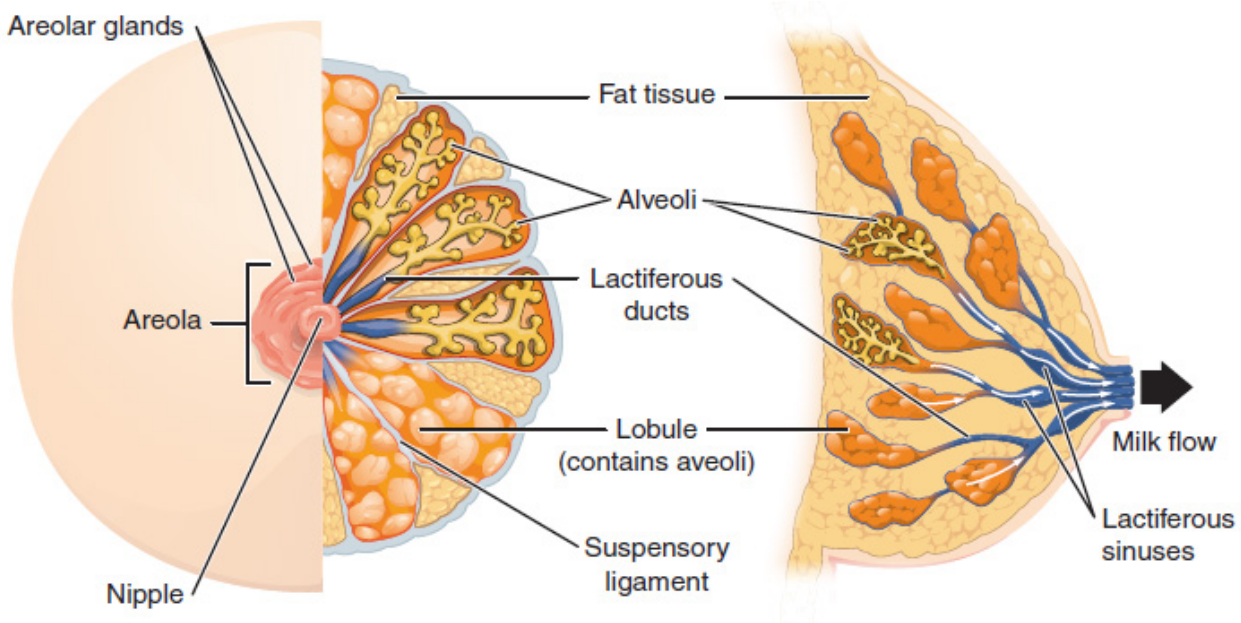

Figure B: Anatomy of the Breast from Frontal and Side View—This figure gives a frontal and side view of the breast, showing how the alveoli are contained within lobules. [Image from: *Human Anatomy and Physiology* OpenStax College Resource http://philschatz.com/anatomy-book/contents/m46392.html]

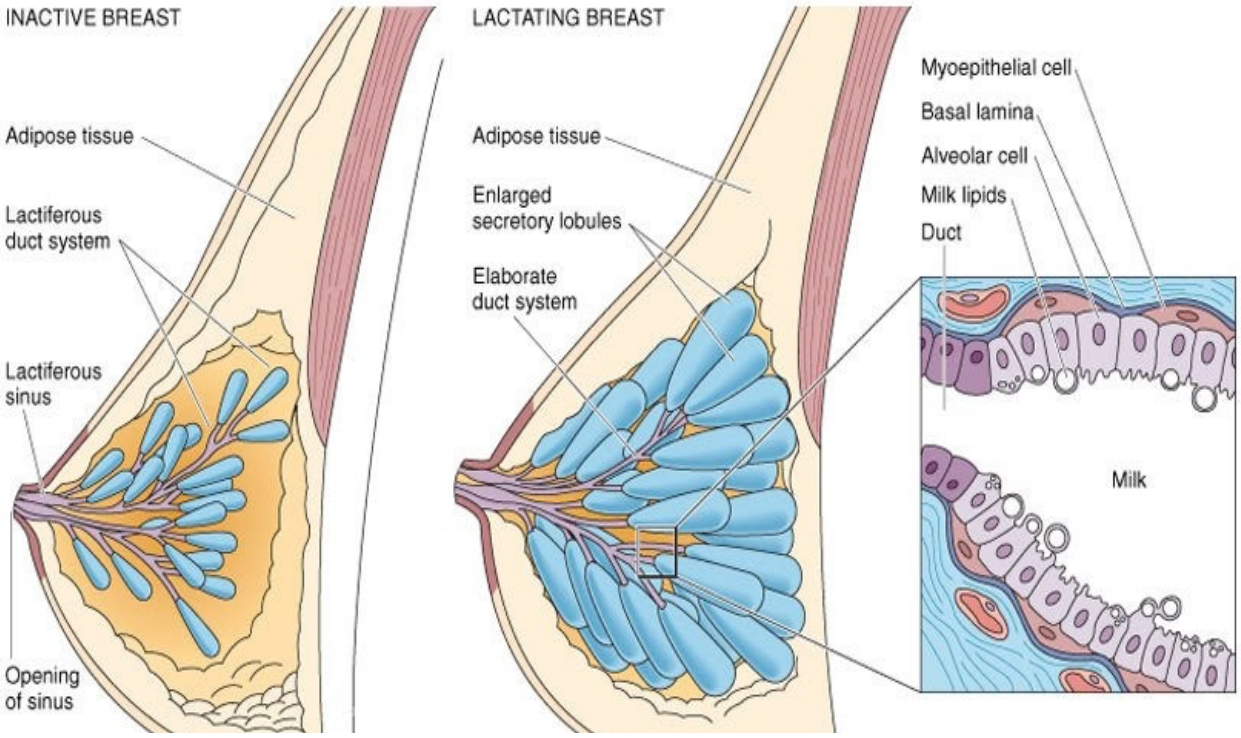

Figure C: Anatomy of the Lobule—This image illustrates the inner lining of the lobules where milk is produced and stored. The cavity of lobules is lined by epithelial and alveolar cells. [Image from: Savannah Bristol, Manchester University http://www.fastbleep.com/biology-notes/16/79/496]

At the onset of puberty, the hypothalamus matures and secretes hypothalamic gonadotropin-releasing hormone. This action stimulates the full maturation of the breast. At the start of a girl's first menstruation, an increase in progesterone stimulates the formation of alveolar buds. These buds form the type one lobules present in breasts. Lobules are composed of alveoli surrounded by epithelial cells encased by a collagen sheath (Black 9-23). Type 1 lobules that are formed during puberty are composed of 11 alveolar buds clustered around a terminal duct that is attached to a lactiferous duct. **Figure D** shows an image of the type 1 lobules. Type 1 lobules do have alveolar buds but fewer than the other types of lobules.

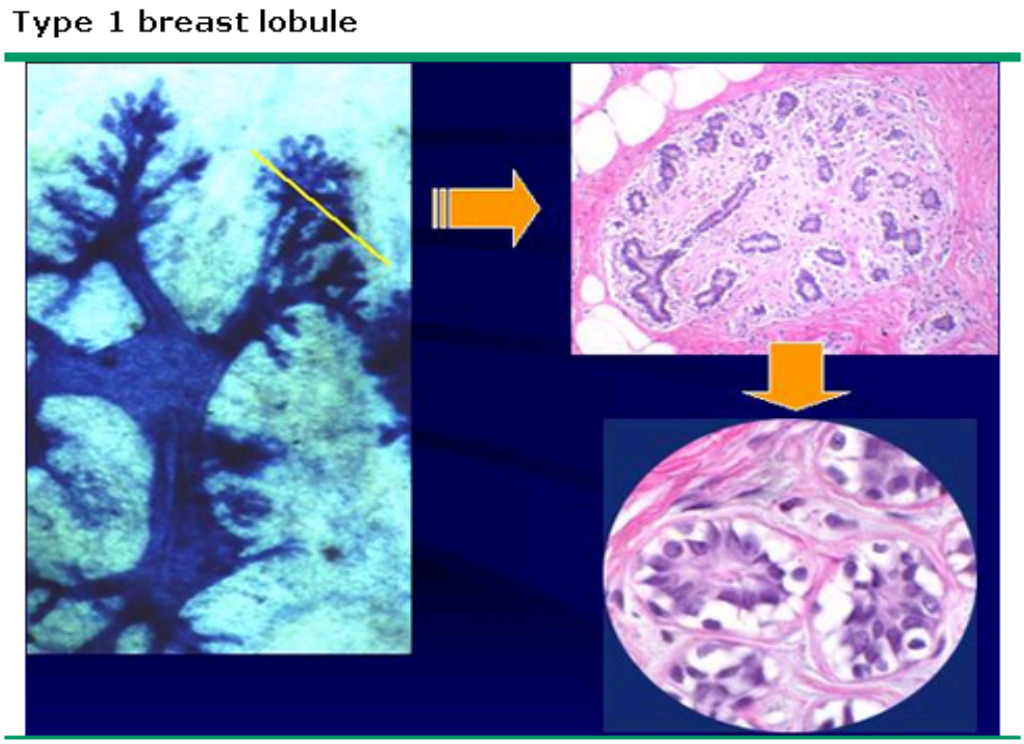

Figure D: Type 1 Lobule—Figure illustrates the branching in type 1 lobules. [Image from: Russo J, Hu Y-F, Silva IDCG, and Russo IH. Cancer risk related to mammary gland structure and development. Microscopy Research and Technique 2001; 52:204.]

Because estrogen and progesterone levels change during menstruation, after the first menstruation, type 1 lobules can be stimulated to form new alveolar buds and can become more mature structures called type 2 and type 3 lobules. Lobules begin to increase in number after puberty so an adult breast is composed of all three types of lobules. Type 2 lobules are composed of 47 alveolar buds while type 3 lobules are composed of 80 alveolar buds. **Figures E** and **F** show images of type 2

and type 3 lobules respectively. The alveolar buds take up more space within type 2 lobules than type 1 lobules, and the buds in type 3 lobules make up more space than the buds in type 2 lobules (Russo and Black).

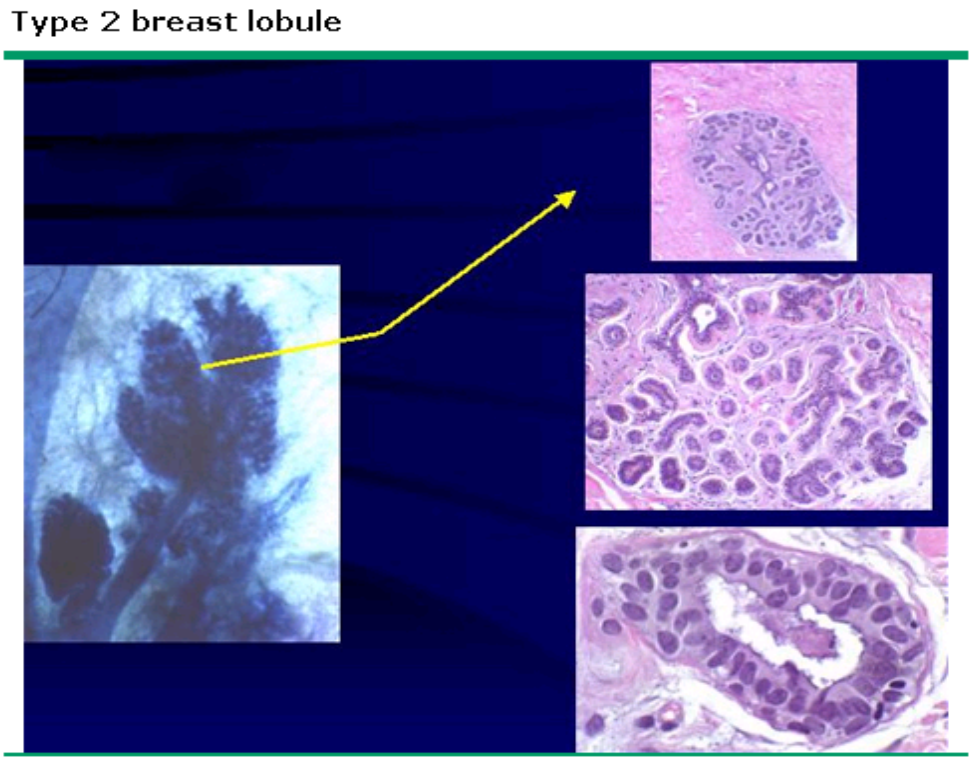

Figure E: Type 2 Lobule—Figure illustrates the expanded branching of type 2 lobules. [Image from: Russo J, Hu Y-F, Silva IDCG, and Russo IH. Cancer risk related to mammary gland structure and development. Microscopy Research and Technique 2001; 52:204.]

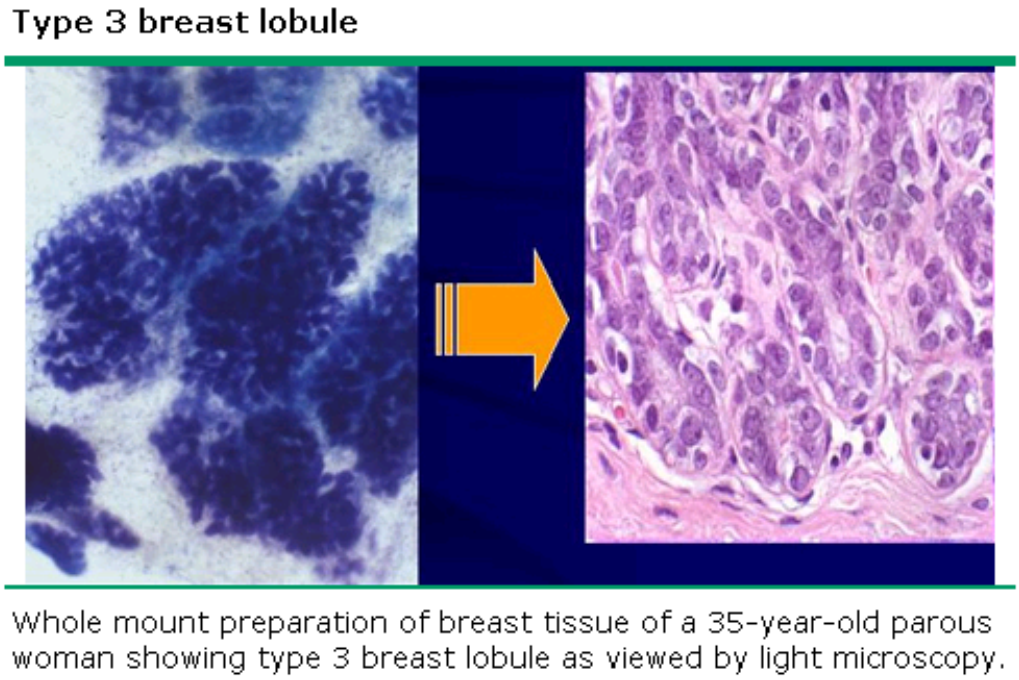

Figure F: Type 3 Lobule—Figure illustrates the large increase in branching from type 1 and type 2 lobules that is involved in type 3 lobules. [Image from: Russo J, Hu Y-F, Silva IDCG, and Russo IH. Cancer risk related to mammary gland structure and development. Microscopy Research and Technique 2001; 52:204.]

The anatomy of male breasts is almost identical to female breasts with the exception of the specialized lobules. Male breasts are still composed of fat; however, male breasts usually lack the amount of adipose tissue present in females because the main function of this tissue is to protect the secretory system. Because males lack the hormonal changes required to induce changes in lobules, they have no need for specialized lobules and cannot produce milk (Argani). **Figure G** shows a comparison of the female and male breast anatomy.

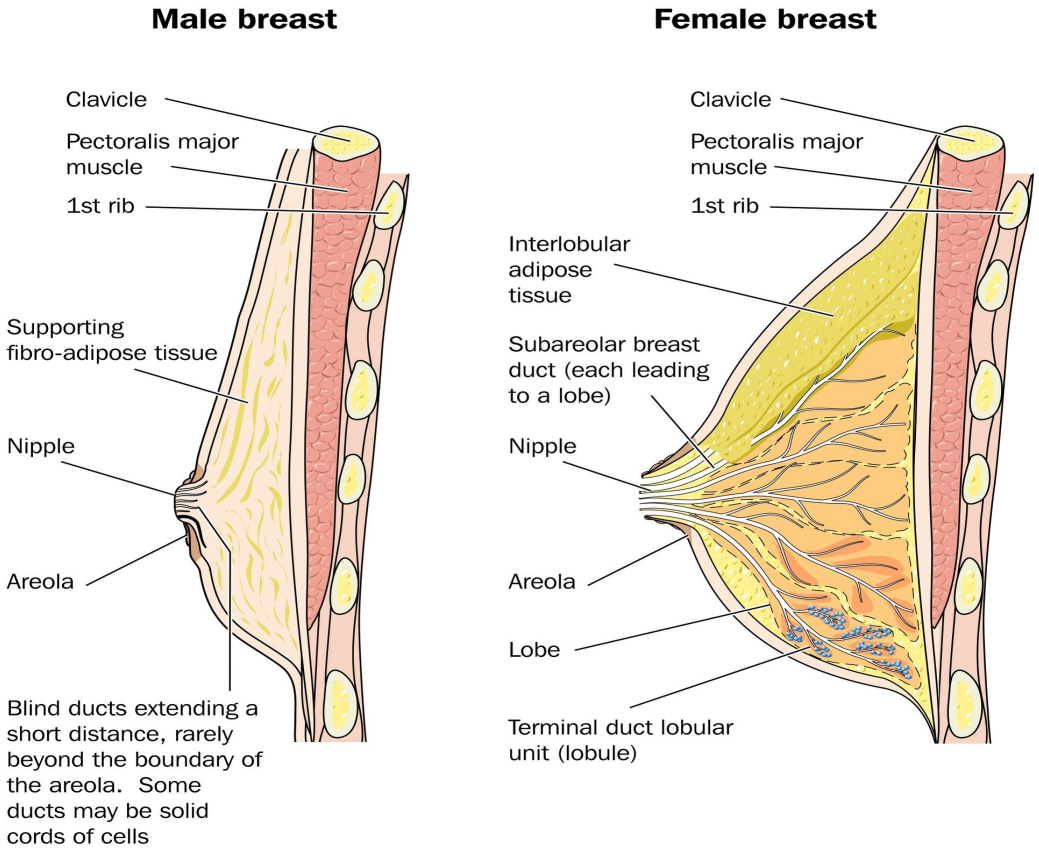

Figure G: Comparison of Male and Female Breast Anatomy—Figure represents the differences between male and female breasts. The male breast lacks the specialized lobules that allow women to produce milk. [Image from: Intimate Health Help http://intimatehealthhelp.net/wp-content/uploads/2012/07/breast-anatomy1.jpg]

There are three major processes the breast goes through while breastfeeding. The first of these processes is mammogenesis. This process involves the development of the breasts from birth to the third trimester of pregnancy and involves the preparation of the breast through growth for milk production. Up until pregnancy, the breast is composed primarily of adipose tissue and lacks complex ductal development; however, the continuous increase of estrogen, progesterone, and prolactin concentrations released during pregnancy causes the breast to

increase in water, electrolyte, and fat content increasing the overall volume of the breast (Beesley). Early pregnancy involves the transformation of type 3 lobules to type 4 lobules as the ductal tree proliferates and creates more alveolar buds (Schanler). **Figure H** illustrates the proliferation of type 4 lobules. These are the lobules that will produce actually produce milk.

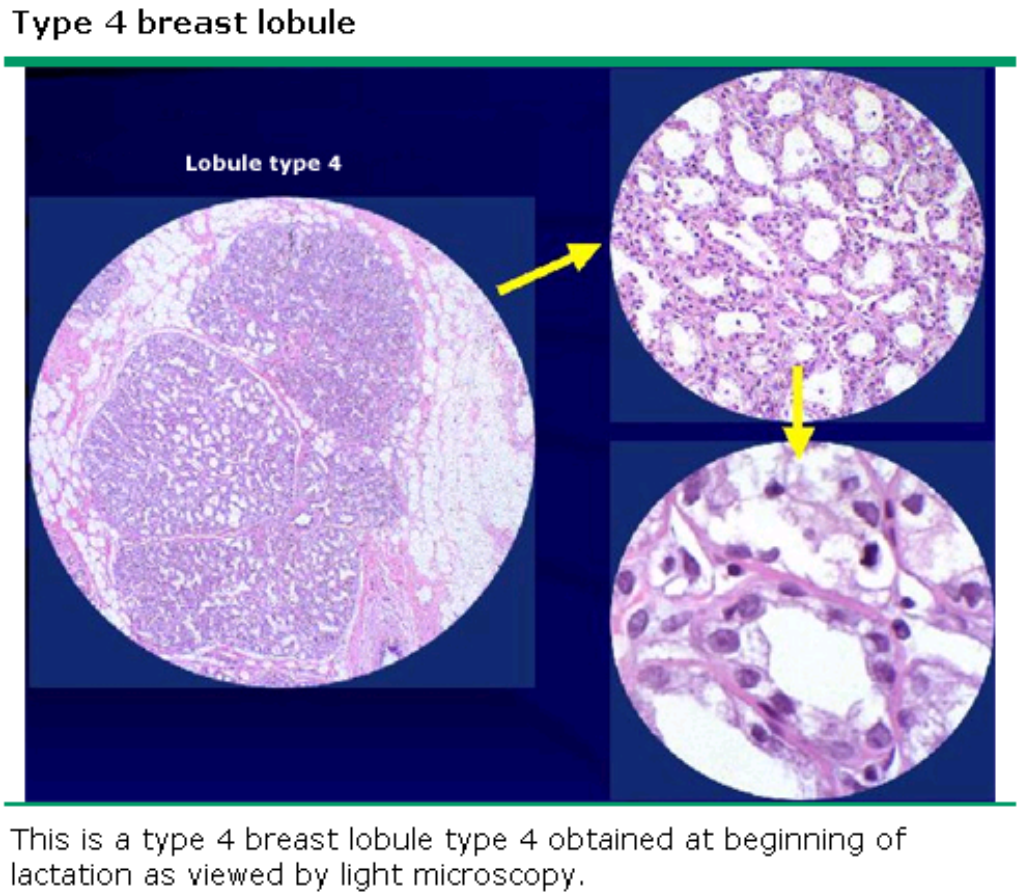

Figure H: Type 4 Lobules—Figure illustrates the changes in type 4 lobules compared to the other types of lobules. [Image from: Russo J, Hu Y-F, Silva IDCG, and Russo IH. Cancer risk related to mammary gland structure and development. Microscopy Research and Technique 2001; 52:204.]

During mid-pregnancy, the lobules continue to increase in size and number to a point where the lobules surround the duct very thickly that it is

indistinguishable. Later in pregnancy, the fully differentiated alveoli become noticeable and the lumen of the secretory units becomes swollen from "secretory material or colostrum" (Schanler). **Figure I** shows the differentiation of the lobules as pregnancy increases causing an increase and change in the lobules.

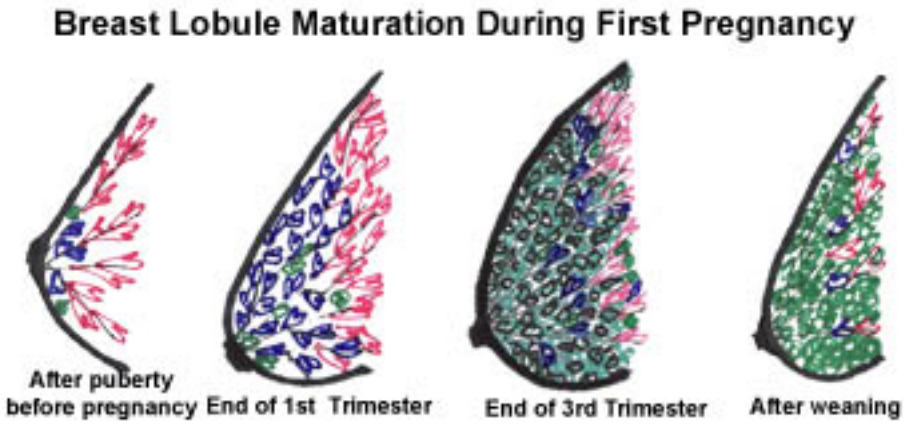

Figure I: Lobule Maturation—Figure compares the lobule changes that occur throughout pregnancy. [Image from: Breast Cancer Prevention Institute http://www.bcpinstitute.org/reproductive.htm]

In order for the breasts to makes these changes, many hormones are involved in the process of mammogenesis. Estrogen, prolactin, and progesterone are three hormones that are critical to this process. An increase in estrogen stimulates "the ductal system to proliferate and differentiate," and it promotes the "synthesis and release of prolactin" and stimulates "prolactin receptors in breast tissue" (Black 37). The release of estrogen is increased "from 20-20,000 mg per 24 hours between early and late pregnancy" (Beesley). This rise in prolactin seems necessary for estrogen to properly manifest itself for its purpose in mammogenesis. Prolactin levels rise from "20-200 ng/ml during pregnancy" (Beesley). This hormone "increases breast mass through alveoli and ductal differentiation and proliferation"

(Black 37). Progesterone affects the "size of the lobes, lobules, and alveoli," and its "secretion increases from 3-300 mg/day during pregnancy" (Black 37 and Beesley). The lack of progesterone and the presence of enough prolactin actually trigger the release of milk to begin lactation. Until an "abrupt diminution in plasma estrogen and progesterone concentration that occurs at the time of delivery," the "mammary epithelium remains a presecretory tissue" (Beesley). After the decrease in estrogen and progesterone "to less than normal follicular phase levels," the acinar epithelium undergoes a transformation from a presecretory to a secretory state (Beesley).

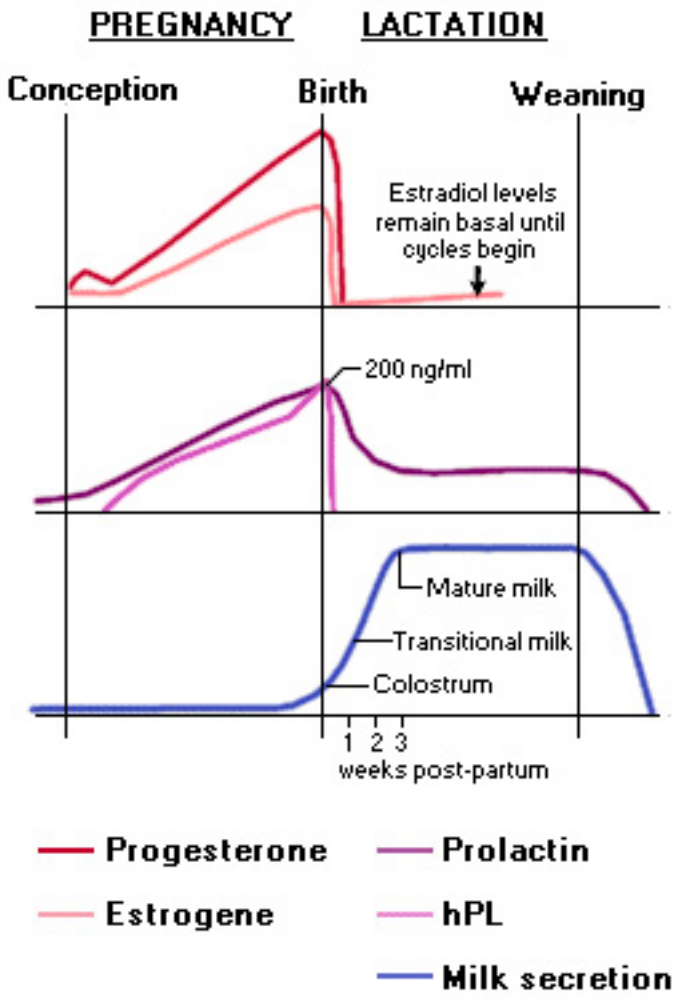

Figure J: Hormonal Changes During Mammogenesis, Lactogenesis, and Galactopoiesis—Figure illustrates the changes that occur throughout these three processes. [Image from: Physiology of Pregnancy, Parturition, and Lactation. humanphysiology.tuars.com/program/section5/5ch10/s5c10_27.htm]

Lactogenesis is the process by which milk production begins. In a human female, it requires between 2 to 5 days for the alveolar epithelium to fully mature in order to begin secreting milk components (Beesley). During labor, the parts of the breast involved in the secretory mechanism have increased in number and size such that the stroma is nearly nonexistent. Lactogenesis takes place in two stages. The first stage, referred to as secretory initiation, begins in the latter part of pregnancy (Schanler). This stage is characterized by a high concentration of progesterone from the placenta; progesterone inhibits any further differentiation of specialized components in the breast. The second stage of lactogenesis, referred to as secretory activation, involves the production of a large amount of milk after labor (Schanler). Progesterone also quickly declines during this stage (Schanler). **Figure J** shows the increase in progesterone that occurs during pregnancy and right before birth and the drastic decrease in progesterone that occurs at birth.

Milk production is inhibited in the presence of high levels of the hormone progesterone because progesterone competitively inhibits cortisol binding by binding to cortisol receptors and preventing the binding of cortisol. Since progesterone levels decrease drastically after labor, cortisol can work with prolactin to begin milk production. Prolactin is an important hormone involved in milk production because it stimulates the synthesis of messenger RNA (mRNA) by binding to receptors on the alveolar epithelium. These mRNA are important for the

creation of certain elements such as milk proteins and other required enzymes (Beesley). Although prolactin levels are increased during pregnancy due to the influence of estrogen, prolactin levels decrease after delivery; however, prolactin is necessary for lactogenesis. The body promotes prolactin secretion for the second time with the stimulation of the nipple from suckling. Going back to **Figure J**, that figure also illustrates how prolactin increases during pregnancy due to the increase in estrogen, but once estrogen decreases, prolactin also does. However, prolactin does not decrease parallel with estrogen due to the surge that occurs when the nipple is stimulated from suckling.

Without prolactin, milk will not be produced. Nipple stimulation sends signals to both the anterior pituitary gland where prolactin is released and the posterior pituitary gland where oxytocin is released. Another hormone that must be present for lactation to occur is oxytocin. Oxytocin is released after suckling stimulates fibers within the nipple to send signals to the neuronal terminals in the posterior pituitary gland to release oxytocin. This hormone causes the epithelial cells of the lobules to shrink allowing the milk to be transported to the lactiferous ducts and finally to the sinuses where it is finally removed by suckling (Beesley).

Galactopoiesis is the process by which milk production continues and is maintained. Milk production declines after labor if suckling and milk removal does not occur (Black 43). If milk is not removed on a regular basis during galactopoiesis, milk builds up in the lumen of the lobules, which leads to the expansion of the alveoli and an increase in intramammary pressure. This distension and pressure increase can inhibit blood flow through capillaries, which impedes the flow of

nutrients and hormones. Because these nutrients and stimulatory hormones are necessary for milk production, the lack of these components decreases milk production. The increase in intramammary pressure actually causes the attachments of cells and membranes to become detached which also inhibits milk production. If milk fails to be removed, the mammary gland will soon become involuted. The involution of the gland reverts the mammary gland to a non-secretory state and reduces the amount of epithelial tissue present in the breast (Schanler).

Even though proper milk removal helps maintain lactation, it is not alone enough to indefinitely upkeep lactation. Hormones such as prolactin and oxytocin are involved in galactopoiesis. During the maintenance of lactation, prolactin levels remain relatively constant and "independent of changes in milk volume" (Black 43). Towards the later part of the postpartum period, prolactin concentrations no longer respond to suckling; however, oxytocin increases throughout lactation in response to suckling (Black 43). **Figure J** also illustrates how prolactin remains constant then decreases as weaning begins to take place.

Another feedback mechanism for lactation involves a milk protein, referred to as feedback inhibitor of lactation. This protein is synthesized by the epithelial cells in the mammary glands due to the increase in intramammary pressure and is secreted into the lumen of the lobules. The feedback inhibitor of lactation (FIL) acts by blocking the secretory path that occurs between the endoplasmic reticulum and Golgi body (Wilde and Prentice). When this protein is present, it inhibits the production of milk so milk must be expressed in order to continue production;

however, it also plays a role in a reversible blockade of the down regulation of cell-surface hormone receptors. FIL is able to block the receptors to which prolactin binds, hence, blocking the maintenance of lactation (Wilde and Addey). Diet is another important aspect for lactation to continue. In order to produce an adequate amount of milk, a lactating mother must maintain increases in protein, carbohydrate, lipid, minerals, and caloric intake (Beesley). If an appropriate diet is not maintained, the body will tap into the storage of the mothers' bodies and begin to deplete it of the specific nutrient missing from the diet. If a mother's diet is lacking nutritionally, the production of milk will decrease in volume significantly (Beesley).

Milk components are secreted in the alveolar lumen by one of five pathways. These five mechanisms work together to move milk constituents from the blood, interstitial fluid, or the mammary epithelial cell (Schanler). The primary mechanism involved in secreting milk components is thought to be exocytosis. Proteins and lactose are formed within the cell and then transported by becoming entrapped in vesicles formed by the Golgi body. These intracellular vesicles then secrete these components into the alveolar lumen by fusing with the plasma membrane and releasing the components from within it to the outside. Other products including water and electrolytes also enter the intracellular vesicles when lactose concentration increases (Schanler). **Figure K** illustrates how the vesicles take in the particles then fuse with the membrane to push them outside the cell.

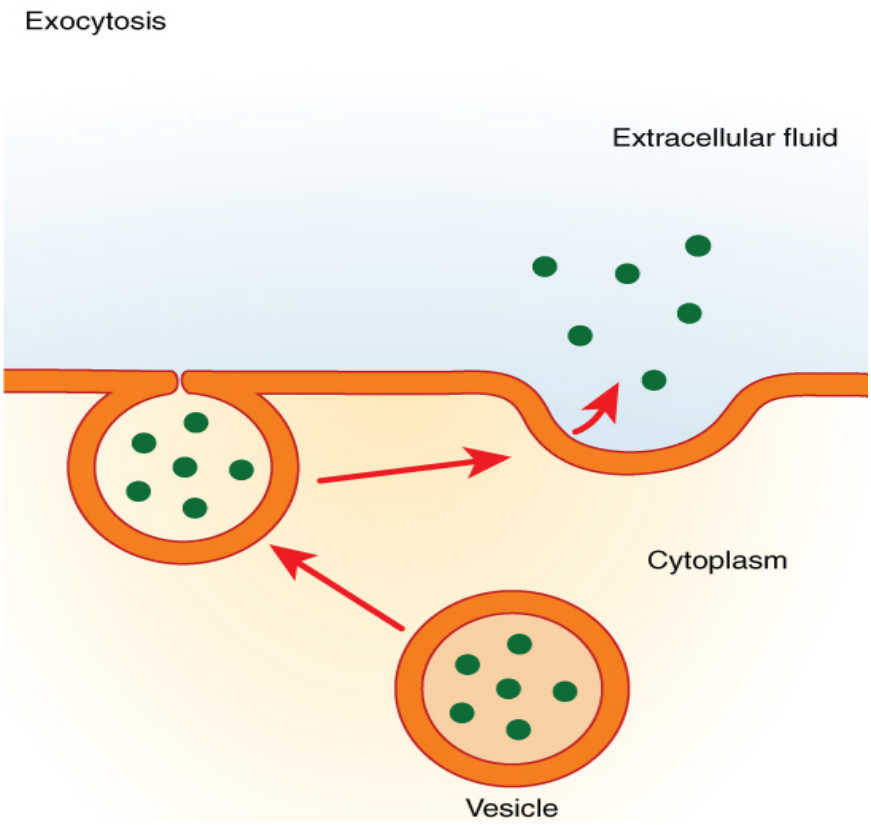

Figure K: Exocytosis of Milk Components—Figure shows the process of exocytosis, one of five pathways by which some components of milk are excreted into the lumen of lobules. [Image from: http://socratic.org/questions/what-are-common-mistakes-students-make-with-endocytosis-and-exocytosis]

Another mechanism is reverse pinocytosis. Reverse pinocytosis involves the secretion of fat molecules into the lumen. The smooth endoplasmic reticulum creates new lipid molecules that coalesce into large droplets. These droplets press against the plasma membrane eventually becoming enveloped in it on the inside and budding from it into the alveolar lumen. These milk-fat globules contain particles from the plasma membrane such as endoplasmic reticulum, ribosomes, and mitochondria which help contribute to the make up of milk. These membrane

fragments actually become the main provision of phospholipids for the infants. Reverse Pinocytosis is a form of exocytosis. However, in reverse pinocytosis, the vesicle actually buds from the plasma membrane taking part of the membrane with it; whereas, in exocytosis, the vesicle becomes part of the plasma membrane and the particle is released on its own (Schanler). **Figure J** illustrates how the milk-fat globule exits the cell and enters the lumen through the plasma membrane. Part II on **Figure L** shows how the milk-fat globule goes through a mechanism similar to budding.

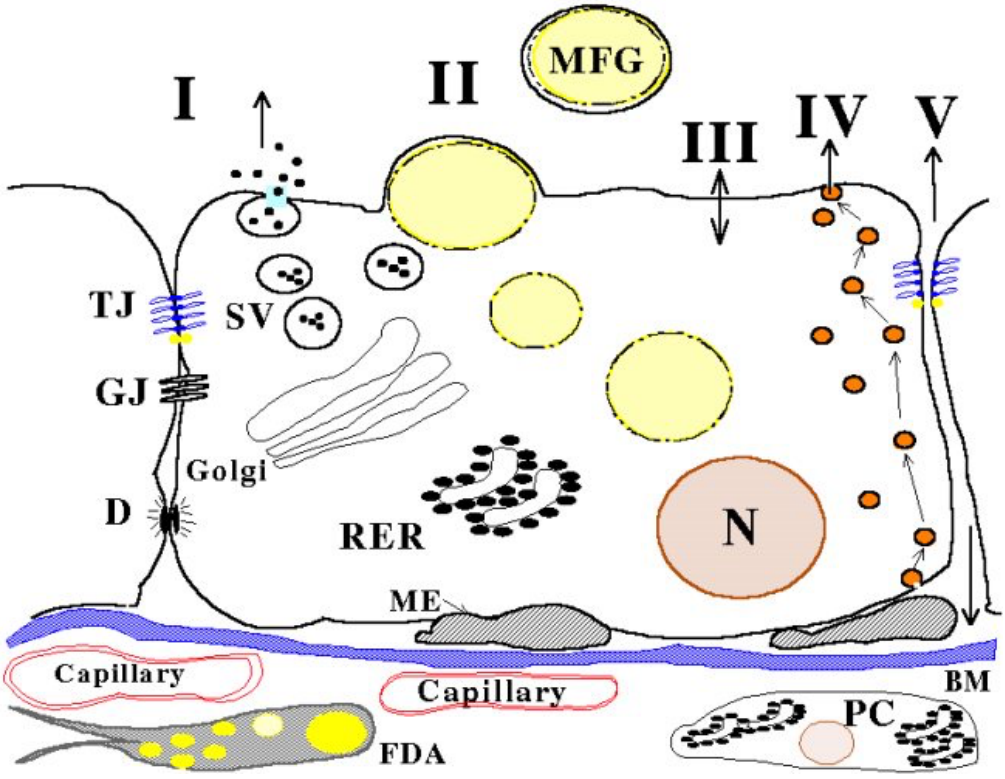

Figure L: Reverse Pinocytosis of Milk Components—Figure illustrates how reverse pinocytosis occurs following the Roman numeral II. This primarily is the exit for fat globules into the lumen. [Image from: Margaret C. Neville, Department of Physiology at UCHSC. http://mammary.nih.gov/reviews/lactation/Neville001/]

The third pathway involved in gathering the components of milk is transcytosis. Transcytosis is used to transport "intact proteins (eg. Immunoglobulins, albumin, and hormones)" into the milk (Schanler). During transcytosis, interstitial proteins bind to receptors that are located at the membrane of the alveolar cells. From there, the proteins are taken across the cell where they are released at the apical membrane (Schanler). **Figure M** illustrates how the proteins attach to the receptors on the outside of the alveolar cells and are released within the lumen.

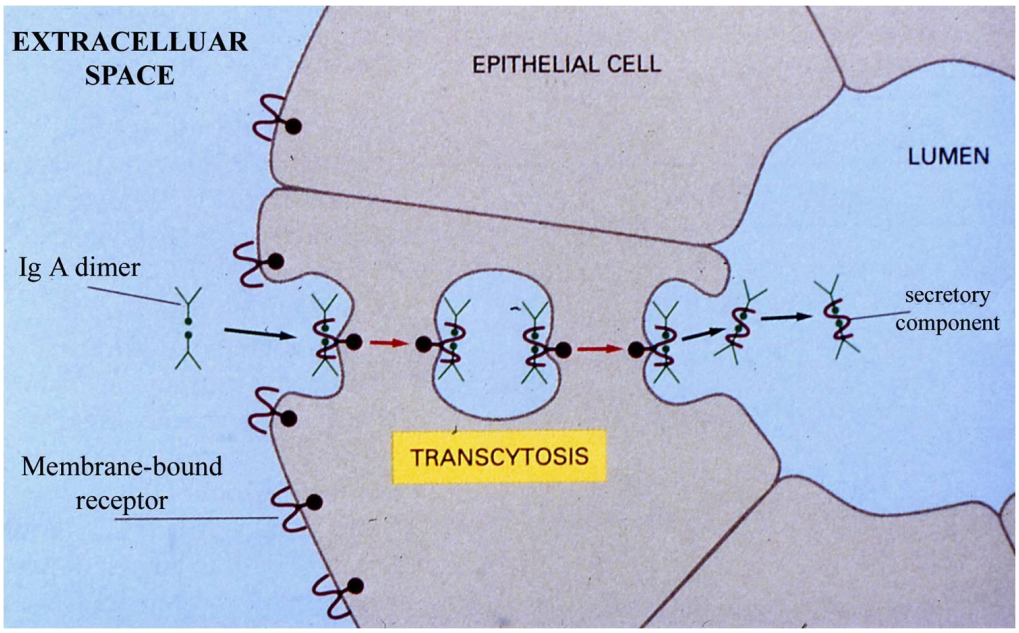

Figure M: Transcytosis of Milk Components—Figure illustrates how transcytosis works to transport proteins into the lumen of lobules. [Image from: http://www.lookfordiagnosis.com/mesh_info.php?term=Transcytosis&lang=1]

The fourth mechanism used to transport components into milk is apical transport. This mechanism is used to transport small molecules, such as sodium, potassium, chlorides, some monosaccharides, and water; however, apical transport

is not well understood and still needs to be studied more in depth (Schanler). Apical transport consists of the direct movement of particles across the apical membrane. This mechanism is possibly through facilitated diffusion transporters. Although the exact mechanism is not well understood, part I on **Figure N** illustrates in a simplified manner how this process occurs.

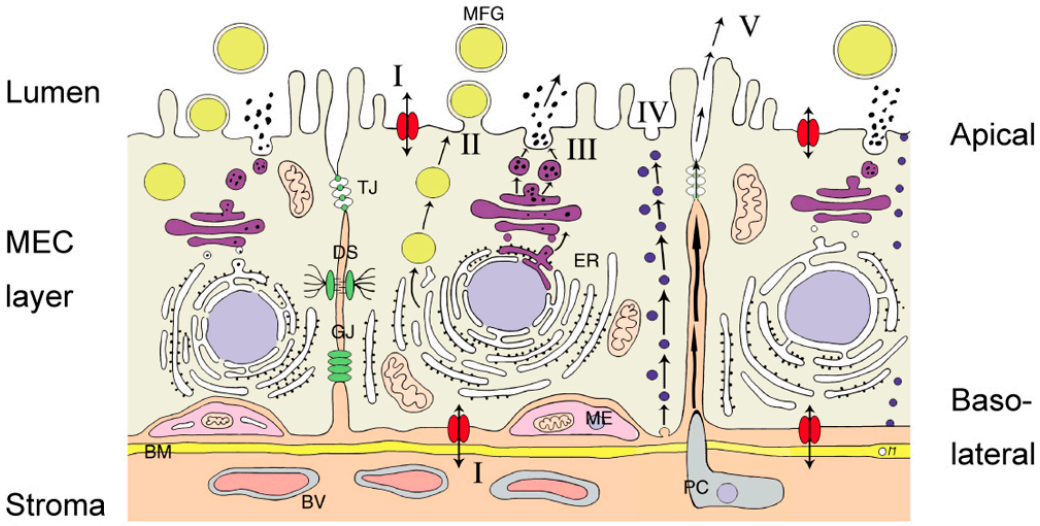

Figure N: Apical Transport of Milk Components—Figure shows apical transport following Roman numeral I. This mechanism is not well understood but may use facilitated diffusion transporters. [Image from: University of Bern, Institute of Biochemistry and Molecular Medicine. http://www.ibmm.unibe.ch/content/groups/albrecht_group/projects/transporters_and_mammary_gland_biology/index_eng.html]

The last mechanism involved in the synthesis of milk composition is paracellular movement. The tight junction, a structure of epithelial cells that binds them tightly together, prevents the passage of small molecules to pass between cells; however, immune cells can enter the milk through diapedesis. Diapedesis is a mechanism that allows movement to occur transiently across open tight junctions. The tight junction does not leave a permanent hole and closes once the paracellular

movement has occurred. When this movement occurs, interstital fluid constituents such as sodium and chloride can pass into the milk (Schanler). **Figure O** illustrates how the components between epithelial cells passively due to the opening of these tight junctions.

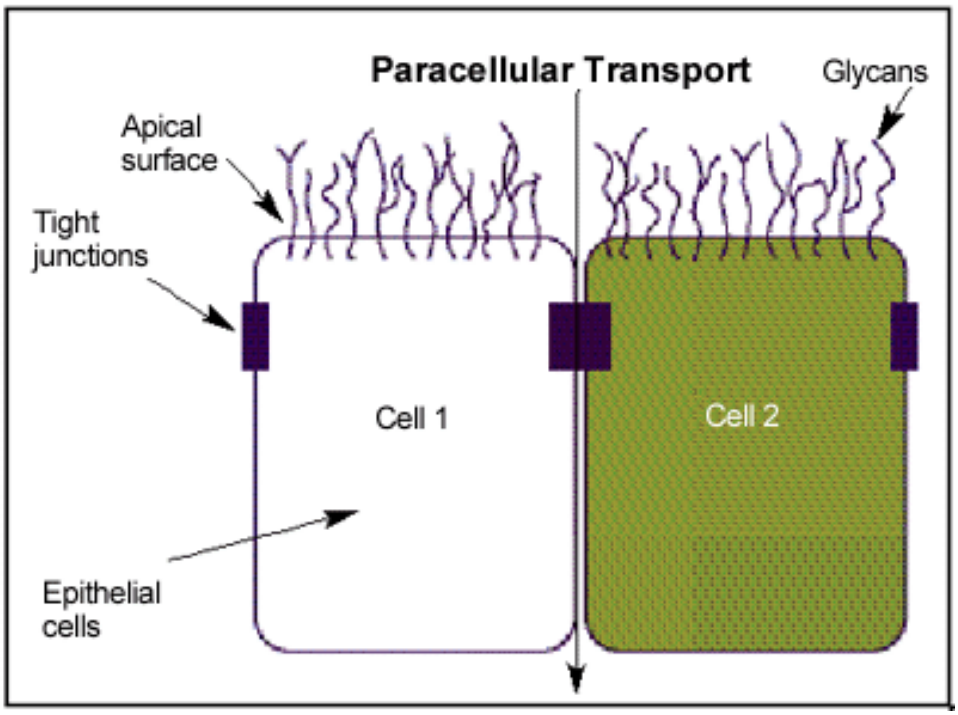

Figure O: Paracellular Transport of Milk Components—Figure illustrates how paracellular transport occurs through tight junctions connecting epithelial cells. [Image from: http://www.quazoo.com/q/Paracellular%20transport]

Lactation ceases with the involution of the mammary gland. For women who do not breastfeed, involution occurs abruptly; whereas, for women who wean gradually involution occurs at a much slower rate (Black 43). Even though prolactin secretion is maintained if only one breast is nursed, the breast not stimulated by suckling will go through involution showing how each individual breast must be stimulated in order to maintain milk production. Within 24 hours of ceasing

breastfeeding, changes of cellular organelles can already be discovered. Lysosomes from the epithelial cells begin an autophagic mechanism. These changes lead to the regression of the glandular tissue relatively immediately, while connective and adipose tissue regress a couple of months after that process (Black 42-43).

There are certain factors that can contribute to the mammary gland not producing enough milk. One reason the breast may not produce enough milk is if placental fragments are present. These fragments could cause progesterone to be produced inhibiting milk production. It is also believed that if estrogen is supplemented postpartum, it could interfere with prolactin binding and then inhibit lactogenesis. The supplement, the sex steroid deladumone, can inhibit milk production due to the combination of testosterone and estradiol valerate when given postpartum. Another supplement that can inhibit lactogenesis is bromocriptin because it inhibits prolactin secretion by acting as a dopamine agonist. (Black 43-44). Knowing which situations can cause a lack of breast milk is an important factor to take into consideration when deciding how to feed an infant and to treat a mother humanely post partum.

CHAPTER III: HEALTH CONSEQUENCES OF BREASTFEEDING

In today's society, it is indisputable that breastfeeding provides health benefits for both mother and infant. Although all major sources on health agree that breastfeeding is the best option for feeding infants, there are also certain instances when a mother should not breastfeed. In these instances, infant formula has helped save infants' lives; however, infant formula is not the only alternative to breast milk that exists or has been used in the past. Cow's and goat's milk have been both used to feed infants as well. Although these are milk, there are differences between the compositions of each type of milk that affects the health of the individual who ingests them. Milk is primarily composed of water, carbohydrates, fats, and proteins. Although these are the main constituents of all types of milk, the degree to which each one composes milk is specific to each type.

Human milk is similar in composition to cows and goats milk; however, human milk has more lactose and less protein than the other two types of milk. Milk composition in humans change depending on the stage of lactation. Human milk contains approximately 1.2 g/dL of protein. Carbohydrates, primarily lactose, make up 7.0 g/dL, and fat makes up 3.8 g/dL of human milk (Eddleman). Because breast milk varies, these numbers are approximations. Although the components of milk vary depending on various factors such as breed, age, or stage of lactation, the main component of bovine milk is water consisting of 87.0 g/dL of its makeup. The

primary carbohydrate is lactose which makes up 4.8 g/dL of cows milk. Fat and proteins constitute 4.0 g/dL and 3.4 g/dL of milk respectively. Finally, minerals form 0.8 g/dL of bovine milk (O'Mahoney). Goat milk is very similar in composition to bovine milk. Protein makes up 3.4 g/dL of goat milk. Lactose makes up the largest solid part of goat milk consisting of 4.7 g/dL of the milk, while fat composes 4.1 g/dL of goat milk (Eddleman). In Gerber Good Start Gentle—Powder formula, water makes up the largest amount of its formula. Carbohydrates constitute the next highest amount; however, carbohydrates make up more than twice the amount of fat and three times the amount of protein (Gerber). **Table 1** gives a condensed form of these numbers and compares the constituents of human milk, bovine milk, goat milk, and Gerber's Good Start Gentle—Powder formula.

Table 1: Make Up of Various Milk Types

	Protein (g/dL)	**Carbohydrates (g/dL)**	**Fat (g/dL)**
Human Milk	1.2	7.0	3.8
Bovine Milk	3.4	4.8	4.0
Goat Milk	3.4	4.7	4.1
Formula	2.2	11.6	5.1

Due to the composition of breast milk and the way it is adapted for humans, there are health benefits that come from its use to both the mother and infant. Research in the United States, Canada, Europe and other developed countries suggests that breastfeeding provides short-term and long-term benefits for a child, while also providing benefits for the mother. Although benefits for the mother are

not as numerous as for the child, the benefits are more worthwhile than people may realize. Studies vary on some aspects of these benefits with some studies showing certain results and others showing no effect. I will try to point these disparities out as information exists for both sides; however, there are still numerous benefits that are agreed upon (United States of America).

Newer studies show direct benefits for the infant that come with breastfeeding. Breast milk provides steady and improved gastrointestinal function for infants. Breast milk contains bacteria belonging to the species "Staphilococcous, Lactococcus, Enterococcus, and Lactobacillus" among others (Lara-Villoslada S96). Bacteria such as these act as probiotics, which aid in digestion. One of the most common gastrointestinal problems for infants is necrotizing gastroenteritis. This disease occurs when colonization of the infant gut is taken over by pathogenic bacteria. Because the fetus's gut is sterile, the infant obtains all of its intestinal flora from its environment. The gut needs to be colonized by certain types of bacteria like the type found in breast milk; however, if an infant does not ingest these bacteria, then other types of bacteria may colonize in the gut. Breast milk contains factors that inhibit the adherence of pathogenic bacteria and factors that promote the adherence of bifidobacteria—a nonpathogenic bacteria. Breast milk contains polymeric IgA produced by the mother's immune system specifically to fight enteric pathogens. Breast milk also provides oligosaccharides that bind to pathogenic bacteria before they have a chance to create a niche in the gut. This method of filling the intestine with good bacterial flora protects the gastrointestinal tract and

promotes its motility as well as protecting against necrotizing gastroenteritis (Claud).

Studies have also shown that breastfeeding increases the rate of gastric empyting significantly. One study found that infants who were breastfed had a mean half-emptying time of 47 minutes; however, those infants who were formula fed had a mean half-emptying time of 65 minutes. This study showed that the gastric emptying of breastfed infants is significantly faster than formula fed infants. Because breastfed infants exhibit faster gastric emptying, these infants do not have as high a risk of becoming nauseaus or ill from gastroparesis, or delayed gastric emptying (Driessche). Breastfed infants have also been shown to have increased intestinal lactase activity. One study measured lactase activity in the small intestine. Lactose can be hydrolyzed in the small intestine by lactase and the portion unhydrolyzed is excreted into the urine. Lactulose uses the same pathway as lactose; however, it cannot be hydrolyzed in the small intestine. Both sugars were administered, and the ratio of both was measured in urine and milk. The greater the ratio of urine to milk of these components, the more active lactase was. By this method, the study found that feeding infants human milk increases lactase activity as compared to feeding infants formula. Although it was shown that a breast milk diet increased lactase activity, it is still unclear if this increase in activity is due to the lactose in breast milk or some other factor (Shulman).

Lipid metabolism also play a role in antimicrobial activity. Lipid hydrolysis produces free fatty acids and monoglycerides. These components actually inactivate enveloped viruses and certain bacteria like *Giardia lamblia.* One study tested the

antimicrobial activity in infants before and after feeding. When the samples were tested before feeding, no antiviral or antibacterial activity was found; however, when the samples were tested one to three hours after feeding, the sample had a reduced amount of enveloped virus titres. The samples also contained killed *Staphylococcus epidermis* and *Eschericia coli*. The same study also found no difference in antimicrobial activity between breastfed and formula fed infants as both contain the triglycerides that produce fatty acids and monoglycerides (Isaacs). Although qualitatively the lipids obtained in formula act the same as those found in breast milk, formula does not produce the same amount of triglycerides as breast milk. Breastfed infants experience higher rates of gastric lipase due to the bile salt dependent lipase found in breast milk. This lipase turns over more triglycerides into fatty acids and monoglycerides providing breastfed infants with better antiviral and antibacterial protection (Hamosh). These components help protect infants in the short-term from certain viral and bacterial infections until their own immune system becomes stronger.

While breastfeeding, human milk also lowers the risk of developing acute illnesses. One study of four infants found that breastfed infants had a lower incidence of wheezing illnesses when breastfed for the first four months of life; however, this was not significant for the entire year just the first four months (Wright). Another longitudinal study followed up breastfed and bottle-fed infants from birth to over four years. Although the study did not find that breast-fed infants had fewer viral respiratory illnesses, the illnesses were less severe. The same study also found that in the first six months, breastfed infants had decreased morbidity

and bottle fed infants experienced more cases of pneumonia and bronchiolitis (Frank).

Breastfeeding also seems to decrease the incidence of gastroenteritis in infants who are breastfed. One study followed up 618 infants for up to two years and found that infants breastfed for at least 13 weeks had fewer cases of gastroenteritis than those infants who were bottle-fed. The infants were followed up at 14-26 weeks, 27-39 weeks, and 40-52 weeks; at all these check points, breastfed infants had significantly lower rates of gastrointestinal illness (Howie). The incidence of otitis media and urinary tract infection are reduced in breastfed infants versus formula fed infants. Looking at the first two years of life of infants, one study showed that the mean duration of otitis media, inflammation of the middle ear, was greatly reduced in breastfed infants over formula-fed infants. The study found that the incidence of diarrhea is 50% lower in breastfed infants during the first year of life, and it also found that breastfed infants had 19% fewer episodes of otitis media and 80% fewer prolonged episodes of otitis media during the first year compared to formula-fed infants (Dewey, Differences in Morbidity). A case-study comparing breastfed and formula-fed infants suggests that breastfeeding reduces the risk of contracting a urinary tract infection during the first 6 months of life (Pisacane). Some studies suggest the reason for the decrease in incidence of urinary tract infections is due to the immunological factors present in breastmilk. One study measured the urinary excretion of lactoferrin, lysozyme, secretory componenet, IgA, and secretory IgA antibodies in breastfed and formula fed infants. They found

increased levels of each of these factors except lysozyme was much greater in breastfed infants over formula fed (Goldblum).

Although there are many direct benefits associated with breastfeeding, there may also be many long-term benefits that breastfeeding leads towards. These long-term benefits include combating many chronic diseases. There have been a number of researchers who have observed a relationship between breastfeeding and obesity. A study surveyed 8186 girls, 7155 boys, and their mothers to analyze the connection between risk of overweight in adolescence and duration of breastfeeding. The study found that adolescents were 20% less likely to be overweight when they were breastfed for at least 7 months than those only breastfed for 3 months (Gillman).

Two possible mechanisms exist for this inverse relationship. Bottles expose how much formula remains, and parents may finish the bottle regardless of whether the infant is satiated or not, whereas, with breastfeeding, the infant will stop on their own. The second mechanism could be due to metabolic reasons dealing with the different types of breast milk. Infants who drink breast milk may intake less "energy per volume of breast milk" than those infants who ingest formula (Gillman). The same study showed that breastfeeding for a longer period is not associated with a decrease in mean BMI but actually a decrease in the standard deviation of BMI meaning there are simultaneous lower rates of both underweight and overweight. This shows that breastfeeding may help children remain at a healthy weight overall (Grummer-Strawn).

Breastfeeding has also been linked to a decrease in certain cancers, and has been associated with a slight reduction in childhood cancers including Hodgkin's disease. One study found a borderline significant association between childhood Hodgkin's lymphoma and breastfeeding when the researchers analyzed 1,618 Hodgkin's lymphoma cases and 8,181 control cases (Wang). Another study found an increased risk in childhood malignancies in children bottle-fed or breastfed for less than 6 months. When compared to children who were breastfed for more than 6 months, there was a greater risk of cancer for those breastfed less than that allotted time (Davis and Savitz). There is a biological plausibility as to why breastfeeding reduces some childhood cancers. Human milk exposes infants to infectious agents early on and may be important for the infant to acquire immunoregulatory capabilities. Due to the antimicrobial and anti-inflammatory activity that exists in human milk, breastfed infants experience less severe infections. Bottle-fed infants lack this immunomodulatory protection and may not be able to protect themselves against carcinogens after infancy (Davis).

Two other chronic diseases that possibly are decreased by breastfeeding are adult cardiovascular disease and allergic conditions; however, data on these two conditions are often contradictory so more research needs to be focused on these for better results. Infants who were breastfed seems to have a lower chance of developing type I diabetes mellitus than bottle-fed infants. The reason for this appears "to be due to a cell-mediated response to a specific cow's milk protein, beta-casein, which may be involved in the pathogenesis of type 1 diabetes mellitus" (Schanler).

In addition to chronic diseases, breastfeeding has been associated with the outcome of neurodevelopment of infants. A 2002 study using two methods of measuring intelligence, the Wechsler Adult Intelligence Scale (WAIS) and the Borge Priens Prove (BPP) test, and two independent samples of adults found a significant positive correlation between breastfeeding and higher cognitive abilities (Mortensen). Another study enrolled neonates in 1982 and followed up with these neonates in 2012 or 2013. The researchers found in their follow-up that a difference of nearly four points or approximately a third of a standard deviation in IQ existed between formula-fed and breastfed infants with breastfed infants having a higher score (Victora). Although other studies show similar findings, there are multiple confounding variables within all these studies so it is difficult to determine the validity of these studies. The effect of breast milk on cognitive abilities still needs to be determined from a biological standpoint in order to fully understand if breastmilk does have a positive effect (Schanler).

Improved visual function has been associated with infants who were breastfed over formula fed due to docosahexaenoic acid (DHA)—a component of phospholipids that is found in the brain, retina, and red cell membranes. DHA is a component of human milk but not cow milk. One study found that DHA concentration is much higher in "cord plasma than in maternal plasma" (Jacobson 361). Placental uptake of DHA allows a surge of synaptogenesis in the brain and promotes photoreceptor development (Jacobson). Another study measured brainstem auditory-evoked responses (BAERs) in preterm infants in order to determine whether breastfeeding played a role in brainstem maturation. The

researchers measured absolute and interwave latencies and found that the "rates of decrease of absolute latencies were greater in infants receiving human milk" showing faster brainstem maturation (Amin).

Infants who are breastfed also seem to have less behavioral problems than formula-fed infants. A study that used the Strengths and Difficulties Questionnaire (SDQ) found that the longer the duration of breastfeeding, specifically breastfeeding for four months or longer, the fewer incidents dealing with behavior problems (Heikkila 635-642). Breastfeeding is also associated with an analgesic effect for infants during painful procedures, which could be due to lactation hormones such as oxytocin and prolactin. These hormones are parts of the stress axis and have a positive affect on social behaviors; however, another possible explanation for this effect could be due to the increased levels of cortisol present in breastfed infants versus formula-fed infants (Schanler).

Although the benefits for the infant being breastfed are numerous, benefits also exist for the mother who decides to breastfeed her infant. There are both short-term and long-term benefits for the mother just as with the infants. In the short-term, lactation allows mothers to recover from childbirth faster due to the release of oxytocin and more rapid uterine involution. Breastfeeding also decreases postpartum bleeding, menstrual blood loss, and increases child spacing. One study reported that 80% of the women in the study did not resume menses until after weaning. The 20% who resumed menses before weaning lacked the temperature shift that suggests ovulation. The results suggest that breastfeeding associated with lactational amenorrhea provides a natural postpartum fertility control method

(Tommaselli). Breastfeeding also seems to have an effect on stress levels. One study looked at the influence the way feeding an infant may have on maternal blood pressure. The study looked at mothers at one month postpartum and found that breastfeeding mothers had lower systolic blood pressure than mothers who used other methods of feeding. However, the study found no significant difference in diastolic blood pressure. This lower systolic blood pressure in breastfeeding mothers could be due to the release of oxytocin, which has been shown to lower blood pressure in animal studies (Ebina).

Another study also showed that breastfeeding mothers experience a lower response to stressors. The study measured lower heart rates in mothers whom exclusively breastfed when compared to mothers who did not exclusively breastfed and non-postpartum controls by measuring the parasympathetic cardiac modulations and heart rates of breastfeeding and non-breastfeeding mothers. The researchers showed that breastfeeding shifts mothers to have a higher parasympathetic response and lower sympathetic response; however, they found the opposite results in bottle-feeding mothers (Mezzacappa). Lactation has also been shown to return mothers back to their pre-pregnancy weight faster. One study showed no difference in postpartum weight between breastfeeding and non-breastfeeding mothers from 1 to 3 months; however, there was a significant difference between weights of mothers from 3 to 6 months postpartum. This study suggests that women should breastfeed for at least 6 months if they expect breastfeeding to improve weight-loss (Dewey).

As well as the previously mentioned short-term benefits for breastfeeding, some long-term benefits for the mother are also associated with breastfeeding. Multiple case-studies have shown a relationship between breastfeeding and a reduced chance of contracting breast cancer. One case-study suggests that an inverse relationship exists between breastfeeding and breast cancer risk; however, this relationship seems more consistent among premenopausal women, mothers who breastfed more than 3 children or who breastfed their first child for a longer period of time (Zheng). Another study also found the same inverse relationship between breast cancer risk and breastfeeding; however, this study was restricted to mothers with a "first-degree family history of breast cancer" (Stuebe 1369).

There have been several mechanisms proposed to show the inverse relationship between breastfeeding and the incidence of breast cancer. One mechanism proposes that this lower risk has to do with ovulatory suppression that occurs during prolonged breastfeeding. During breastfeeding, the mother is not exposed to the cyclic hormones of the menstruation. A second mechanism proposes that the physical changes the breast experiences during milk production are responsible for this inverse relationship. This is based off the changing of lobules into specialized lobules. Breast cancer is formed in type 1 and type 2 lobules most often which are the less frequent type found in women who have had children. Type 3 lobules are cancer resistant when they are the result of the regression of type 4 lobules, used for milk production, back to type 3 lobules (Zheng). A third mechanism proposes that breastfeeding helps excrete organochlorides as milk is a major exit for

these chemicals. Organochlorines are lipophylic products that can build up in body fat and can become carcinogenic (Helewa).

The risk of contracting ovarian cancer is also though to be reduced in women who breastfeed. An analysis of various studies found a relationship between breastfeeding and reduced chance of ovarian cancer; however, more research needs to be done in this area as a mechanism for how this happens has not been found (Ip s17-s18). Some support exists for the claim that breastfeeding decreases the risk of osteoporosis; however, there are also studies that refute this claim. In one study, the researchers found that women who breastfed had greater bone mineral density during young adulthood (Chantry). However, another study did not replicate those findings and found no significant findings for those who breastfed and osteoporosis (Grainge). Several studies have also found a relationship between breastfeeding and a decrease risk of cardiovascular disease. A study performed by the Women and Infants Study of Healthy Hearts found fewer vascular characteristics associated with a higher risk of cardiovascular disease in women who breastfed for at least 3 months compared to mothers who bottle-fed showing that mothers who bottle-fed experience a greater risk of cardiovascular disease (McClure 46.e5).However, there are other reasons this may be the case. Mothers who often have to bottle-feed their children also often have to work which could enhance these vascular characteristics due to stress. Although breastfeeding provides many benefits for the mother and infant, there are certain circumstances when mothers should not breastfeed; in these instances, formula has allowed infants a greater chance at surviving. Several contraindications for breastfeeding exist. One condition in which breastfeeding is

contraindicated is classic galactosemia. Classic galactosemia is a metabolic disorder "which can result in life-threatening complications including feeding problems, failure to thrive, hepatocellular damage, bleeding, and E. coli sepsis in untreated infants;" however, complications can be limited if the infant is put on a lactose-restricted diet within the first two weeks of life (Berry).

Breastfeeding should not be used in "mothers who have active untreated tuberculosis disease or are human T-cell lymphotropic virus type I- or II-positive; mothers who are receiving diagnostic or therapeutic radioactive isotopes or have had exposure to radioactive materials (for as long as there is radioactivity in the milk); mothers who are receiving antimetabolites or chemotherapeutic agents or a small number of other medications until they clear the milk; mothers who are using drugs of abuse ('street drugs'); and mothers who have herpes simplex lesions on breasts (infant may feed from other breast if clear of lesions)" (Breastfeeding and the Use of Human Milk 497).

Mothers should not breastfeed if they are infected with the human immunodeficiency virus (HIV)—both HIV-1 and HIV-2 are included in this assessment. The use of bottle-feeding in this instance is to prevent the possibility of transmitting HIV to the infant from the mother. Certain lifestyle choices need to be taken into account when choosing to breastfeed or bottle-feed. Mothers who do not make enough milk, are taking certain medications or have infants who are born at a very low weight need to consult feeding decisions with their physician. Although smoking tobacco is not contraindicative to breastfeeding, it can potentially cause health problems. Medical professionals should advise parents to advise smoking in

the house and advise mothers to wean themselves off tobacco as quickly as they can. Alcohol is another substance that should not be consumed by breastfeeding mothers because alcohol becomes concentrated in breast milk and inhibits the synthesis of milk; however, a small alcoholic beverage can be consumed rarely as long as a mother avoids breastfeeding for at least two hours before breastfeeding (Breastfeeding and the Use of Human Milk 497).

There are certain conditions that are not contraindications to breastfeeding that many women may think are. Breastfeeding can still healthily be administered to "infants born to mothers who are hepatitis B surface antigen-positive, mothers who are infected with hepatitis C virus…, mothers who are febrile" (unless cause is from a contraindication to breastfeeding), "mothers who have been exposed to low-level environmental chemical agents, and mothers who are seropositive carriers of cytomegalovirus (CMV)" (Breastfeeding and the Use of Human Milk 497). Parents need to be aware of instances when a mother should breastfeed and when a mother should not breastfeed. Although formula has allowed many infants to live, mothers need to understand the health benefits that come from breastfeeding before choosing to bottle-feed unless necessary.

CHAPTER IV: SHIFT OF NURTURANCE FROM WET NURSING TO FORMULA AND THE SOCIAL PRACTICES THAT HAVE INLUENCED THIS SHIFT

Motherhood has always been a concept shaped by culture just as it is defined by political, legal, economic, social, intellectual, emotional, and medical paradigms (Golden 5). Mothering does not have a universal cultural definition and does not always follow a biological definition; instead, mothering is a fluid concept that changes with social class, race, age, and marital status (Golden 5). Society has been constantly shifting their condemnation from the eighteenth century "'woman of leisure' who hired a wet nurse" to the "nineteenth century outcry against women who permitted 'moral lepers' into their nurseries" to eventually the "twentieth century celebration of 'scientific mothers'" (Golden 5).

Wet nursing began as an alternative for a birth mother breastfeeding her own child. This was a method by which a community could save a child whose mother could not provide (Baumslaug 39). Wet nurses provided municipal and church authorities the ability to take care of infants who had been abandoned or orphaned and allowed mothers who could not provide milk due to health problems the means by which their child could still receive natural nutrients (Golden 29). Although wet nursing started as an adaptive tool to save orphaned infants, the prosperous people of society shifted wet nursing into a profession that allowed wealthy mothers' an excuse to not nurse their children (Baumslag 39).

Wet nursing was originally considered a respectable profession, and women bid to be the wet nurse for infants of noble houses. Noble women were expected to abstain from any laborious work in order to showcase her and her family's high social status. These relationships were built upon the idea of class structure and power differences. Women of high class were meant to have as many children as possible, and women of the eighteenth century were aware of the contraceptive effect breastfeeding had, further influencing women of high status to rely on others to feed their children. Wet nursing was very popular in the twelfth century and continued up to the eighteenth century. Because wet nursing became a lucrative job in the twelfth century, women with a lower class status began to abandon their own infants to obtain a job as a wet nurse; however, this became such a large issue that some governments, including France, stipulated that a woman's own child must be at least a certain age before the mother looked for work as a wet nurse (Palmer 180-184).

Although many women were against breastfeeding because of the contraceptive effect, they also felt that breastfeeding would destroy their health and figures and would detract from their own social obligations, which were viewed with the upmost importance (Baumslag 45). The lack of scientific knowledge during this period is shown through the lack of understanding of the benefits that breastfeeding provided to both the mother and the child. Because the wealthy families endorsed the use of wet nurses, between the twelfth and eighteenth century, wet nursing was seen as the norm for families (Palmer 183).

By the eighteenth century, science had advanced further leading doctors to understand more about the chemistry and mechanisms behind breastfeeding. The nineteenth century saw a rise in physicians who understood the benefits of a mother breastfeeding her own child. During previous centuries, wives were subjective to their husbands in every manner; however, by the nineteenth century, the status of women had begun to change and adapt to give women more power in the home (Palmer 187). Physicians began to address infant health directly to the mothers, and the American culture of the nineteenth century saw women begin to gain power in decision-making when it came to family and the domestic arena. Before this time, women still had to consult their husbands about all subjects—domestic and child related. Motherhood became a way for women to find their identity and allowed women to finally have power even if it was power within a limited realm (Apple 5).

Over the course of the nineteenth century, "economic transformations resulted in new conceptualizations of home and work" (Golden 40). The ideal situation was that women stayed within the house and their private domain but not in the labor force. As the working class women were becoming more culturally isolated, wet nurses began to be seen as dangerous and not fit to serve within homes (Golden 40). Although mothers were given new importance during this era, which led them to be more involved with their children than the wealthy mothers of the past, this rise of motherhood led to the loss of many jobs for wet nurses. Although wet nurses were still necessary to nourish orphaned infants and to help mothers who could not breastfeed due to difficulties or inconveniences, wet nursing as a

profession declined in prestige during the nineteenth century (Palmer 188). It was during the middle part of the nineteenth century that the home began to be seen as the workplace for a mother. Because of this perception of the home, opening one's home to an unknown wet nurse was perceived as a risk to the family and especially the child as the wet nurse could impart immoral tendencies to the child (Golden 39). Because wet nurses were usually poor, the perceived risk of hiring one was intensified because the "poor were seen as medically threatening and morally lax" (Golden 39). This perception put pressure on mothers to keep their houses free from wet nurses who could potentially be dangerous to the upbringing of their children.

Physicians played a large role in the decline of wet nurses. Not only were physicians promoting breastfeeding as the healthiest and best option to mothers, but they also dissuaded mothers from using wet nurses due to the perception of imperfect milk at that time (Apple 7). Because of the concern for the high mortality rates of infants during this century, breastfeeding was the way that most infants received their nourishment. Scientific interest in the infant mortality rate led to the conclusion that poor nutrition, which was caused by either a lack of breastmilk or inadequate artificial food, led to the higher death rate (Apple 4). Although physicians concluded that breast milk was the best nourishment for infants, they also conceded that the ideal breast milk was rare and to find a wet nurse who was perfect in a physical, psychological, and moral sense was difficult if not nearly unfeasible (Apple 7). During this era, breastfeeding was connected to morality, and those who breastfed infants were thought to somehow pass on their own

immorality. Women were persuaded to breastfeed their own children because wet nurses' morality may not be up to the family's standard. This belief also came from the idea that no one is perfect and so rarely was a women's breastmilk perfect, especially not a woman who was usually from a lower class like wet nurses. Because of this belief in the rarity of ideal breast milk, the nineteenth century saw the beginning of interest in artificial infant feeding.

The nineteenth century was not the first time that artificial feeding was used. People in both the late fifteenth and sixteenth century sought to feed children through alternative means such as cows and goats milk which were administered to the infants through various sucking instruments (Stuart-Macadam 106). The seventeenth and eighteenth centuries saw a decrease in using alternative milks; however, by the nineteenth century under the influence of the Industrial Revolution, infant feeding practices began to shift drastically from wet nursing or breastfeeding to artificial feeding. The Industrial Revolution introduced new technologies and more interest in scientific study, including the study of artificial feeding methods for infants. Physicians of the nineteenth century began to promote artificial feeding as the best alternative to breastfeeding and in some instances, as better than breastfeeding altogether. Although physicians realized that breastfeeding was the best option, pediatrics was not well defined as a medical specialty, and the consequences of poor breast milk were considered detrimental to the infant. Because of the unknown nature of these problems, doctors felt that bottle-feeding was better because the problems with formula could be studied and understood

more easily. Physicians believed that they could better control and monitor the technology associated with bottle-feeding (Apple 7).

Research about breastfeeding substitutes increased dramatically during this period due to the strategy of artificial infant feeding businesses. The infant food industry began to produce what they advertised as the best alternative to breast milk, and they promoted the versatility of their formula products (Apple 11). Another explanation for the rise of artificial infant feeding was that the increase in wealth of the rising middle and ruling classes was causing women's roles to be cemented as consumers (Palmer 214). The wealthy women of the late nineteenth century were persuaded by physicians and family members that they were delicate creatures who were too delicate to breastfeed their infants (Palmer 215). Although doctors still acknowledged that breastmilk was the ideal method of feeding, they did not think that "upper-class women were able to breastfeed" due to their frailty, and physicians "despised lower-class wet nurses" (Palmer 215). This argument was centered on control. The belief of the day was that women were not to be trusted with the care and feeding of their children due to their delicate nature. Although women still ran the household in most respects, they were believed to be too frail to directly nurture their infants. The artificial infant feeding movement was also fueled by physicians who were still disapproving of wet nursing but needed an alternate method to feed infants (Apple 57). Even today, the relationship between the medical field and artificial feeding industry has continued to undermine "breastfeeding wherever it has been established" (Palmer 222). In the last 60 years, particularly after World War II and with the formation of the large-scale infant formula industry,

formula feeding became the norm, and breastfeeding was decreased "by half between 1946 and 1956" (United States 1). This fall continued so that "by 1967, only 25 percent of American infants were being breastfed at the time of hospital discharge" (United States 1).

Although the artificial feeding industry has influenced more women to not breastfeed, it has also allowed "infants to survive without breast milk for the first time in human history;" however, the implications of the health of infants fed in this manner are just now beginning to be understood (Stuart-Macadam 27). Although there are many factors that led to a decrease in breastfeeding, "increased formula feeding parallels a rapid increase in the number of working women" (United States 1). Up until the twentieth century, women were supposed to remain in their own domain at home. Before the Industrial Revolution, mothers breastfed until they were prepared to produce another child, providing women with natural birth control (Baumslag 189). Their business was to take care of the home, especially in the wealthy and middle class families. By the twentieth century, the idea that the home was a woman's only domain began to change as more women entered into the workforce and shifted the views of where women belonged.

In previous centuries, the "length of time breastfeeding" corresponded "to the spacing between children;" however, "the length of breastfeeding now corresponds largely with the spacing between the birth and the return to employment" (Baumslag 189). During the early twentieth century, women in the work force increased, and women who tried to merge breastfeeding and the work force found barriers that prevented them from continuing to breastfeed after they

resumed employment. Differences between the areas women lived and worked also affected their ability to breastfeed while working. Because major differences in practice existed between women who lived in rural areas and those who lived in urban areas, women in rural areas were more likely to breastfeed for a longer time as they were more likely to have their family to help them and less likely to work on a rigorous schedule. However, women in urban areas were more likely to use alternative means to breastfeed their child because these women often lived in manufacturing towns and had strict work schedules they had to follow (Stuart-Macadam 107).

Other factors that influenced the decision to breastfeed were "the type of work in which a woman was employed, how close she lived to her place of work, whether crèche was available, whether she had relatives nearby who could help with childcare, and whether there was a tradition of either sending infants to be nursed in the country or of employing caretakers during the day" (Stuart-Macadam 107). Although the idealized, abstract image of woman as mother was consistent throughout this period, the "various changes in American society affected the substance of the maternal role" so that by the late nineteenth century and twentieth century an increasing amount of women were working (Apple 98). The large increase in the amount of women in the work force "since World War II is one of the most significant social and economic trends in modern U.S. history" (United States 1).

According to the United States Department of Agriculture in their article, "The Economic Benefits of Breastfeeding: A Review and Analysis," in the United

States, “the number of women in the labor force increased by 178 percent between 1950 and 1985” (1). As of 1995, forty-five percent of the work force is made up of women, “eighty percent of women in the labor force are of childbearing age, and ninety-three percent of these women will become pregnant during their working lives” (Baumslag 191). There is a perception that work and breastfeeding are mutually exclusive concepts that cannot work in harmony; however, this faulty mentality must be debunked if women are to work and provide for their children in the healthiest way possible. With women now having to compete in the labor force in order to alleviate financial challenges, childrearing often has to take a backseat; however, mothers are an essential component to increasing the health of the child and family (Baumslag 192-193).

Early in the twentieth century, countries throughout the world were discussing maternity leave and lactation breaks in order to better protect newborn children and help lower the risk of death (Baumslag 194). The leaders of nations and physicians understood the important health benefits of breastfeeding, but they also understood that more women needed to work for financial reasons and that there was an increase in single mother families. It was not until 1919 that the “International Labour Organization resolved that a woman should be allowed paid maternity leave for six weeks following a birth and should be allowed to nurse her child twice a day for half an hour during working hours” (Baumslag 194). Then in 1952, governments began providing paid nursing breaks throughout the working day, which further increased these maternity protections.

Although almost every country today has some form of paid maternity leave, the United States still does not mandate paid maternity leave; however, this has not always been the case. The United States, during special circumstances such as World War I and World War II, persuaded women to join "the work force with the offer of crèches, maternity entitlements, lactation breaks,…and child-care centers," but as soon as the men returned from war, women were sent back to take care of their homes and children (Baumslag 199). In 2010, President Barack Obama signed the Affordable Care Act (ACA) which requires employers to allow mothers to have lactation breaks to express their milk and a place other than the bathroom in which to take these breaks; however, the employer is not required to provide any compensation due to pregnancy or breastfeeding needs. The ACA also does not intrinsically protect a mother's job after she returns to work as an employer could still fire her after her return (Breastfeeding State Laws).

Since women have entered the workplace, there has been a call for equality—equal pay, equal hours, equal treatment—however, the call has not taken into account the differences between men and women. Motherhood requires needs in the workplace that do not apply to men. The focus in the United States on women's equality has not always been pointed in the correct direction. The main drive behind U.S. feminism has been "proving that women could perform equally in a man's world;" however, this picture is inaccurate because it assumes that women must act like men in the working force (Baumslag 199). Although fathers have no doubt taken a larger role when it comes to raising their children, even more so since the mid-twentieth century, they do not have to deal with the matter of lactation as

this affects mothers even if they decide not to breastfeed. Instead, feminists should assume "that a man's and a woman's career patterns are inherently different" because maternity only directly affects women (Baumslag 199). The focus of obtaining rights for women in the work force should not be on obtaining the exact same stipulations as men but should focus on obtaining rights that are tailored to the needs of women, which includes motherhood.

Women in the work force have historically struggled to acquire rights specific to motherhood. Activists used the Civil Rights Act of 1964 to argue for fair employment rights; however, the courts ruled that pregnancy was a separate matter from these civil rights and was not protected from discrimination. In 1978, Congress passed the Pregnancy Discrimination Act (PDA) which instructed employers to treat pregnancy and any related problems as a disability. Although the PDA made it illegal to discriminate due to pregnancy, it did not help "establish any parental entitlements or to foster the combination of working and parenting" (Baumslag 199). The PDA made it illegal for employers to fire women for being pregnant, but it did not help mothers whose parental responsibilities sometimes interfered with working ones.

Finally, in 1993, the United States passed the Family and Medical Leave Act becoming the official policy on family leave in the U.S. Even with this act, women still do not maintain many rights involving motherhood and working. Essentially, this policy states that women cannot be fired due to pregnancy and must be allowed to return to their position after twelve weeks of unpaid maternity leave. Although the employer does not have to pay wages to the woman, the employer must cover

health-care benefits to the employee (Baumslag 201). Problems with this policy reveal the problems with the type of feminism that has become popular today. Women should be fighting for rights that pertain to womanhood and motherhood; they should not be focused on obtaining the exact same rights as men. These differences in parenthood between men and women induce the need for women to have individualized rights separate from men (Palmer 200-205).

Not only do many women lack the place and time to breastfeed while working, many women also avoid breastfeeding because of the uncomfortable nature that the American culture has placed on it. The negative perception of breastfeeding in public, specifically the exposure of breasts, has caused many women to cease breastfeeding (Palmer 202). Many women now feel "ashamed and embarrassed about the need to expose their breasts in order to nourish their child" so women who are unable to "stay home with the infant at all times" or unable "to seek privacy every time the child is hungry" may be influenced to choose bottle-feeding as the preferred method of nourishment (Palmer 202-203).

Although "forty-six states have laws that specifically allow women to breastfeed in any public or private location," these laws do not prevent owners of businesses from asking women to leave or throwing them out if they do breastfeed in public (Breastfeeding State Laws). For example, in October 2014, a mother breastfeeding her infant at a public OB/GYN and Pediatric clinic in Texas was asked to leave. Texas is one of the forty-six states that has laws protecting the rights of mothers to breastfeed in public; however, these laws did not stop the clinic from asking the mother to leave (Walker). Not only did the clinic disobey the law, the

clinic also participated in discouraging breastfeeding, which should never be the aim of any physician. According to a statistic from *The Journal of the American Dietetic Association* that was produced in *Babytalk* magazine, "57 percent of [Americans] polled are opposed to breastfeeding in public" (Zablit). Although the government may see the importance of promoting breastfeeding, the public has yet to see the importance of breastfeeding, and the way the public perceives breastfeeding affects how mothers perceive it. If a mother perceives breastfeeding as a disgusting habit that the public disapproves then the likelihood of that mother continuing to breastfeed, especially if she must breastfeed in public, will greatly diminish and the ensured health of the infant may also decrease.

CHAPTER V: MEDIA AND CULTURAL INFLUENCES ON THE VIEW OF BREASTFEEDING IN TODAY'S SOCIETY

Many issues lead to a decrease in breastfeeding in today's society; however, one of the main contributions to that decrease is due to media and pop culture. Breasts in the United States culture are no longer viewed from a biological perspective with the purpose of feeding the young; now breasts are viewed usually within sexual views. Previous cross-cultural studies have found that the decision to breastfeed or not, and infant feeding practices in general, are based within the intricate web of cultural context (Stuart-Macadam 168). Regardless of nutritional, immunological, contraceptive, and economic considerations, there are numerous factors and beliefs that are not directly related to breastfeeding that influence women's choice about breastfeeding (Stuart-Macadam 169).

Although many humans use the breasts for sexual arousal and pleasure, this is a view of breasts seen only in humans. Breasts "play no role in sexual behavior in any species other than humans" (Stuart-Macadam 179). Not only are the mammary glands only viewed as sexual among humans, but it is also clear that this view is a cultural phenomena. Although most people in Western culture perceive breasts as sexual organs, "people in most cultures do not regard female breasts as sexually stimulating, manipulation of the breasts is not a common aspect of sexual behavior in most cultures, and women in most human populations do not have particularly

prominent breasts" (Stuart-Macadam 179). This idea of breasts as sexually attractive has been taught in Western society; they are not intrinsically viewed that way. Since this view is one that is "culturally imposed," society "can choose not to accept the idea that large breasts are desirable, and worth the high cost to women and children's health" (Stuart-Macadam 181).

Although not all cultures view breasts in this manner, Western culture has drastically shifted towards a sexual perspective of breasts. In this culture, the female breast has come to be viewed as an erotic sexual organ that people find pervasive to the extent that some people even deny the actual gland function of the breast for raising children (Stuart-Macadam 169). This mindset about breasts has led to detrimental consequences when it comes to health. Many people in the United States look at breasts as primarily sexual organs that are focused on eroticism (Stuart-Macadam 174). People are uncomfortable with the fact that they were fed by their mothers' breast. Because people consider the breasts a sexual organ, they want to distance themselves from their mothers' sexuality. The United States culture shows breasts as tools to attract males and then eventually to keep men entertained. Breasts, in any other light, are viewed negatively due to the aversive nature which society, otherwise, perceives them. This can be seen "in many different arenas of American culture, both by the 'normal' circumstances under which breasts are exposed in the United States, by the phenomenon of breast augmentation surgery, by the association of breasts with sexual pleasure, and by the reaction of people when they do see women using their breasts to feed their children" (Stuart-Macadam 174). The reactions that people show women who choose to breastfeed

their children in public influence the future choice of women to breastfeed because women are less likely to choose breastfeeding when society looks at it negatively.

Body image, in general, has changed throughout the ages in regards to what is considered attractive by society. The body image that society considers attractive revolves around what body characteristics are hardest to obtain. For example, in the Middle Ages, working outside all day was the norm so being pale and plump was considered attractive. Certain aspects about current society have led the definition of "attractive" towards a figure that is only attainable through mutilation of the body. Fredrickson and Roberts state that "bodies exist within social and cultural contexts, and hence are also constructed through sociocultural practices and discourses" (174). Women have become more dissatisfied with their bodies than men; this is most likely due to sociocultural reasons, including the increase in the porn industry (Feingold 190-195). Because the rate of porn watched has increased, men have begun to compare women in everyday life to women they see in porn. Not only in porn but even in television and Hollywood, "large breasts are portrayed in the media as sexy, beautiful, and essential for attracting the attention of men" (Stuart-Macadam 175).

Promiscuously dressed women usually with large breasts are seen in every area of advertising from clothing ads to beer and cigarette ads. Models openly admit that women with smaller breasts are less likely to get bigger advertisement deals than models with larger breasts, which is why most models eventually undergo breast augmentation surgery with either silicone or saline implants in order to further their careers (Stuart-Macadam 175). This image of a thin woman with large

breasts has come to signify beauty within this current society; however, this image is not easily obtained and comes at a price. No longer do women look at their bodies as beautiful tools by which their infants survive. A study looking at data from 1989 found that an estimated amount of "815,700 women in the United States had silicone gel, saline, or polyurethane coated breast implants in 1989" (Cook 525). These implants often occurred for purely cosmetic reasons. In 1992, eighty percent of breast implants were for cosmetic reasons and the other percentage was for reconstructive surgery that played no role in the health of the patient; however, many of these were for women who had breasts removed due to cancer and provided psychological healing. Also in 1992, "it was estimated that between 1.6 and 2.0 million U.S. women already had breast implants, and the demand keeps growing, at the rate of 150,000 each year" (Stuart-Macadam 176). The pressure to obtain the 'ideal' body comes from multiple areas including the media.

Although all women are not endowed with large breasts, they are encouraged to obtain them through plastic surgery, and in that way, many women mutilate their breasts and lose the opportunity to breastfeed forever. Although some plastic surgeries dealing with breasts do not necessarily prevent breastfeeding, the majority of procedures and the most common surgery methods do prevent women from breastfeeding. Body mutilation has been used in many cultures in order to obtain the ideal, beautiful body. In their book, *Breastfeeding: Biocultural Perspectives*, Patricia Stuart-Macadam and Katherine Dettwyler propose that a "perfect analogy to the way Western culture eroticizes breasts is the now-defunct practice of foot-binding in China, which persisted from some time prior to

A.D. 960 until well into the twentieth century" (177). Breast augmentation also serves no purpose and is mutilating a body part just like foot-binding. In Chinese culture, small feet were seen as a symbol of high status and wealth because they marked families whose women did not have to preside in agricultural labor. These tiny feet were also seen as an erotic stimulant for men (Stuart-Macadam 177-178). The parallels between foot-binding and breast augmentation are incredibly clear, and the two practices are, at their base, the same (Stuart-Macadam 178). Breast augmentation surgery takes a "perfectly healthy, functional organ" and transforms it "through surgery into something useful only for male sexual pleasure" (Stuart-Macadam 178).

The media is one area of culture that uses its prevalence to influence society, sometimes in a negative way. Not only does the media have the ability to influence social norms, particularly about women's breasts, but also the media can also affect how formula is perceived in society (Bentley 307). In 1998, an episode of *Chicago Hope* "portrayed an exclusively breastfed, 6 week old infant who, according to an autopsy report, died from heart failure, secondary to dehydration, which the chief physician said was indicative of starvation" (Bentley 306). This controversial episode showed the mother's lawyers blaming the hospital for their 'Baby-Friendly Contract,' which stated that they mother would do everything in her power to breastfeed. It turned out that the mother might not have been producing enough milk. This story promoted the use of formula care with a frightening story of a child dying from breastfeeding. Although this plot was partially based on a real woman's tale, the episode left some facts from the true story out. Tabitha Walrond, the

woman the episode is based on, had breast reduction surgery which led to her breasts not producing enough milk. Walrond argued that her doctors never informed her that her breast surgery might prevent her from properly breastfeeding; however, the episode shown to the world did not include facts like these. The episode portrayed breastfeeding as the enemy and not the lack of information which truly was the cause of the infant's death (Bentley 306).

Television is not the only media used to influence women, but print media also contributes to the idea that bottle-feeding is the societal norm promoting it over breastfeeding (Bentley 306). Magazines use celebrities to endorse formula feeding. For example, a 2002 copy of *Working Mother* featured Vanessa Williams, a singer and actress, on the cover feeding her daughter a bottle of what appears to be infant formula (Bentley 306-307). Images like this one are viewed by thousands or millions of women and persuade women to buy into what the picture is selling. Seeing a beautiful and happy mother/daughter duo using formula influences mothers to use formula so they and their children will also be beautiful and happy (Bentley 307).

Various barriers are in place within today's society influencing the choice of breastfeeding. These barriers come from multiple areas of life and include environmental, interpersonal, and community influences. Environmental influences can heavily promote or discourage breastfeeding. The environment that birthing occurs in often promotes formula feeding over breastfeeding. Hospitals often encourage bottle-feeding in order for mothers to rest, and it is not standard for a hospital to provide mothers with samples of formula upon discharge from the

hospital (Bentley 307). Although hospitals also provide lactation specialists to help with breastfeeding, providing the infant formula has been found to discourage breastfeeding altogether (Bentley 307). The condition of the area in which a mother lives also influences whether she breastfeeds or not. Women living in more dangerous areas or poorer conditions are less likely to breastfeed due to multiple factors, including working conditions and safety concerns (Bentley 307). Many women have to work nowadays, and often, working environments are not conducive to a mother breastfeeding or expressing her milk during the day.

The interpersonal influences include the set of individuals that create a woman's social network, such as family, friends, and health care providers, among others (Bentley 307). These individuals help create a sphere in which a mother thinks about breastfeeding, particularly doctors', grandmothers', and fathers' opinions are "strong indicators of maternal intention to breastfeed (Bentley 307). Challenges for breastfeeding involve the negative attitudes surrounding mothers that can come from partners, family members, and even women's health care professionals (Arora 1).

The community and culture also influences parents' decisions to breastfeed or bottle-feed. Communities help provide information and support to its members; when a woman lacks those factors, she is less likely to engage in breastfeeding. In their study, "Major Factors Influencing Breastfeeding Rates: Mother's Perception of Father's Attitude and Milk Supply", Samir Arora, Cheryl McJunkin, Julie Wehrer, and Phyllis Kuhn found that "the most important factors reported by bottle-feeding mothers that would have encouraged them to breastfeed included more information

from pre-natal classes, magazines, books, and television, as well as support from the infant's grandmother or other family members" (2). It is clear that mothers make their decision based off the pre-conceived information coming from their family and public sector as 78.0% of all mothers who responded revealed that they had decided to breastfeed or not before they even became pregnant or during their first trimester (Arora 2). Although the split between breastfeeding and bottle-feeding while in the hospital was close to being the same percentage, "more than one-fourth of the initial 44.3%" breastfeeding mothers "had switched to bottle-feeding by the time the infant was 1 month old and only 13.0% were breastfeeding by the time the infant was 6 months old" (Arora 2). The major elements that contribute to a mother's decision to initially breastfeed include infant's health, naturalness, and emotion bonding (Arora 2). The "primary reasons for initiating bottle-feeding over breastfeeding included the mother's perception of the father's preference and mother's uncertainty regarding the amount of milk the infant would receive" (Arora 2).

There are certainly reasons why mothers should not breastfeed. For instance, not making enough milk or carrying certain diseases are clear reasons to not breastfeed and reasons why formula is a necessary product; however, the major reasons why people did not breastfeed could easily be changed. Communities and nations, in general, need to make information more easily available to women before pregnancy or at least during the early stages of pregnancy. Education about factors such as using breast pumps and creating breastfeeding friendly environments in work and public arenas could possibly increase the number of

mothers who breastfeed exponentially; however, this knowledge needs to be more readily available if the negative view of breastfeeding is to change.

The fact that breastfeeding is looked at as offensive helps create the façade that breastfeeding is acceptable only in the home but in public breasts should only be used to indicate sexual beauty. In late 2014, Kim Kardashian posed nude for the magazine *Paper*. Around the same time, actress Alyssa Milano posted a picture of her breastfeeding her almost three-month old infant to Instagram. Milano received backlash and criticism for two of her pictures that showed her breastfeeding; however, people tried to 'break the internet' with Kardashian's nude magazine cover. The dichotomy between the two reactions is astounding. In today's society, posing nude is looked at as acceptable but a picture of a woman breastfeeding is unthinkable (Weingus).

The perception of breasts in today's society is that one is allowed to show parts of a breast as long as a clothing item allows it, but it is not appropriate to reveal part of a breast when breastfeeding. Breasts are only allowed when trying to attract a male, not when trying to feed an infant, regardless of the fact that the intrinsic functional use of breasts are to feed infants. The American Dietetic Association ran a survey that found that 79 percent of Americans think it is inappropriate to show breastfeeding on television (Zablit). A double standard exists in the United States' culture. Women are allowed to expose themselves in a sexual manner but not in a manner that exposes themselves for the purpose of breastfeeding. Sexualizing the mammary glands "may lead women who internalize the sexual objectification of their bodies to have more negative attitudes toward

breastfeeding" (Johnston-Robledo 429). In a culture that is becoming more and more sexual in its view of every day things, breastfeeding could become a concern for the women of today.

In her book, *The Psychology of the Female Body*, Dr. Jane Ussher stated, "It is ironic that breastfeeding an infant in public is still widely frowned upon, denying the natural function of the breasts at the same time objectifying them for the sexual gratification of men" (22). Fredrickson and Roberts put forth the objectification theory that "posits that girls and women are typically acculturated to internalize an observer's perspective as a primary view of their physical selves" (173). This view puts the perspective of one's body on others which "can lead to habitual body monitoring, which, in turn, can increase women's opportunities for shame and anxiety, reduce opportunities for peak motivational states, and diminish awareness of internal bodily states" (Fredrickson 173). In their article, "Indecent Exposure: Self-objectification and Young Women's Attitudes Toward Breastfeeding," Johnston-Robledo, Wares, Fricker, and Pasek found that the majority of participants "(80%) intended to breastfeed during the first few months of infancy;" however, since they also stated that they had "intentions of early supplementation with formula," the participants are likely to "not persist with breastfeeding for the recommended 6 months" (435). These participants' results indicate that they have internalized the popular slogan 'breast is best,' but many of them have also been influenced by the cultural taboos surrounding breastfeeding in today's society (Johnston-Robledo 435).

Looking at breastfeeding through the lens of the objectification theory, women "to varying degrees internalize this outsider view and begin to self-objectify by treating themselves as an object to be looked at and evaluated on the basis of appearance" (Szymanski 8). If women view their bodies through the eyes of the public, and most likely through the eyes of men, they will view their breasts as the public sees them and in this way, the breasts lose value as an important tool. In their article, "Sexual Objectification of Women: Advances to Theory and Research," Szymanski, Moffitt, and Carr state that "research…indicates that the media often depicts a narrow and often unattainable standard of women's physical beauty and links this standard with a woman's sexiness and worth" (10). Since women hold the views of those around them in high esteem, they are not likely to go against the social norm that counts breasts as sexual items. In order for breastfeeding to flourish, attitudes toward breastfeeding need to change. The attitudes of those closest to mothers have a strong influence on their decision to breastfeed. Not only do mothers need to be educated on the benefits of breastfeeding, but everyone involved with a potential mother needs to be educated about these facts.

Awareness of why breastfeeding is the best method, within most situations but not necessarily all, needs to be more widely spread; however, the more important aspect that needs to be addressed is the taboo of breastfeeding in public. If breastfeeding in public were more socially acceptable, breastfeeding in general may become the more widely used method of feeding infants. Since the perception of breastfeeding begins at a young age from the influence of parents, young people need to be taught and shown that breastfeeding is good through examples. More

images of breastfeeding mothers need to be shown in the media and more educational programs need to be shown on television (Sayers 45). The perception of breastfeeding is one of the underlying problems with lack of breastfeeding in North America, and this problem can only be addressed through interpersonal relationships and the media.

CHAPTER VI: THE RISE OF THE FORMULA INDUSTRY AND COSTS ASSOCIATED WITH ARTIFICIAL FEEDING

The rise of the infant food industry was influenced not only by the increase of women in the workforce but also by the rise of scientific motherhood. Although infant formula companies in the nineteenth century developed a wonderful formulation in order to save the lives of abandoned or sick infants, their purpose had shifted by the turn of the century to producing a product that promoted the replacement of mother's milk (Baumslag 147). Bottle-feeding had exploded by the end of World War II and had become the norm for families in the United States. This escalation in sales occurred for multiple reasons, including an increase in scientific knowledge and skillful tactics in marketing and promotional efforts (Baumslag 147). In the late nineteenth century, physicians began to research and formulate theories focused around healthy infants. However, because they were faced with breastfed infants who did not flourish like they postulated, physicians grew in concern over the increase in deaths of breastfed infants and how to prevent these deaths (Apple 4). All of these factors contributed to commercial infant-food products, typically created by chemists, emerging on the market, allowing mothers to choose alternatives to nursing (Apple 4).

The infant formula industry began their climb by distributing free samples to mothers in hospitals and to clinicians; however, "the goals of the baby food industry are in direct conflict with the best interest of babies" (Baumslag 148). Finding

alternative means to feed a child due to an inability for a mother to directly feed their child was a necessary measure that the health field needed to explore. Not every woman has the biological or social ability to breastfeed their infant, but the infant food industry directly influences the choices made by women when making the decision to breastfeed. The formula industry began advertising in the mass media, and in developed nations, bottle-feeding became associated with the elite and breastfeeding became symbolic of peasantry (Baumslag 148). These companies used new mediums that had become available to spread their message to most of the population in the United States and other developed countries. Not only was advertising on television, radios, and billboards used but also advertising within hospitals and clinics. The different formula companies all used the same persuasive techniques in order to entice medical and nonmedical audiences to purchase their products (Apple 11). Advertisements for formula products appeared widely in women's and other popular magazines, and most formula companies extensively advertised in medical journals (Apple 11). Companies sent free samples and booklets in their pursuit of cultivating medical patronage (Apple 11).

Although most physicians still believed that breastfeeding was the best method for feeding infants, formula companies published persuasive stories from satisfied mothers and physicians, or companies misrepresented information about their products by relaying quotations by respected physicians out of context (Apple 11-13). Another technique used involved using 'milk nurses', who were women, employed by infant food companies, who went to hospitals and homes in order to sell formula dressed up in nurses' uniforms (Baumslag 150). These different

marketing techniques targeted women's insecurities about their ability to breastfeed, and capitalized on mothers' descriptions about their fears of inadequate maternal nursing and knowledge of infant nutrition. Formula companies used these fears to persuade mothers that formula was the best option (Apple 15). Companies chose slogans that undermined a woman's confidence in her ability to feed which led many mothers to begin viewing infant formula as special food or medicine (Baumslag 150).

By the late nineteenth century, artificial feeding had risen in popularity; however, along with that increase came an increase in health problems within infants. Infantile death, referred to as, 'bottle-baby disease' was a vicious, dangerous, and potentially fatal cycle of diarrhea, dehydration, and malnutrition resulting from unsafe, unhygienic, and diluted feeding methods and continued to rise in areas that used to be very safe with the death of the mother being the only safety concern for infantile safety (Baumslag150). Alternative feeding methods became a real threat to infant health as these other methods grew in popularity with physicians and mothers. Although many physicians and mothers chose formula feeding with the belief that it would be easier to monitor the infant's health, they neglected the facts that a mother's milk is known to have the health benefits necessary for a child and that formula was still new and being tested (Baumslag 150).

The early twentieth century saw a huge increase in scientific motherhood and an increase in mothers' desire to study childrearing techniques (Apple 150). According to a "1936 study incorporated into the White House Conference on Child

Health and protection, John E. Anderson published a survey of 3,000 families" that "represented a broad cross-section of socioeconomic levels of American society" (Apple 151). The results of his study showed that "over 50 percent of the families had read at least one book on child care during the year, and over 70 percent had read at least one pamphlet" (Apple 151). American mothers turned to books, pamphlets, and classes for advice on how to raise their children. These reading materials were not always written by professionals; however, this did not stop women from stringently following the advice they gave in prenatal and postnatal classes, the instructions they read in books or pamphlets, or the information they received from physicians (Apple 152). This disjunction among sources and childrearing techniques enabled companies like the infant industry to heavily promote artificial feeding to mothers. The figures from a 1930 study of two hundred mothers sharply contrast with those from 1917 to 1919 in which "at most one-third of the mothers bottle fed at three months, and by six months less than one-half did so;" however, "by 1930, the percentage of babies fed no breast milk was dramatically higher at both ages" (Apple 154).

Although many factors undoubtedly contribute to mothers' decisions to bottle feed rather than breast feed, a major contributing factor was that mothers continued to be exposed to more articles and information pertaining to artificial feeding over maternal nursing (Apple 155). Advertisements and articles in women's magazines implied that at some point mothers would have to bottle feed so regardless of whether they were breastfeeding or intended to breastfeed, their infants would experience the bottle at some point in their lives (Apple 155).

Mothers were beginning to consult physicians for troubles with infants. Although checking in with physicians was helpful for infant health, it also led mothers to believe that infant feeding was a more plausible feeding method as they could contact their family physicians with any questions.

The rise of the scientific mother continued into the late twentieth century. By 1920, "barely 20 percent of American women gave birth in hospitals;" however, "by 1950, over 80 percent of U.S. births occurred there" (Apple 159). According to Rima Apple in her book, *Mothers & Medicine: A Social History of Infant Feeding 1890-1950*, "Through its routines and procedures, its implicit and explicit teachings, the hospital fostered the ideology of scientific motherhood, the need for scientific and medical expertise in the successful rearing of infants" (159). The hospital had influence over mothers' choices about feeding infants, and "hospital conditions and practices discouraged breast feeding and encouraged the belief that bottle feeding was as good as, if not better than, mother's milk" (Apple 160). Many new mothers' first attempt at feeding their infant came while in the hospital, and while new mothers were nervous about their ability to feed, what workers within the hospital suggested easily influenced them. Oftentimes, workers in hospitals did not work with mothers to help them lactate successfully. The conditions within the hospital settings are not conducive for successfully nursing, especially during the early pivotal moments necessary to establish milk flow (Apple 161). Babies were actually given bottles at night to encourage the mother to sleep.

A study done in 1950 by the University of Pennsylvania "demonstrates the effect of such supplemental feedings, particularly with mothers not fully committed

to maternal nursing" (Apple 160). The study involved women with different attitudes towards breastfeeding and involved bottle-feeding directly after a mother breast-fed for the four days. The results of this study found that "the mother's attitude toward maternal nursing had a significant affect on her ability to breast feed" (Apple 160). The study found that "of those with a positive attitude, 74 percent were breast feeding with no supplemental bottles after four days; of the negative mothers, 26 percent were successful; and of those ambivalent about the need for or desirability of maternal nursing, only 35 percent were successfully breast feeding without supplemental bottles at the time of hospital discharge" (Apple 160-161). This study showed that women who were uncertain about breast feeding were more likely to continue bottle-feeding because the hospital's provisions discouraged mothers from attempting breastfeeding seriously (Apple 161).

The formula industry began to flourish in the late nineteenth and early twentieth century due to multiple factors. During this time, the conditions in the United States were ideal for a relationship between the formula industry and health market to flourish (Palmer 212). A market for artificial feeding was able to come alive during these conditions and begin to make its permanent hold on the public. Due to the rapid industrialization and urbanization of the United States, urban mothers were required to work and in effect, bottle-feed their infants. The formula industry took advantage of this cultural change by using terms to persuade these mothers to use their products. Creating the term, 'infant formula' was a genius marketing strategy because it glorified a recipe based on ordinary old cows' milk and made it seem like something novel and marvelous (Palmer 212). Formula

companies used techniques like these to promote artificial feeding, but they were not the only factors involved. The three groups of people involved in helping formula feeding become prominent are physicians, manufacturers, and mothers. Physicians desired to discover ways to lower infant mortality and morbidity and create new arenas for the medical field. Although some manufacturers developed "their products for humanitarian reasons," most "needed to build consumer demands for infant foods" (Apple 169). Since mothers were "concerned for the health and well-being of children and uncertain of their own abilities," they began "to believe that doctor-supervised artificial feeding was best for their infants" (Apple 169). These three factors contributed to a rise in the use of formula feeding throughout the twentieth century. Although some manufacturers developed their products for humanitarian reasons, they also wanted to build a consumer demand for formula. Since mothers began to become uncertain about their own nurturing abilities and wanted to ensure the well-being of their children, they looked towards physician-supervised methods that involved artificial feeding because they felt physicians could monitor their infants' health easier that way. These three factors contributed to a rise in the use of formula feeding throughout the twentieth century (Apple 169).

As bottle-feeding in urban areas with working mothers became popular, mothers who remained in the home also began to artificially feed their infants (Palmer 213). Women have continued to expand their fields and more and more women have left the home and entered the work field. In fact, "by 1997, 59 percent of women worked, compared with 28 percent in 1940" (United States of America 2).

By 1995, “41 percent of the employed women had children under the age of 18, and 55 percent of this group had returned to the workplace before their children’s first birthday” United States of America 2). During this time, bottle-feeding continued to rise, and it was not until this last century that breastfeeding rate has risen. Although the number of mothers breastfeeding have risen in the last century, most mothers do not breastfeed for at least six months, which is the recommended length to provide optimal health and nutritional protection, nor do mothers breastfeed with additional foods for at least 12 months, which is the ideal pattern for feeding infants. The percentage of women who breastfeed in the United States for 12 months is approximately 17% to 20% which is much lower than the global average. Since breastfeeding rates continued to decline since the 19th century, the US Department of Health and Human Services (HHS) created a set goals for breastfeeding initiation and duration rates in the late 1970s (American Dietetic Association 810).

Since this initiative, the rates of breastfeeding have slowly increased over the years; however, this increase pertains mostly to breastfeeding initially and not to the recommended period for breastfeeding. As of 2002, approximately 71% of American women breastfeed initially, but only 36% continue to breastfeed up to six months, and only 17% breastfeed for a year (American Dietetic Association 811). Although there are certain reasons mothers should use formula over breast milk, these rates are still clearly not the optimal rates for breastfeeding that the United States desired when starting the initiative so the number of women who could breastfeed are still much lower than desired. Although there are a large number of mothers who are missing out on the health benefits that come from breastfeeding,

these mothers and families also are missing out on the other benefits that come from breastfeeding that include benefits to the environment and economy.

Although breastfeeding indisputably provides health benefits to infant and mother, breastfeeding, or lack thereof, also impacts the environment. Not only is mother's milk a natural renewable resource that builds itself with pregnancy, but it also "is produced and delivered to the consumer without using and wasting other resources" and "creates not pollution" (American Dietetic Association 813). On the other hand, infant formula requires "manufacturing, packaging, shipping, disposing of containers, or extensive advertising" (American Dietetic Association 813). Breastfeeding does not require the use of bottles which lowers the environmental impact of breastfeeding. Even if a mother chooses to use a breast pump, this method or breastfeeding without the use of one does not require the amount of containers and excess equipment that formula feeding requires, and the lack of using formula leads to a lack of waste produced into the environment.

Breastfeeding also impacts families economically. According to a report by the American Dietetic Association, "Breastfeeding allows the family to save the money that otherwise would be spent on infant formula, other milk substitutes, and feeding equipment" and "also improves household food security and saves the family's disposable income for food for older children and adults" (813). Families can obviously save money by breastfeeding due to the money that would be spent on formula, but there are other costs that can be taken into account. As breastfeeding is shown to help reduce risks of illnesses, children who are fed with formula are at a higher risk to contract diseases and require medical attention.

Breastfeeding can help reduce medical expenses. The United States began a program to help mothers and promote breastfeeding. The United States Department of Agriculture's Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), which "is the largest purchaser of infant formula," spent $567 million in 1997 distributing formula to women involved in WIC (United States of America 3). The U.S. Department of Agriculture found that "a 10-percent increase in breastfeeding rates would save the [WIC] program approximately $750,000" (4).

According to the American Dietetic Association in an article published in 2005, "It is also estimated that $30 million would be saved if all of the women in WIC breastfed for 1 month," and "an additional $48 million could be saved if 75% of the mothers in WIC breastfed for 3 months" (813). The American Dietetic Association also found that "families who do not breastfeed spend close to $700 for standard formulas in the first year" and "the USDA estimates that at least $3.6 billion could be saved in health care costs if breastfeeding rates were increased from the current levels to those recommended by the US Surgeon General" (813). These numbers are estimated at a lower rate due to the fact that these numbers only take into account three childhood illnesses and not many others that children may contract. There could also be benefits for employers as mothers and fathers who have healthy children do not have to take time off to care for children with an illness.

Although increasing the rate of breastfeeding will require some capital investment by areas such as employers and insurance agencies, improving the rate of breastfeeding could help these two groups later down the road (Ball 253). The

mother may have to take time off initially and insurance may have to pay more initially; however, over time, both groups should be able to save through lack of health problems. The employer will not have to lose an employee due to illness and the insurer will not have to pay for medical expenses. This benefits the family as well since the parents can participate in a full-time occupation which allows them to make more money instead of losing money by missing time at their job and by not having to spend more money for health costs. According to Bell and Bennett, "one study found that breastfeeding mothers were absent from work less than non-breastfeeding mothers" and "the insurance company Aetna estimated that it saved $1435 in medical claims per breastfed infant and 3 days of employee sick leave per breastfed infant in the first year of its lactation program" saving "in claims alone…$108,737" (258). The total benefits of this lactation program "resulted in an impressive return on investment of almost 3 to 1" (Ball 258). Employers may have to spend more money to create a work-site lactation program for his/her employees; however, the benefits and savings over the long run may very well be worth the initial cost.

Although it is clear that money could be saved, there are other costs that are not directly monetary that should be considered. Costs revolving around both infants and mothers are associated with breastfeeding. Although they cannot be quantified, costs for the infant from not breastfeeding can include the pain and suffering that come from infantile illnesses or infectious diseases and also include diseases that can occur later in life which the infant is at a higher risk of contracting. Another "cost associated with breastfeeding" that lacks much research associated

with it “is the discomfort that nursing mothers may encounter at work or in public while nursing their infants” (Ball 256). Although mothers cannot be fired for being pregnant, mothers have been threatened with the loss of their job for nursing at their workplace, and others have been kicked out of public places and even criminally prosecuted for nursing in public; however, if legislation and workplace regulations focused on ensuring breastfeeding friendly atmospheres for nursing mothers, these costs could be eliminated at a minimal cost (Ball 256). The costs associated with breastfeeding could easily be conquered and could be put towards making the workplace more productive if a breastfeeding-friendly work environment were created. Although there are clear economic benefits in savings for breastfeeding parents, there are also less clear savings that the employer, health insurer, medical provider, and society could accumulate with some capital investment that could turn out to be incredibly beneficial (Ball 260).

CONCLUSION

Although various topics are discussed in this paper, the theme centers around breastfeeding. Breastfeeding is not often thought of as an important conversation because its importance has been diminished by factors such as social practices and media influences. Breastfeeding is a natural occurrence that mammals have adapted in order to nourish their young. Because lactation involves mammary glands, in today's society, United States' culture has warped the purpose of breasts to revolve around sexual pleasures instead of nourishment. This mentality only hurts infants by persuading mothers to use artificial feeding over natural breastmilk. Varying techniques are used to influence mothers to choose formula over lactation, including persuasive methods from the formula industry, media influence on the perception of breasts, and lack of working regulations allowing women to have more opportunities to breastfeed while keeping a steady job. Although all public health arenas support the use of breastmilk, breastfeeding will not become more universal until these other problems have been addressed, and the United States' perception of breasts change.

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