UNIVERSITY OF EDUCATION, WINNEBA

INFANT FEEDING PRACTICES AND NUTRITIONAL KNOWLEDGE OF NURSING MOTHERS IN APAM

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A DISSERTATION IN THE DEPARTMENT OF HOME ECONOMICS, FACULTY OF SCIENCE EDUCATION, SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES, UNIVERSITY OF EDUCATION, WINNEBA IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE MASTER OF PHILOSOPHY DEGREE.

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DECLARATION

Student Declaration

I, Kafui Adigbo declare that this thesis, the exception of quotations and references contained in published works which have all been identified and duly acknowledged, is entirely my own original work, and that it has not been submitted, either in part or whole, for another degree elsewhere.

Signature ……...

Date……

Supervisor's Declaration

I hereby declare that the preparation and presentation of this work was supervised in accordance with the guidelines for supervision of Thesis as laid down by the University of Education, Winneba.

Name of Supervisor……

Signature……

Date……

Name of Co-Supervisor……..

Signature…….

Date…….

DEDICATION

This work is dedicated to my parent, Lt. Col. C. J. Adigbo and Mrs Eileen Cecilia Adigbo

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GLOSSARY OF TERMS

Abbreviations

AAP	American Academy of Pediatrics
AMA	American Medical Association
CDC	Centre for Disease Control
CDD	Centre for Developmental Disabilities
DHA	Docosahexaeonic Acid
DRI	Daily Reference Intake
FAO	Food and Agriculture Organization
GDHS	Ghana Demographic and Health Survey
GINAN	Ghana Infant Nutrition Action Network
LAM	Lactation Amenorrhea Method
LCPUFA	Long Chain Polyunsaturated Fatty Acid
MDG	Millennium Development Goal
MOH	Ministry of Health
NCWD	National Council on Women and Development
RCHC	Reproductive and Child Health Centre
PEM	Protein Energy Malnutrition
RDDA	Required Daily Dietary Allowance
UNICEF	United Nations Children's Fund
WHO	World Health Organization

ABSTRACT

The study sought to find out infant feeding practices and nutritional knowledge of nursing mothers in Apam. Multiple methods of data collection procedures such as questionnaire and interviews were used for the study. A total of one hundred and fifty (150) respondents were purposively sampled for the study. The St Lukes hospital and the Reproductive and Child health center (RCHC) all in Apam were used for the study. The data obtained were analysed using SPSS Version 20 and presented in charts, frequency distribution tables and percentages. The results of this work indicated that mothers introduced their infants to complementary food too early in life which maybe a major contributory factor for the incidences of malnutrition in Apam. Therefore, the most urgent priority is to ensure access to, improve the quality and proper timing of complementary foods which should be given to infants from the sixth month. Evidence gathered also showed that majority of the nursing mothers believe that exclusive breast feeding protects the infants from diseases, saves the infants life, provides a nutritious easily digestible food for the infant and it's a hygienic food with the right amount of nutrient also meets all water requirements that the infant needs. It was concluded that nursing mothers in Apam obtained nutritional knowledge from hospitals and clinics in which they obtained antenatal also nursing mothers depended on parents when it come to feeding. Even though majority practiced exclusive breast feeding, it was found out that some practiced the mixed, re-lactation, tandem feeding, induced lactation, extended breast feeding and expressed feeding.

CHAPTER ONE

INTRODUCTION

1. 0 Background to the Study

More than nine million children under 5 years of age die each year worldwide. Malnutrition underlies a majority of these deaths of which 70% occur in the first year of life. Infant and young child feeding practices directly impact the nutritional status and, ultimately, the survival of children less than 2 years of age. Therefore, improving infant feeding is critical to ensuring their optimal health, nutrition and development (WHO/UINCEF, 2008).

Globally, about 38% of babies are just breastfed during their first six months of life (WHO, 2014). In the United States about, 75% of women started breastfeeding, 43% breastfed for six months only 13% exclusively breastfed, and 23% breastfed for twelve months(Academy of Pediatrics Section on Breastfeeding, 2012).

Breastfeeding rates in the United Kingdom were the lowest in the world in 2015 with only 0.5% of mothers still breastfeeding at a year, while in Germany 23% are doing so, 56% in Brazil and 99% in Senegal. In Australia for children born in 2004, more than 90% were initially breastfed. In Canada for children born in 2005-06, more than 50% were only breastfed and more than 15% received both breast milk and other liquids, by the age of 3 months (Fenglian, Liqian, Binns, Liu & Xiaoxian, 2009). Breastfeeding rates in different parts of China vary considerably (Fenglian, *et.al.* 2009). Death of an estimated 820, 00 children under the age of five could be prevented globally every year with increased breast feeding (Victoria, Bahl, Barros, Franca, Horton, Krasevec, Murch, Sankar, Walker, Rollins, 2016).

The practice of exclusive breastfeeding in some countries in sub-Saharan Africa is undesirable in comparison to the optimum period of six months set by United Nation Children's Fund (UNICEF, 2011). Some countries with low practice of exclusive breastfeeding rates include Chad (2%), Cote d'Ivoire (4%), Gabon (6%), and Sierra Leone (8%) (UNICEF, 2011). Other countries in the region which have achieved high levels of exclusive breastfeeding include Benin (70%), and Rwanda (85%) and Ghana's exclusive breastfeeding rate is about 63%. Although there is a steady progress in the rates of exclusive breastfeeding in the sub-region, it implies that social and environmental factors may be influencing such rates. These have challenged some sub-regional governments to adopt, formulate, and implement strategies to improve the practice of exclusive breastfeeding among mothers (GDHS, 2008).

Inadequate food intake is a consequence of insufficient food available at the household level, improper feeding practices, or both. Improper feeding practices include both the quality and quantity of foods offered to young children as well as the timing of their introduction. Poor sanitation puts young children at increased risk of illness, in particular diarrheal disease, which adversely affects their nutritional status (WHO, 2010). Malnutrition is responsible, directly or indirectly for about one third of deaths among children under five. Well above two thirds of these deaths, often associated with inappropriate feeding practices, occur during the first year of life.

Nutrition and nurturing during the first years of life are both crucial for life-long health and well-being. In infancy, no gift is more precious than breastfeeding; yet barely one in three infants is exclusively breastfed during the first six months of life (WHO, 2010). Matusiak (2005) attributes this to the fact that most of these infant

feeding campaigns are almost always directed to the mother and are based on the assumption that women are free to make their own decisions on feeding their infants.

The World Health Organization (WHO) recommends that infants must start breast feeding within one hour of life, be exclusively breastfed for six months, with timely introduction of adequate, safe and properly fed complementary foods to the infant while continuing breastfeeding for up to two years of age or beyond (WHO, 2010)..

1.1 Statement of the Problem

Infancy is the stage of life when the foundation for dietary habits and nutritional adequacies over one's lifetime are established. Nutrient intakes are therefore largely dependent on the meals taken at this stage, and these can also be affected by the knowledge of nutrition of the mother. However, Ghanaian mothers do not hesitate at all to give their infants complementary foods. Complementary foods are food-based sources of nutrients other than breast milk that are provided to infants who are still breast feeding such foods are supposed to be nutrient dense because infants have a high nutritional requirement relative to body size and consume small amounts of food at a time (Black, 2008).

Appropriate complementary foods can be readily consumed and digested by the young child from 6 months onwards and provide nutrients to help meet the growing child's needs. The most important nutrients are protein, iron, zinc, calcium and vitamin A, the absence of which contributes to increased morbidity and mortality in children. In developing counties, the raw materials used to prepare complementary foods are unrefined cereals or legumes which contain a high amount of phytic acid and phenotic compounds (Black, 2008).

Cereals, often maize is the major ingredient for most African complementary foods. Porridge made with maize meal which is a bulky food low in nutrient density is used as the main complementary food in sub-Saharan Africa (Gibbs & Gibson, 2010).For instance, Davis, Tagoe-Darko and Munkuria (2003) reported that water and glucose solutions were widely given to infants beginning in the first few months of life with the explanation that water should be given to infants immediately after birth because they are thirsty after the exhaustion of the birth process or as a cultural gesture to welcome the child into the world. They report that, most mothers in Ghana give 'koko', a maize-based fermented porridge to their infants as early as the first month of life. However, this food is deficient in energy, protein and micronutrients, making it one of the major causes for stunted growth among children in the country at a stage where the child is supposed to be exclusively breast fed.

The above discussions point to the fact that the high incidence of infant malnutrition and mortality experienced in developing countries is mainly due to poor infant feeding practices. The poor living condition of mothers in developing countries including Ghana, and in particular Apam in the Central Region of Ghana is a factor that leads to malnutrition. Based on the above reasons, it will be assured that nursing mothers in Apam may not feed their infants with food adequate in quantity and quality for the optimum growth of their infants.

1.2 Purpose of the Study

The study was to find out the infant feeding practices and nutritional knowledge of nursing mothers in Apam.

1.3 Objectives

The objectives of the study were to find out:

1. nutritional knowledge of nursing mothers in Apam.
2. infant feeding practices of mothers in Apam.
3. nursing mothers adherence to six months exclusive breast feeding in Apam.
4. benefits of six months exclusive breastfeeding practices to mothers in Apam.

1.4 Research Questions

The following research questions were formulated to guide the study:

1 What is the nutritional knowledge of nursing mothers in Apam?

2 What are the infant feeding practices in Apam?

3 To what extent do nursing mothers adhere to exclusive breast feeding practices in Apam?

4. How useful do nursing mothers find exclusive breast feeding?

1. 5 Significance of the Study

The following are the significance of the study:

1. This study has important implications for nutrition education. It will increase the knowledge and understanding of the factors affecting infant feeding practices and nutrient intake in Apam.
2. Testing the nutritional knowledge of parents will provide information that will reflect on the infant's nutritional status.
3. The study will give an indication of the level of nutritional knowledge of parents in Apam; this will fill the gap in the information oninfant feeding practices of nursing mothers in Apam.

1. 6 Limitations of the Study

The major limitation of this study was the use of one hospital in Apam. Also the criteria for the selection of the respondent limited the researcher to a particular group of nursing mothers. The following criteria were however used to select the nursing mothers:

1. Has to be the infant's mother
2. Has to be resident in Apam
3. Infants must be between 0-12 months old

1.7 Delimitations

The study was delimited to the Gomoa West District and the result cannot be extended to cover the other two districts in Gomoa.

1.8 General Layout of the Thesis

The study was organized into six chapters. Chapter one dealt with introduction, background to the study, statement of the problem, purpose and objectives, research questions, significance of the study, limitations, delimitations and the general layout of the report. The second chapter reviewed related literature under the following subheadings, history of infant feeding, infant feeding in Ghana, factors influencing infant feeding behavior, nutrients needs of infants, energy intakes and growth rates of infant, infant and child mortality in Ghana. The third chapter dealt with methodology which includes introduction, justification for qualitative and quantitative measures, research design, and selection of study location, population, sample and sampling techniques, development of the instrument, reliability and validity of the instrument, piloting of the instrument, procedure for data collection and data analysis.

The fourth chapter discussed the results and findings of the study which were represented in tables, figures, charts and other illustrative matter. Also this chapter is put in three sections, section one is the introduction, section two is the findings from the main research questions and section three is the result from the correlation between demographic and main research questions. Chapter five discussed the major findings of the research and the inferences made from them in view of the findings from related previous studies. The final chapter presented the summary of findings, conclusions and recommendations to indicate how the research work has contributed to knowledge.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

Many researches have been conducted on infant feeding in several countries especially western countries such as the United States and elsewhere. The review of available literature will therefore be mainly on work done elsewhere.

These include:

2.1 History of Infant Feeding

2.2 Types of Infant Feeding

2.3 Factors Influencing Infant Feeding

2.4 Nutrient Needs of Infants

2.5 Energy Intake and Growth Rates of Infants

2.6 Infant and Child Mortality in Ghana

2.1 History of Infant Feeding

Breastfeeding is one of the defining characteristic of a mammal. A wet nurse is a woman who breastfeeds another child (Davies *et. al.,* 2003). The importance of breastfeeding before civilization was so pronounced that, wet nurses were contracted for infants of the wealthy and the royal families who were not able to lactate successfully (Wickes, 1953a). In England and America in the fifteenth and sixteenth centuries, the middle classes began employing wet nurses, a luxury formerly afforded only by the elite. By the latter part of the 1700s wet nursing was on the decline in

North America and England, largely due to increased public concern regarding the moral character of wet nurses and the care they provided (Golden, 1996).

Attempts in 15th century Europe to use cow or goat's milk were not very positive. In the 18th century, flour or cereal mixed with broth was introduced as substitutes for breastfeeding, but this did not have any favorable outcome, either. True commercial infant formula appeared on the market in the mid-19th Century but their use did not become wide spread until after World War II. This was the period when the working pattern of women was rapidly changing; a resultant effect of the industrialization process (Golden, 1996). This was the beginning of artificial feeding for infants. As the superior qualities of breast-milk became better established in medical literature, breastfeeding rates have increased and countries have enacted measures to protect the rights of infants and mothers to breastfeed (Osborn, 1979a).This was a common practice before the introduction of the feeding bottle and formula.

Wet nursing began as early as 2000 BC and extended until the 20th century. Throughout this time period, wet nursing evolved from an alternative of need to an alternative choice. It became a well-organized profession with contracts and laws designed to regulate its practice. Despite objections during the Middle Ages and the Renaissance, wet nursing continued until the feeding bottle was introduced in the 19th century. With a feasible alternative feeding method available, wet nursing as a profession quickly declined to extinction. In Greece circa 950 BC, women of higher social status frequently demanded wet nurses.

Eventually, wet nurses acquired a position of great accountability and had authority over slaves (Wickes, 1953a). The Bible also notes several examples of wet nurses, perhaps the most famous being the woman hired by Pharaoh's daughter to nurse

Moses, whom she found in the bulrushes (Osborn, 1979a).At the height of the Roman Empire, between 300 BC and 400 AD, written contracts were made with wet nurses to feed abandoned infants. The infants were usually unwanted females thrown onto rubbish piles. The wealthy purchased the infant as an inexpensive slave for future use, and the wet nurses who were slaves themselves fed the infant for up to 3 years (Osborn, 1979a).

From approximately 100 AD through 400 AD, medical authors such as Soranus of Ephesus, Galen of Pergamus, and Oreibasius listed the qualifications for a wet nurse. For example, Soranus of Ephesus (98 AD to 117 AD) cited in (Wickes, 1953a) composed an obstetrical and gynecological treatise of 23 chapters that provided a model for infant feeding (Osborn, 1979a). The treatise included the choice of and regimen for a wet nurse. He also described the fingernail test used for assessing the quality and consistency of breast milk. When a drop of breast milk was placed on a fingernail, the milk was not supposed to be so watery that it could run all over the surface of the nail. When the fingernail was turned downward, the milk was not to be thick enough to cling to the nail; the consistency of the milk should range between the two extremes.

Soranus' criterion was used for the next 1,500 years to determine breast milk quality (Wickes, 1953a).The physical work was to incorporate chest and shoulder movements to enhance the flow of milk. Oriebasius cited in Osborn (1979a) recommended activities such as grinding, weaving, and walking. He also advised that a wet nurse should be a healthy 25 to 35 years old woman who had recently delivered a male child (Osborn, 1979a). If circumstances necessitated a wet nurse, Guillemeau recommended a happy, healthy, conscientious, well behaved, observant, sober female who was

willing to breastfeed. Most importantly, according to Guillemeau, the wet nurse should not have auburn hair because redheads were known to have a hot temperament that was harmful to their breast milk (Wickes, 1953a).From the end of the 18th century through the 19th century, the practice of wet nursing shifted away from wealthy families to laboring, lower-income families (Osborn,1979a).

The increased cost of living and poor wages forced many women to seek employment and contribute financially to their family, which made it virtually impossible for many mothers to breastfeed and attend to their children. Consequently, many of these children were given to destitute peasant women. By law, peasant wet nurses were required to obtain a license from local authorities and to report the death of any infant receiving their care. Unfortunately, the laws were ignored and created little change with regard to the high infant mortality rate of infants. In the 19th century, artificial feeding became a feasible substitute for wet nursing. Advancement in the feeding bottle and the availability of animal milk (Osborn, 1979a) began to slowly but steadily reduce the use of wet nurses. By 1900, the once highly organized wet-nursing profession was almost extinct.

The Feeding Bottle

Although wet nursing was the alternative feeding method of choice, evidence suggests that artificial feeding was also used in ancient times (Osborn, 1979a). Vessels of all shapes and sizes have been found, dating back thousands of years BC. Crude feeding bottles and issues with their cleanliness were written about throughout the Roman Era, middle Ages, and the Renaissance. It was not until the Industrial Revolution that a refined, hygienic feeding bottle became available (Wickes, 1953a).

Many different devices were used to feed animal's milk to infants. Some of the devices found were made from wood, ceramics, and cow horns. By the 1700s, many infant-feeding devices were made from pewter and silver. The pewter bubby-pot was among these devices invented in 1770 by Hugh Smith, a physician at the Middlesex Hospital in London, the bubby-pot was similar to a small coffeepot with the exception of the neck arising from the bottom of the pot (Wickes, 1953a). The end of the spout formed a knob in the shape of a small heart, with three to four small holes punched into it. A small rag was tied over the holes for the infant to play with and suck milk through. During the same era rags or small pieces of linen cloth and sponges were often used as a teat or nipple (Wickes, 1953a).

Another feeding device used from the 16th to 18th centuries in Europe was a pap boat. A pap consisted of bread soaked in water or milk and panada consisted of cereals cooked in broth. Both substances were used as a supplement to animal milk, especially when the infant showed a failure to thrive. The pap boat included a spoon with a hollow stem so that the pap or panada could be blown down the infant's throat. Compared to breastfeeding, the use of the pap boat enabled the infant to receive food quickly and in much larger quantity during feeding (Wickes, 1953a).

Unfortunately, feeding bottles, pap boats, and teats during the 16th to18th centuries were difficult to clean. Subsequently, the build-up of bacteria made the feeding devices detrimental to the infant's health. In the early 19th century, the use of dirty feeding devices, combined with the lack of proper milk storage and sterilization, led to the death of one third of all artificially fed infants during their first year of life. During the mid-19th century, great strides were made in the development of the feeding bottle and the nipple. Glass bottles were used, and the evolution of the

modern feeding bottle began. The first feeding bottles, created in 1851 in France, were elaborate. They contained a cork nipple and ivory pins as air inlets to regulate flow (Wickes, 1953a). Although the first rubber nipples had a repulsive odor and taste, they were refined and adapted by the beginning of the 20th century. With the invention of the modern feeding bottle and nipple, the availability of animal's milk, and the change in society's acceptance of wet nursing, artificial feeding became a popular choice (Wickes, 1953a).

Formula Feeding

The use of animal's milk for infant feeding is noted as far back as 2000 BC. Since then, alternative milk sources have evolved to include the synthetic formulas of today. The use of artificial feeding substances grew rapidly and was significantly influenced by advertising campaigns. This had a profound negative effect on breastfeeding trends, despite research that revealed many discrepancies between breastfed and artificially fed infant (Wolf, 2003).

Although artificial or formula feeding of infants is presently much safer than it has been in decades, breast milk is still considered the best source of infant nutrition (Leung & Sauve, 2005). Throughout the ages and until the end of the 19th century, animal's milk was the most common source of artificial feeding. The type of animal's milk used was dependent on the kind of animal that was available; goats, sheep, donkeys, camels, pigs, or horses. The most common and universally used milk for artificial feeding, however, was cow's milk.

In 1810, Nicholas Appert developed a technique to sterilize food in sealed containers. His development was followed by the invention of evaporated milk, which was patented in 1835 by William Newton. In 1853, Texan Gale Borden added sugar to the

evaporated milk, canned the substance, and sold it as Eagle Brand Condensed Milk, which became a popular infant food. In 1885, John B. Myerling developed an unsweetened condensed milk, labeling it as “evaporated milk.” Myerling's product was also a popular choice for infant feeding and was highly recommended by pediatricians from the 1930s to the 1940s (Fomon, 2005).

Many other commercial products and formulas were rapidly introduced after the marketing of Liebig's infant food and the invention of evaporated milk. By 1883, there were 27 patented brands of infant food (Fomon, 2005). These commercial products came in powdered form and consisted of carbohydrates such as sugars, starches, and dextrins that were to be added to milk. Name brands for the products included “Nestlé’s Food®, Horlick's Malted Milk®, Hill's Malted Biscuit Powder®, Mellin's Food®, Eskay's Food®, Imperial Granum®, and Robinson's Patent Barley®”. The foods were fattening but lacked valuable nutrients like protein, vitamins, and minerals. Over time, the nutrients were individually added (Fomon, 2005).

In the 1920s, scientists also began developing nonmilk-based formulas for infants allergic to cow's milk. The first non-milk formula was based on soy flour and became available to the public in 1929. Like the first formulas introduced in the late 19th century, soy formula lacked vital nutrients, particularly vitamins. Eventually, the problem was as resolved with vitamin fortification (Fomon,2005).

Baby food composition varied according to region and economic status. In Europe and America during the early 19th century, the prevalence of wet nursing began to decrease, while the practice of feeding infant mixtures based on animal milk rose in popularity. The success of this product quickly gave rise to competitors such

as Mellin's Food, Ridge's Food for Infants and Nestlé's Milk (Schuman, 2003).While infant formula had been introduced in developed countries in the 1920s as a healthy way to feed one's children, the emergence of research on health benefits of breastfeeding precipitated the beginning of the breastfeeding promotion movement in the United States (Guasti, 2012).

As formulas evolved and research supported their efficacy, manufacturers began to advertise directly to physicians. By 1929, the American Medical Association (AMA) formed the Committee on Foods to approve the safety and quality of formula composition, forcing many infant food companies to seek AMA approval or the organization's "Seal of Acceptance." Three years later, advertising became regulated so that manufacturers could not solicit information to nonmedical personnel, which facilitated a positive relationship between physicians and the formula companies. By the 1940s and 1950s, physicians and consumers regarded the use of formula as a well known, popular, and safe substitute for breast milk. Consequently, breastfeeding experienced a steady decline until the 1970s (Fomon, 2005).

Currently, many believe the development and advertisement of infant formula has once again negatively impacted the practice of breastfeeding. Although the breastfeeding rate was 90% in the 20th century, it has decreased to approximately 42% in the 21st century (Gaynor, 2003).

La Leche League was founded in 1956 after breastfeeding rates in the United States dropped to about 20%. Today, La Leche League has groups in all 50 states and many countries worldwide. Its goals include promoting understanding of breastfeeding as a part of child development and providing support and education for breastfeeding mothers (La Leche League, 2010). La Leche League utilizes peer support groups in

breastfeeding promotion in addition to supporting World Breastfeeding Week and other breastfeeding promotion initiatives. All La Leche League support group leaders have been specially trained and accredited in breastfeeding support. La Leche League also operates an online help form, online discussion forums, and podcasts to enable remote access to breastfeeding support resources (La Leche League, 2010).

In Ghana oral literature had it that in the early 1930s and 1940s breastfeeding was practiced by a lot of women. In this period there were no substitute for breast milk and healthy mothers had no problem breastfeeding their babies since the milk flowed copiously. The duration of breast feeding was long as some women breastfed their babies for more than three years. It was also said that gruels made from starchy roots, plantain and cereals were given to babies as early as one month old. Since feeding bottles were nonexistent calabashes were used.

Sometimes cupped hand was used as spoons. The cupped hand was put to the mouth and gruels poured into it for the baby to drink. Where the baby refuses, his nose was pinched to prevent him from breathing and was therefore forced to open his mouth to gulp down. This was done without considering whether the baby was physiologically ready to digest the gruel or not. One can only imagine the effect these could have on the infant. The psychological trauma, the physiological discomfort, the environmental and sanitary condition led to several ailments which affected infant morbidity and mortality.

Several years down the line, with improved technology and education much of these practices have become things of the past and better ways of infant feeding have been introduced. The Ghana Infant Nutrition Action Network (GINAN) in collaboration with the National Council on Women and Development (NCWD) organized a training

workshop on peer group counseling and breastfeeding promotion for market women in Accra, Ghana in February 1995. The main objective of this project was to provide peer counseling services and to make the market place a baby-friendly environment. It aimed to train market women as key promoters of breastfeeding in the market place to provide on the spot counseling services to their breastfeeding colleagues. The purpose of this was to increase awareness and knowledge of nutritional, emotional and contraceptive importance of breastfeeding (World Alliance for Breastfeeding Action, 2010).

Raw milk formulas

As physicians became increasingly concerned about the quality of such foods, medical recommendations such as Thomas Morgan Rotch's "percentage method" (published in 1890) began to be distributed, and gained widespread popularity by 1907. These complex formulas recommended that parents mix cow's milk, water, cream, and sugar or honey in specific ratios to achieve the nutritional balance believed to approximate human milk reformulated in such a way as to accommodate the believed digestive capability of the infant (Fomon, 2005).

At the dawn of the 20th century in the United States, most infants were breastfed, although many received some formula feeding as well. Home-made "percentage method" formulas were more commonly used than commercial formulas in both Europe and the United States. They were less expensive and were widely believed to be healthier. However, formula-fed babies exhibited more diet-associated medical problems, such as scurvy, rickets and bacterial infections than breastfed babies. By 1920, the incidence of scurvy and rickets in formula-fed babies had greatly decreased through the addition of orange juice and cod liver oil to home-made formulas.

Bacterial infections associated with formula remained a problem more prevalent in the United States than in Europe, where milk was usually boiled prior to use in formulas (Solomon, 2008).

In the 1920s and 1930s, evaporated milk began to be widely commercially available at low prices, and several clinical studies suggested that babies fed evaporated milk formula thrive as well as breastfed babies. By the late 1930s, the use of evaporated milk formulas in the United States surpassed all commercial formulas, and by 1950 over half of all babies in the United States were reared on such formulas (Solomon, 2008).

Commercial formulas

In parallel with the enormous shift (in industrialized nations) away from breastfeeding to home-made formulas, nutrition scientists continued to analyze human milk and attempted to make infant formulas that more closely matched human milk and its composition. Maltose and dextrin were believed nutritionally important, and in 1912, the Mead Johnson Company released a milk additive called Dextrin-Maltose. This formula was made available to mothers only by physicians. In 1919, milk fats were replaced with a blend of animal and vegetable fats as part of the continued drive to closer simulate human milk. This formula was called SMA for "simulated milk adapted (Fomon, 2005).

In the late 1920s, Alfred Bosworth released Similac (for "similar to lactation"), and Mead Johnson released Sobee. Several other formulas were released over the next few decades, but commercial formulas did not begin to seriously compete with evaporated milk formulas until the 1950s. The reformulation and concentration of Similac in 1951, and the introduction (by Mead Johnson) of Enfamil (for "infant meal") in 1959

were accompanied by marketing campaigns that provided inexpensive formula to more hospitals and pediatricians centres. By the early 1960s, commercial formulas were more commonly used than evaporated milk formulas in the United States, which all but vanished in the 1970s. By the early 1970s, over 75% of American babies were fed on formulas, almost entirely commercially produced (Fomon, 2005).

When birth rates in industrial nations tapered off during the 1960s, infant formula companies heightened marketing campaigns in non-industrialized countries. Unfortunately, poor sanitation led to steeply increased mortality rates among infants fed formula prepared with contaminated (drinking) water. Additionally, low-income families may over-dilute in an effort to "stretch" supplies resulting in malnourishment for the infant. Organized protests, the most famous of which was the Nestlé boycott of 1977, called for an end to unethical marketing. This boycott is ongoing, as the current coordinators maintain that Nestlé engages in marketing practices which violate the International Code of Marketing of Breast-milk Substitutes (Fomon, 2005).

Generic Brand Formulas

In addition to commercially marketed brands, generic brands (or store brands) of infant formula were introduced in the United States in 1997, first by PBM Products. These private label formulas are sold by many leading food and drug retailers such as Wal-Mart, Target, Kroger, Loblaws, and Walgreens. All infant formula brands in the United States are required to adhere to the Food and Drug Administration (FDA) guidelines. As reported by the Mayo Clinic: “as with most consumer products, brand-name infant formulas cost more than generic brands. But that doesn't mean that brand-name Similac, Nestle, Enfamil formulas are better. Although manufacturers may vary

somewhat in their formula recipes, the FDA requires that all formulas contain the same nutrient density (Fomon, 2005).

Follow-on and Toddler Formulas

Follow-on or toddler formulas are sold for ages 6 months to 2 years, (when infants are typically breastfed) and are not nutritionally complete nor subject to the same regulations as infant formula. Critics have argued that follow-on and toddler formulas were introduced to circumvent the regulations regarding infant formula and have resulted in confusing advertising (Fomon, 2005).

An early example of follow-on formula was introduced by Wyeth in the Philippines in 1987, following the introduction in this country of regulations on infant formula advertising, but which did not address follow-on formulas (products that did not exist at the time of their drafting) Similarly, while infant formula advertising is illegal in the United Kingdom, follow-on formula advertising of formulas is legal, and the similar packaging and market of formula results in follow-on advertisements frequently being interpreted as advertisements for formula. These products have also recently fallen under criticism for contributing to the childhood obesity epidemic in some developed countries due to their marketing and flavoring practices (Fomon, 2005).

Nutritional Content

Besides breast milk, infant formula is the only other milk product which the medical community considers nutritionally acceptable for infants under the age of one year (as opposed to cow's milk, goat's milk, or follow-on formula). Supplementing with solid food in addition to breast milk or formula begins during weaning, and most babies begin supplementing about the time their first teeth appear, usually around the age of

six months. Although cow's milk is the basis of almost all infant formula, plain cow's milk is unsuited for infants because of its high casein content and low whey content and untreated cow's milk is not recommended before the age of 12 months. The infant intestine is not properly equipped to digest non-human milk, and this may often result in diarrhea, intestinal bleeding and malnutrition (Kerr & Désirée, 2008).

To reduce the negative effect on the infant's digestive system, cow's milk used for formula undergoes processing to be made into infant formula. This includes steps to make protein more easily digestible and alter the whey-to-casein protein balance to one closer to human milk, the addition of several essential ingredients (often called "fortification"), the partial or total replacement of dairy fat with fats of vegetable or marine origin, etc. The nutrient content of infant formula for sale in the United States is regulated by the Food and Drug Administration (FDA) based on recommendations by the American Academy of Pediatrics Committee on Nutrition (Kerr & Désirée, 2008).

Uses of Infant Formula

In some cases, breastfeeding is medically contraindicated. These include:

1. **Mother's health:** The mother is infected with HIV or has active tuberculosis. She is extremely ill or has had certain kinds of breast surgery, which may have removed or disconnected all milk-producing parts of the breast (Katy, 2009).

2. **Baby is unable to breastfeed:** The child has a birth defect or inborn error of metabolism such as galactosemia that makes breastfeeding difficult or impossible (Katy, 2009).

3. **Baby is considered at risk for malnutrition:** In certain circumstances infants may be at risk for malnutrition, such as due to iron deficiency, vitamin deficiencies (e.g. vitamin D which may be less present in breast milk than needed at high latitudes where there is less sun exposure), or inadequate nutrition during transition to solid foods (Mamiro, Kolsteren, Roberfroid, Opsomer, & Van Camp, 2005).

4. **Personal preferences, beliefs, and experiences:** The mother may dislike breast-feeding or think it is inconvenient. In addition, breastfeeding can be difficult for victims of rape or sexual abuse; for example, it may be a trigger for posttraumatic stress disorder. Many families bottle feed to increase the father's role in parenting his child (Katy, 2009).

5. **Absence of the Nursing Mother:** The child is adopted, orphaned, abandoned, or in the sole custody of a man or male same-sex couple. The mother is separated from her child by being in prison or a mental hospital. The mother has left the child in the care of another person for an extended period of time, such as while traveling or working abroad (Katy, 2009).

6. **Food Allergies**: The mother eats foods that may provoke an allergic reaction in the infant (Katy, 2009).

7. **Societal Structure:** Breastfeeding may be forbidden at the mother's job, school, place of worship or in other public places, or the mother may feel that breastfeeding in these places or around other people is immodest, unsanitary, or inappropriate (Katy, 2009).

8. Social Pressures: Family members, such as mother's husband or boyfriend, or friends or other members of society may encourage the use of infant formula. For example, they may believe that breastfeeding will decrease the mother's energy, health, or attractiveness (Katy, 2009).

9. Lactation insufficiency: The mother is unable to produce sufficient milk. In studies that do not account for lactation failure with obvious causes (such as use of formula and/or breast pumps), this affects around 2 to 5% of women. Alternatively, despite a healthy supply, the woman or her family may incorrectly believe that her breast milk is of low quality or in low supply. These women may choose infant formula either exclusively or as a supplement to breastfeeding (Katy, 2009).

2. 2 Types of Infant Feeding

Current guidelines for infant feeding developed jointly by the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF), emphasize exclusive breastfeeding for the first six months of life and the subsequent addition of appropriate complementary foods to meet the increasing energy requirements for infant growth. Continued breastfeeding is recommended for the first two years and beyond. Like in many of the sub-Saharan African countries, the practice of breastfeeding in Ghana has been a major aspect of infant feeding (WHO/UNICEF, 2008).

Nursing mothers in Ghana breastfeed averagely for as long as fifteen months, looking at the percentage of mothers practicing breastfeeding and for that duration of time, malnutrition and its associated infant mortality should have been a thing of the past in Ghana. However Ghana is still saddled with the problem of malnutrition among

infants. At a time when infants are supposed to be fed exclusively with breast-milk in Ghana, they are fed alongside with supplementary foods. For instance in a study conducted by Davis, *et. al.,* (2003) on complementary feeding practices in Ghana, water and glucose solutions are widely given to infants, beginning in the first few months of life.

In Ghana, and in most African countries, the traditional complementary food fed to infants is a fermented maize porridge called 'koko'. 'Koko' is generally perceived by mothers as easy to digest and is often the first food introduced to infants and the food of choice during illness (Davis, *et. al.,* 2003).

Exclusive Breastfeeding

Breast feeding is one of the best ways to get your baby off to a healthy start in life. Nursing mothers successfully over the long haul require knowledge, support and practical information and technique to be able to go through effective breast feeding (Weiss 2010). Breast-feeding has a unique biological and emotional influence on the health of both mother and infant. It is furthermore an important determinant of infant health in the prevention of malnutrition and infections (Weiss 2010).

Exclusive breastfeeding is defined as "an infant's consumption of human milk with no supplementation of any type (no water, no juice, no nonhuman milk and no foods) except for vitamins, minerals and medications (Gartner, Morton, & Lawrence, 2005). Exclusive breastfeeding till six months of age helps to protect an infant from gastrointestinal infections in both developing and industrialized countries. The risk of death due to diarrhea and other infections increases when babies are either partially breastfed or not breastfed at all (WHO, 2014).

Colostrum is a form of milk produced by the mammary glands of mammals (including humans) in late pregnancy. Colostrum contains antibodies to protect the newborn against disease, as well as being lower in fat and higher in protein than ordinary milk. The colostrum soon changes and becomes thin and white (transitional milk). Three to four days after delivery the mature breast milk starts to flow. At each feed the breasts produce two types of milk: foremilk, produced at the beginning of feed; and hind milk, which has more fat, energy and essential nutrients. As babies grow it is important they receive the hind milk in order to meet their nutritional needs (Gartner *et. al,* 2005).

Health organizations, including the World Health Organization (WHO), recommend feeding for six months only through breastfeeding (Kramer & Kakuma, 2012). This means that no other foods or drinks other than possibly vitamin D are typically given. After the introduction of foods at six months of age, continued breastfeeding until at least one to two years of age is then recommended. Globally about 38% of infants are only breastfed during their first six months of life (WHO, 2014).

(i) The Process of Milk Production

The endocrine system drives milk production during pregnancy and the first few days after the birth. From the twenty-fourth week of pregnancy (the second and third trimesters), a woman's body produces hormones that stimulate the growth of the breast's milk duct system. Progesterone influences the growth in size of alveoli and lobes; high levels of progesterone, estrogen, prolactin and other hormones inhibit lactation before birth; these hormone levels in the nursing mother drop after birth, triggering milk production. After birth, the hormone oxytocin contracts the smooth

muscle layer of cells surrounding the alveoli to squeeze milk into the duct system (Sobrinho, 2003).

Not all of breast milk's properties are understood, but its nutrient content is relatively consistent. Breast milk is made from nutrients in the mother's bloodstream and bodily stores. Breast milk has an optimal balance of fat, sugar, water, and protein that is needed for a baby's growth and development. Breastfeeding triggers biochemical reactions which allows for the enzymes, hormones, growth factors and immunologic substances to effectively defend against infectious diseases for the infant. The breast milk also has long-chain polyunsaturated fatty acids which help with normal retinal and neural development. Because breastfeeding requires an average of 500 calories a day, it helps the mother lose weight after giving birth (Hendrickson & McKeown, 2012).

(ii) Process of Lactation

(a) Commencement

Breastfeeding can begin immediately after birth. The baby is placed on the mother and feeding starts as soon as the baby shows interest. According to some authorities, increasing evidence suggests that early skin-to-skin contact (also called kangaroo care) between mother and baby stimulates breastfeeding behavior in the baby. Newborns who are immediately placed on their mother’s skin to have a natural instinct to latch on to the breast and start nursing, typically within one hour of birth. Immediate skin-to-skin contact may provide a form of imprinting that makes subsequent feeding significantly easier. In addition to more successful breastfeeding and bonding, immediate skin-to-skin contact reduces crying and warms the baby (Cornell, 2011).

According to studies cited by UNICEF, (2008) babies naturally follow a process which leads to a first breastfeed. Initially after birth the baby cries with its first breaths. Shortly after, it relaxes and makes small movements of the arms, shoulders and head. The baby crawls towards the breast and begins to feed. After feeding, it is normal for a baby to remain latched to the breast while resting. This is sometimes mistaken for lack of appetite and absent interruptions, all babies follow this process. Rushing or interrupting the process, such as removing the baby to weigh him/her, may complicate subsequent feeding. Activities such as weighing, measuring, bathing, needle-sticks, and eye prophylaxis wait until after the first feeding (Gartner *et. al.,* 2005).

(b) Timing

Newborn babies typically express demand for feeding every 1 to 3 hours (8-12 times in 24 hours) for the first two to four weeks. A newborn has a very small stomach capacity. At one-day old it is 5 to 7 ml, about the size of a marble; at day three it is 0.75-1 oz, about the size of a "shooter" marble; and at day seven it is 1.5-2 oz, or about the size of a ping-pong ball. The amount of breast milk that is produced is timed to meet the infant's needs in that the first milk, colostrum, is concentrated but produced in only very small amounts, gradually increasing in volume to meet the expanding size of the infant's stomach capacity (La Leche League, 2010).

According to La Leche League International, experienced breastfeeding mothers learn that the sucking patterns and needs of babies vary. While some infants' sucking needs are met primarily during feedings, other babies may need additional sucking at the breast soon after a feeding even though they are not really hungry. Babies may also nurse when they are lonely, frightened or in pain. Comforting and meeting sucking

needs at the breast is nature's original design. Pacifiers (dummies, soothers) are a substitute for the mother when she cannot be available. Other reasons to pacify a baby primarily at the breast include superior oral-facial development, prolonged lactational amenorrhea, avoidance of nipple confusion, and stimulation of an adequate milk supply to ensure higher rates of breastfeeding success. During the newborn period, most breastfeeding sessions take from 20 to 45 minutes. After one breast is empty, the mother may offer the other breast (La Leche League, 2010).

(c) Location

Most US states now have laws that allow a mother to breastfeed her baby anywhere. In hospitals, rooming-in care permits the baby to stay with the mother and simplifies the process. Some commercial establishments provide breastfeeding rooms, although laws generally specify that mothers may breastfeed anywhere, without requiring a special area. Breastfeeding in public remains controversial in many developed countries (AAP, 2011).

In 2014, newly elected Pope Francis drew world-wide commentary when he encouraged mothers to breastfeed babies in church. During a papal baptism, he said that mothers "should not stand on ceremony" if their children were hungry. "If they are hungry, mothers, feed them, without thinking twice, he said, smiling. “Because they are the most important people here” (World News, 2014).

(d) Position

Correct positioning and technique for latching on are necessary to prevent nipple soreness and allow the baby to obtain enough milk. Babies can successfully latch on to the breast from multiple positions. Each baby may prefer a particular position. The "football" hold places the baby's legs next to the mother's side with the baby facing

the mother. Using the "cradle" or "cross-body" hold, the mother supports the baby's head in the crook of her arm. The "cross-over" hold is similar to the cradle hold, except that the mother supports the baby's head with the opposite hand. The mother may choose a reclining position on her back or side with the baby lying next to her (AAP, 2011).

(e) Latching on

The "rooting reflex" is the baby's natural tendency to turn towards the breast with the mouth open wide; mothers sometimes make use of this by gently stroking the baby's cheek or lips with their nipple to induce the baby to move into position for a breastfeeding session, then quickly moving the baby onto the breast while its mouth is wide open. To prevent nipple soreness and allow the baby to get enough milk, a large part of the breast and areola need to enter the baby's mouth. Failure to latch on is one of the main reasons for ineffective feeding and can lead to infant health concerns (AAP, 2011).

(iii) Benefit of Exclusive Breast Feeding

(a) Saves lives

Exclusive breastfeeding is the single most effective intervention for preventing child deaths, yet less than 40% of infants under 6 months old do not receive the benefits of exclusive breastfeeding. Diarrhea and pneumonia are the leading causes of death among infants in developing countries. Babies who are not breastfed are almost six times more likely to die by the age of one month than those who receive at least some breast milk (Aune *et. al.,* 2014).In developing countries, morbidity and mortality from diarrheal disease is high and there is convincing evidence that breast milk provides

protection against gastrointestinal infection and diarrheal disease (Kramer & Kakuma, 2012).

(b) Protects Against Illness

Early breastfeeding is associated with fewer nighttime feeding problems. Early skin-to-skin contact between mother and baby improves breastfeeding outcomes, increases cardio-respiratory stability and decreases infant crying. Reviews from 2007 found numerous benefits. Breastfeeding aids general health, growth and development in the infant. Infants who are not breastfed are at mildly increased risk of developing acute and chronic diseases and necrotizing enter colitis, infants exclusively breastfed have less chance of developing diabetes mellitus type 1 than those with a shorter duration of breastfeeding. Breastfed infants and children appear to have a lower likelihood of developing diabetes mellitus type 2 later in life. Breastfeeding is also associated with a lower risk of type 2 diabetes among mothers who practice it (Aune, Norat, Romunstad & Vatten, 2014).

The protective effect of breastfeeding against obesity is consistent, though small, across many studies. A 2013 longitudinal study reported less obesity at ages two and four years among infants who were breastfed for at least four months (Moss &Yeaton, 2014). In children who are at risk for developing allergic diseases (defined as at least one parent or sibling having atopy), atopic syndrome can be prevented or delayed through 4-month exclusive breastfeeding, though these benefits may not persist (Greer, Sicherer & Burks, 2008).

(c) Promotes Recovery of the Sick Child

Breastfeeding provides a nutritious, easily digestible food when a sick child loses his or her appetite for other foods. Continued breastfeeding during diarrhea reduces

dehydration, the severity and duration of diarrhea, and the risk of malnutrition. Continued breastfeeding beyond six months accompanied by sufficient quantities of nutritionally adequate, safe and appropriate solid, semi-solid and soft foods, also help ensure good nutritional status and protects against illnesses. Breastfeeding also stimulates an infant's immune system and response to vaccination and, according to some studies, confers cognitive benefits as well (Dorea, 2009).

(d) Provides Total Food Security

Breast milk is a hygienic source of food with the right amount of energy, protein, fat, vitamins, and other nutrients for infants in the first six months. It cannot be duplicated. Breast milk is the only safe and reliable source of food for infants in an emergency (Dorea, 2009).

(e) Meets all Water Requirements

Breast milk is 88% water, exclusively breastfed infants under 6 months old do not need additional fluids, even in countries with extremely high temperatures and low humidity. Offering water before 6 months of age reduces breast milk intake, interferes with full absorption of breast milk nutrients, and increases the risk of illness from contaminated water and feeding bottles.

The moisture content of breast milk is higher than that of infant formulae. Breast milk has enough water to meet the Required Daily Dietary Allowance (RDDA) value for infant per day. Infant formulae requires external source of water for it to meet its RDDA value (Erhinyodavwe, Egele, Idolor, & Ugbune, 2009).

(f) Optimizes a Child's Physical and Mental Growth and Development

Infants fed breast milk show higher developmental scores as toddlers and higher IQs as children than those who are not fed breast milk. Breast milk supplies key nutrients that are critical for health, growth, and development. Breastfeeding protects babies from illnesses that can cause malnutrition, hearing problems, and learning difficulties. Breast-milk's vitamin 'A' component reduces the risk of eye problems, growth failure, illness, and death. It improves intelligence later in life. However, other studies concluded that breastfeeding was associated with increased cognitive development in childhood, although the cause may be increased mother child interaction rather than nutrition (Horta, Bahl, Martines, & Victora, 2007).

(g) Benefits for Women

Exclusive breastfeeding usually delays the return of fertility through lactational amenorrhea, although it does not provide reliable birth control. Breastfeeding may delay the return to fertility for some women by suppressing ovulation. Mothers may not ovulate, or have regular periods, during the entire lactation period. The non-ovulating period varies by individual. This has been used as natural contraception, with greater than 98% effectiveness during the first six months after birth if specific nursing behaviors are followed (Hauck, Thompson, Tanabe, Moon, & Vennemann, 2011).

Breastfeeding helps release beneficial hormones into the lactating mother's body. Oxytocin and prolactin hormones relax the mother and increase her nurturing response. This hormone release can help to enable sleep. Breastfeeding soon after birth increases the mother's oxytocin levels, making her uterus contract more quickly and reducing bleeding. Pitocin, a synthetic hormone used to make the uterus contract

during and after labour, is structurally modelled on oxytocin (Hauck et al, 2011). Breast feeding aids maternal physical and emotional health, breast feeding and depression in the mother are associated (Dias & Figueiredo, 2015). Mothers who successfully breast feed are less likely to develop post-partum depression (Figueiredo *et. al., 2013).*

(h) Economic and Environmental Benefits

Families save money that would have been spent to treat illnesses due to contaminated and inadequate breast milk substitutes. Exclusive breastfeeding eliminates dependence on costly breast milk substitutes, feeding equipment, fuel for food preparation and protects the environment. Breast milk is a naturally renewable, sustainable resource that requires no fuel for preparation, packaging, shipping, or disposal (Perez-Escamilla *et. al.*, 1997).

Mixed Feeding/Side by Side Feeding

Predominantly or mixed infant feeding means feeding breast milk along with infant formula, baby food and even water depending on the age of the child. Formula and pumped breast milk or side by side infant feeding is of uniform consistency and colour, while the milk exhibits properties of organic solution, separating into the cream line layer of fat at the top, milk and a watery blue layer at the bottom (Hanna, Ahmed, Anwar, Petrova, Hiatt, & Hegyi, 2004).

Expressed Milk

This is milk expressed by a nursing mother for storage and later use. Expression occurs with massage or a breast pump. It can be stored in freezer storage bags, containers made specifically for breast milk, a supplemental nursing system, or

a bottle ready for use. Using someone other than the mother/wet nurse to deliver the bottle maintains the baby's association of nursing with the mother/wet nurse and bottle feeding with other people. Breast milk may be kept or stored at room temperature for up to six hours, refrigerated for up to eight days and preserved by freezing for six to twelve months. Research suggests that the antioxidant activity in expressed breast milk decreases over time, but remains at higher levels than in infant formula (Hanna *et. al.,* 2004).

Mothers express milk for multiple reasons. Expressing breast milk can maintain a mother's milk supply when she and her child are apart. A sick baby who is unable to nurse can take expressed milk through a nasogastric tube. Some babies are unable or unwilling to nurse. Expressed milk is the feeding method of choice for premature babies. Viral disease transmission can be prevented by expressing breast milk and subjecting it to Holder pasteurization. Some women donate expressed breast milk (EBM) to others, either directly or through a milk bank. This allows mothers who cannot breastfeed to give their baby the benefits of breast milk (Hanna *et. al.,* 2005).

Babies feed differently with artificial nipples than from a mother's breast. With the mother's breast, the infant's tongue massages the milk out rather than sucking, and the nipple does not go as far into the mouth. Drinking from a bottle takes less effort and the milk may come more rapidly, potentially causing the baby to lose desire for the breast. This is called nursing strike, nipple strike or nipple confusion. To avoid this, expressed milk can be given with spoons or cups. "Exclusively expressing", "exclusively pumping", and "EPing" are terms for a mother who exclusively feeds her baby expressed milk. With good pumping habits, particularly in the first 12 weeks while establishing the milk supply, it is possible to express enough milk to feed the

baby indefinitely. With the improvements in breast pumps, many women exclusively feed expressed milk, expressing milk at work. Women can leave their infants in the care of others while traveling, while maintaining a supply of breast milk (AAP, 2011).

Shared or Wet Nursing

Wet nursing was common throughout history. It remains popular in some developing nations, including those in Africa, for more than one woman to breastfeed a child. Shared breastfeeding is a risk factor for HIV infection in infants. A woman who is engaged to breastfeed another's baby is known as a wet nurse. Shared nursing can sometimes provoke negative reactions in the Anglosphere (AAP, 2011).

Tandem Nursing

Feeding two children at the same time who are not twins or multiples is called tandem nursing. Appetite and feeding habits of each baby may differ, so they may feed at the same or different times, which may involve feeding them simultaneously, one on each breast. Breastfeeding triplets or a larger number of infants is a challenge given the varying appetites of babies. Breasts can respond to the demand and produce larger milk quantities; mothers have breastfed triplets successfully (AAP, 2011).

Tandem nursing occurs when a woman gives birth while breastfeeding an older child. During the late stages of pregnancy, the nursing mothers milk changes to colostrum. While some children continue to breastfeed even with this change, others may wean. Breastfeeding a child while pregnant with another may be considered a form of tandem feeding for the nursing mother, as she provides nutrition for two (AAP, 2011).

Induced lactation

Induced lactation in mothers is also called adoptive lactation, is the process of starting breastfeeding in a woman who did not give birth. This usually requires the adoptive

mother to take hormones and other drugs to stimulate breast development and promote milk production. In some cultures in the world breastfeeding an adoptive child or children creates milk kinship that built community bonds across class and other hierarchal bonds (Morrison & Wambach, 2014).

Re-lactation

Re-lactation is the process of restarting breastfeeding. In developing countries, mothers may restart breastfeeding after a long weaning period as part of an oral rehydration treatment for diarrhea. In developed countries, re-lactation is common after early medical problems are resolved, or because a mother changes her mind about breast feeding. Re-lactation is most easily accomplished with a newborn or with a baby that was previously breastfeeding; if the baby was initially bottle-fed, the baby may refuse to suckle. If the mother has recently stopped breastfeeding, she is more likely to be able to re-establish her milk supply, and more likely to have an adequate supply. Although some women successfully re-lactate after months-long interruptions, success is higher for shorter interruptions (Morrison & Wambach, 2014).

Suckling may be encouraged with a tube filled with infant formula, so that the baby associates suckling at the breast with food. A dropper or syringe without the needle may be used to place milk onto the breast while the baby suckles. The mother should allow the infant to suckle at least ten times during 24 hours, and more times if he or she is interested. These times can include every two hours, whenever the baby seems interested, longer at each breast, and when the baby is sleepy when he or she might suckle more readily. Suckling will keep an increased contact between mother and child, also increase skin-to-skin contact. During re-lactation grandmothers should pull

back and help in other ways. Later on, grandmothers can again provide more direct care for the infant (Morrison & Wambach, 2014).

These techniques require the mother's commitment over a period of weeks or months. However, even when lactation is established, the supply may not be large enough to breastfeed exclusively. A supportive social environment improves the likelihood of success. As the mother's milk production increases, other feeding can decrease. Parents and other family members should watch the baby's weight gain and urine output to assess nutritional adequacy. A WHO manual for physicians and senior health workers citing a 1992 source states: "If a baby has been breastfeeding sometimes, the breast milk supply increases in a few days. If a baby has stopped breastfeeding, it may take 1-2 weeks or more before much breast milk comes (Morrison & Wambach, 2014).

Extended Breastfeeding

Extended breastfeeding means breastfeeding after the age of 12 or 24 months, depending on the source. Worldwide, infants are weaned on average between ages two and four. Breast-feeding continues until children are six or seven years old in some cultures but in other countries extended breast-feeding is less common. In Western countries such as the United States, Canada, and Great Britain, extended breastfeeding is relatively uncommon and can provoke criticism. In the United States, 22.4% of babies are breastfed for 12 months, the minimum amount of time advised by the American Academy of Pediatrics. In India, mothers commonly breastfeed for 2 to 3 years (Stein, Boies & Snyder, 2004).

2.3 Factors Influencing Infant Feeding

The World Health Organization (WHO) recommends that infants should be exclusively breastfed for the first six months of life to achieve optimal growth, development and health. Thereafter, to meet their evolving nutritional requirements, infants should receive nutritionally adequate and safe complementary foods while breastfeeding continues for up to two years of age or beyond (WHO, 2008).

The appropriate time to introduce solid foods is a controversial issue. Some nutritionists suggest introducing solid foods as early as four to six months after birth, while some suggest that the digestive and immune systems of infants are not developed sufficiently at this point to handle solid foods and argue that premature introduction of solid foods may lead to food allergies, poor digestion, and obesity (AAP, 2011).

More recent research suggests that delaying certain food introductions, such as dairy, beyond six months may actually be associated with an increase in allergic symptoms such as eczema. The American Academy of Pediatrics recommends breastfeeding as the sole source of nutrition for about six months, followed by a combination of breast milk and solid foods throughout the first year (AAP, 2011).

Factors Influencing Infant Feeding Initiation

(i) Socio-Demographic Factors:

Mothers' education levels are associated with breastfeeding initiation. Mothers who have a college or university education are more likely to initiate breastfeeding than mothers with a high school education or less (Sinclair *et. al.,* 2003).

Mothers with lower income levels are less likely to initiate breastfeeding than mothers with higher income levels (Sinclair *et. al*., 2003) A mother's marital status may also influence breastfeeding initiation; a study of infant feeding practices in Northern Ontario found that mothers who are single, divorced or widowed are less likely to initiate breastfeeding than married women (Sinclair *et. al.,* 2003).

Specifically older and more educated women are the subgroup most likely to choose breastfeeding as their preferred infant feeding method, and generally they breastfeed their children longer than other groups (AAP, 2011). Older women are more likely to breastfeed exclusively (Arora *et. al.,* 2000). Multiple studies addressing the factors associated with the infant feeding practices have identified adolescent mothers as one group that is unlikely to breastfeed. In a study by De La Mora (1999), the attitudes of married women concerning breastfeeding were more positive than were the attitudes of single mothers (Volpe & Bear, 2000).

(ii) Personal Factors

Naturally, newborns and infants have little control over what they eat, and their parents are responsible for selecting and providing any source of nourishment they receive. The clear ideal to shoot for, in virtually all circumstances, is breastfeeding. The composition of breast milk, even in mothers who are not optimally healthy, is still clearly superior to formula. The decision about whether and how long to breastfeed is complex for many mothers, and often involves issues related to physical challenges, employment outside the home, and lack of support for breastfeeding from the social and home environment (Kramer, Moodie & Dahhou, 2011).

The support that a mother receives can influence whether or not she initiates breastfeeding. An Australian study found that mothers with a high perceived breastfeeding support were more likely to initiate breastfeeding than mothers receiving medium or low support. The timing of a decision for how to feed a baby appears to influence breastfeeding initiation. Mothers who decide how to feed their babies before they become pregnant and mothers who intend to breastfeed for longer periods of time are more likely to initiate breastfeeding than mothers who intend to breastfeed for shorter periods of time or are unsure of how long they will breastfeed (Blyth, 2004).Some women fear that breast feeding will negatively impact the look of their breast; however a 2008 study found that feeding had no effect on a woman's breast (Ireland, 2011).

(iii) Environmental

Attending prenatal classes appears to be associated with breastfeeding initiation. Mothers who attend prenatal classes are more likely to initiate breastfeeding than mothers who do not attend (Sinclair *et. al.,* 2003). As well, factors related to the hospital that a mother gives birth in may influence whether or not she initiates breastfeeding. In hospitals, rooming-in care permits the baby to stay with the mother and improves the ease of breastfeeding. Research suggests that nursing mothers whose infants are brought to them every three hours and nursing mothers whose infants are brought to them for nighttime feedings are more likely to initiate breastfeeding (Batal & Boulghaurijian, 2005).

Hospital practices may also affect infant feeding practices, with regards to the initiation and duration of breastfeeding, and the introduction of infant formulas. The role of the healthcare professional can be very critical in providing women with the

information they need to make the decision on how to feed their babies(Black, et al., 2008).Public breast feeding is forbidden in some countries, not addressed by law in others and a legal right in others. Even given a legal right some nursing mothers find it reluctant to breast feed which affects breast feeding (Wolf, 2008).

(iv) Working and Breastfeeding

Work is the most commonly cited reasons for not breast feeding (Galson, 2008). Employment of mothers outside the home, especially full-time employment, has a negative influence on duration of breastfeeding. Employment appears to have a less deleterious effect on initiation of breastfeeding. Among mothers of infants in their first year, 35.5% work full time and 16.1% work part time outside the home; for mothers of children aged 12 to 24 months, the rates are 40% and 17%, respectively. Therefore, improving the ability of mothers to breastfeed or to express and store milk in the workplace would likely contribute to higher US breastfeeding rates (Dietz & Hunter, 2009).

Women frequently attribute early weaning to unsupportive work environments. Lack of privacy and adequate time to express breast milk are cited as barriers. Other impediments include employers' perception that the presence of infants in the workplace reduces mothers' productivity, regulations and other rules that bar children from the workplace, and a lack of child care close to the workplace (Raju, 2006).

Women's experience of workplace-related barriers to breastfeeding varies by occupation. Professional women have significantly greater success in breastfeeding than do women in such occupations as retail sales, administrative support, and construction trades. Professional women typically have more autonomy, enabling

greater privacy to breastfeed and greater freedom to accommodate the timing demands of lactation. They also may have greater access to employer-sponsored lactation programs than the nonprofessional working nursing mothers, even in the same company. Another study found that women in food and health service occupations did not differ greatly in breastfeeding from professional women; these women likely had flexibility in arranging their work schedules (Hansen, 2007).

In 2000, only 11% of mothers who worked fulltime were still breastfeeding at 1 year, as opposed to19% of mothers who worked part-time and 22% of mothers who did not work (Ross Product Division, 2000). Several prior studies have examined the issue of the timing of the return to work, workplace characteristics, and breastfeeding duration. Taking maternity leave could influence the extent to which women who have chosen to initiate breastfeeding feed their infants. Maternity leave duration was highly associated with duration of breastfeeding for black and white women. White professional women were more likely to continue breastfeeding after returning to work (Hartig *et. al.,* 2007).

2. 4 Nutrient Needs of Infants.

Infancy is characterized by extremely rapid physical growth and development. During the first few days of life, most infants lose a little bit of weight. But, within 7 to 10 days, they typically regain their birth weight and set off at a pace of growth that, on average, more than double their initial birth weight in four to six months and triples it within the first year of life. At the same time, the individual organ systems of the infant are developing to allow for increasingly more complex functions (Andres, Cleves & Bellando, 2011).

Children under one year do not have fully developed organ system, they need food that is easy to digest and contains enough calories, vitamins, minerals, and other nutrients to grow and develop normally. Infants also need the proper amount of fluids for their immature kidneys to process (Andres *et. al.,* 2011).

According to Andres *et. al,* (2011), protein energy malnutrition and micronutrient under-nutrition occur together. It is an important part of weaning strategies to optimize nutritional status and to tackle under-nutrition-related problems as a group for maximum effectiveness. Traditionally, weaning foods are liquids and semisolids which are later replaced by foods eaten by older family members. In some cases these foods can be filling and yet not meet the child's nutrient needs.

Carbohydrates

Carbohydrates are a preferred energy source for body functions (Whitney, DeBruyne, Pinna, & Rolfes, 2007). Carbohydrates fall into these major categories: simple sugars or monosaccharide (e.g., glucose, galactose, fructose, and mannose), double sugars or disaccharides (e.g., sucrose, lactose, and maltose), and complex carbohydrates or polysaccharides (e.g., starch, dextrin, glycogen, and indigestible complex carbohydrates such as pectin, lignin, gums, and cellulose). Dietary fiber is another name for indigestible complex carbohydrates of plant origin (these are not broken down by intestinal digestive enzymes). Sugar alcohols, including sorbitol and mannitol, are also important to consider for infants (Kleinman, 2009). Carbohydrates are necessary in the infant's diet because they:

i. supply food energy for growth, body functions, and activity.
ii. allow protein in the diet to be used efficiently for building new tissue.

iii. allow for the normal use of fats in the body and provide the building blocks for some essential body compounds

(b) Protein

According to the Institute of Medicine, Food and Nutrition Board (2003) all proteins are combinations of about twenty (20) common amino acids. Some of these amino acids are manufactured in the body when adequate amounts of protein-rich foods are eaten. Nine amino acids that are not manufactured by the human body and must be supplied by the diet are called "essential" or "indispensable" amino acids. These include: histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, and valine. Two other amino acids, cystine and tyrosine, are considered essential for preterm and young term infant because enzyme activities involved in their synthesis are immature.

Infants require high quality protein from breast milk, infant formula, and/or complementary foods. Proteins

i. build, maintain, and repair new tissues, including tissues of the skin, eyes, muscles, heart, lungs, brain, and other organs;
ii. manufacture important enzymes, hormones, antibodies, and other components.
iii. perform very specialized functions in regulating body processes.
iv. serve as a potential source of energy if the diet does not furnish sufficient kilocalories from carbohydrate or fat. As with energy needs, protein needs for growth per unit of body weight are initially high and then decrease with age as growth rate decreases.

In developing countries, infants who are deprived of adequate types and amounts of food for long periods of time may develop kwashiorkor, resulting principally from a

protein deficiency; marasmus, resulting from a deficiency of calories; or marasmic-kwashiorkor, resulting from a deficiency of calories and protein. In the United States, very few infants suffer from true protein deficiency and cases of kwashiorkor are rare (Kleinman, 2009).

(c) Lipids

Lipids include fats and oils and related compounds, such as cholesterol and sterols (Brown, 2005). Fatty acids are the major constituent of many lipids. Fatty acids that must be provided in the diet to maintain health are called essential fatty acids. Linoleic acid (abbreviated 18:2n-6 or LA) and linolenic acid (18:3n-3 or ALA) are both essential fatty acids. Small amounts of linoleic and linolenic acid must be provided in the diet. Two other fatty acids, arachidonic acid (20:4n-6or ARA) and docosahexaenoic acid (22:6n-3 or DHA), also known as long-chain polyunsaturated fatty acids (LCPUFA), are derived from linoleic acid and linolenic acid respectively. They are considered essential fatty acids only when linoleic acid and linolenic acid are lacking in the diet (Kleinman, 2009).

Infants require lipids in their diets because they:

i. supply a major source of energy. Fat supplies approximately 50 percent of the energy consumed in breast milk and infant formula;
ii. promote the accumulation of stored fat in the body which serves as insulation to reduce body heat loss, and as padding to protect body organs;
iii. allow for the absorption of the fat-soluble vitamins A, D, E, and K.
iv. provide essential fatty acids that are required for normal brain development, healthy skin and hair, normal eye development, and resistance to infection and disease.

Cholesterol and Fatty Acids in Infant Diets

Fats supply infants with energy for their liver, brain, and heart. The current recommendation for infants younger than age one is to consume a minimum of 30 grams of fat per day (Institute of Medicine, 2005). Linolenic acid is omega-3 fatty acid with DHA (docosahexaeonic acid) which plays a critical role in neurological development and visual acuity. Maternal DHA intake provides evidence that mothers who consume more fish have higher breast milk concentrations of DHA (American Academy of Pediatrics, 2012).Mothers who are unable to or choose not to breastfeed should select an infant formula that contains omega-3 essential fatty acids (Hadders-Algra, 2010).

Trans fats, which are believed to be similar to saturated fats in their atherosclerotic affect, are found in fat that has been modified to a more solid form, such as polyunsaturated oils used to make spreadable margarine. They are present in most American diets, thus may be present in breast milk but serve no physiologic purpose. Trans fats are not routinely used in the preparation of infant formulas (Hadders-Algra, 2010).

Vitamin and Mineral Supplements

Vitamins are organic molecules that do not provide energy, but are needed to regulate body processes (Smolin& Grosvenor, 2008). Vitamins are usually classified into;

(1) Water-soluble vitamins (e.g. ascorbic acid, thiamine, riboflavin, niacin, pyridoxine, biotine, pantothenic acid, folate and cobalamin.

(2) Fat soluble vitamins (e.g. A, D, E, K). Many vitamins serve as coenzymes for reaction to release energy from carbohydrate, fat, protein and alcohol (Smolin &

Grosvenor, 2008). Excessive amounts of certain vitamins and minerals, in the form of drops or pills, can be toxic or even fatal to infants (Lawrence& Lawrence, 2005).

Water

Infant's water needs are met from consuming breast milk, infant formula, and complementary foods. Supplemental water is not necessary, even in hot, dry climates, and may have severe consequences if given in excess (Kleinman, 2009). An infant's health care provider may recommend feeding a small amount of sterile water (4 to 8 oz per day) in a cup when complementary foods are introduced at the appropriate time. Sterile water is water that is brought to a very bubbly boil, boiled for 1 to 2 minutes, and then allowed to cool (Kleinman, 2009).

Water is required by infants for:

i. body temperature regulation
ii. transport route (fluid medium) for nutrients and metabolic waste products
iii. cell metabolism and normal kidney function.

Water and Renal Solute Load of Foods

Water is an essential nutrient that must be consumed in a diet for survival. Death occurs within only a few days without water (Smolin & Grosvenor, 2008). The kidney needs water to easily excrete waste products, called solutes, via the urine. Solutes are "end products" formed after food has been fully digested and metabolized. The term used to express the relative amount of solutes from a food or a mixture of foods presented to the kidney for excretion is "renal solute load." The higher the renal solute load of a food, the more water is required to properly excrete the byproducts that result from digestion and metabolism of the food. The immature kidneys in very

young infants have difficulty handling the byproducts of foods with a high renal solute load (Kleinman, 2009).

These foods include cow's milk and high protein foods. Breast milk has a lower renal solute load compared to infant formulas and diluted evaporated whole-milk formulas; cow's and goat's milk have a much higher renal solute load than infant formulas (Kleinman, 2009). Owning to their very high renal solute load, cow's milk, highly concentrated infant formula, undiluted evaporated milk, or boiled undiluted cow's milk should not be fed to infants. When milk is boiled, some of the water in it evaporates leading to an excessive concentration of protein and minerals.

Micronutrient Overview

When it comes to vitamins and minerals, it is the quality of the breastfeeding mom's diet that is extremely important. In the case of formula-fed infants and older children consuming solid foods, it's the quality of the formula and the foods that is important.

Sun exposure is a way to get vitamin D, but unprotected exposure for infants under six months is generally not recommended. A healthy supply means the right amount, because over-consumption and excess intake of macronutrients can be just as problematic for infants as under-consumption (Allen, 2012).

Nevertheless, infant micronutrient status tends to be poor at six months of age and is often attributed to substitution of breast milk by nutrient-poor fluids and foods, low birth weight and/or preterm delivery, and/or infant morbidity, while the role of substitution by foods of low nutrient density on nutritional status may not have been considered adequately (Allen, 2012).

Infants who experience iron deficiency during the first 6–12 months of life are likely to experience persistent effects of the deficiency that alter functioning in adulthood.

A lack of sufficient iron intake may significantly delay the development of the central nervous system as a result of alterations in morphology, neurochemistry, and bioenergetics. Depending on the stage of development at the time of iron deficiency, there may be an opportunity to reverse adverse effects, but the success of repletion efforts appear to be time dependent. Publications in the past several years describe the emerging picture of the consequences of iron deficiency in both human and animal studies (American Society for Nutrition, 2016).

There are many high-quality infant formulas on the market that contain all of the essential nutrients that babies need for normal growth and development. However, in almost all cases, the best bet for optimal nourishment of infants is breastfeeding by a mother whose diet is filled with a balanced mix of whole, natural foods like those we feature on the World's Healthiest Foods website. With that said, there are some nutritional deficiencies that are more common in infants and young children, most notably vitamin D (Allen, 2012).

In 2008, the American Academy of Pediatrics (2011) doubled the recommended daily intake of vitamin D for infants and concluded that both breastfed and formula-fed infants could not receive adequate amounts of vitamin D without some form of supplementation. The recommendation is for babies to receive 400 IUs (10 mcg) of liquid vitamin D starting in the first few days after birth. Once solids are introduced, you can incorporate foods that are good sources of vitamin D, such as fish, eggs, and fortified foods and decrease supplementation. Sun exposure is another way to get vitamin D, but unprotected exposure for infants under six months is generally not recommended (American Society for Nutrition, 2016).

Table 1: Dietary Reference Intakes (DRIs) of Infants between the Ages of 0-12 Months Old

Nutrient	0-6 months	7-12 moths
Energy (calories)	520-570	676-743
Protein (grams)	9.1	13.5
Vitamin A (mcg RE)	40	500
Vitamin D (mcg)	10	10
Vitamin E(mg alpha-TE)	4	5
Vitamin K (mcg)	2	2.5
Thiamin (mg)	0.2	0.3
Riboflavin (mg)	0.3	0.4
Pantothenic Acid	1.7	1.8
Vitamin B6 (mg)	0.1	0.3
Folate (mcg)	65	80
Vitamin B12	0.4	0.5
Choline (mg)	125	150
Biotin (mcg)	5	6
Vitamin C (mg)	40	50
Calcium (mg)	200	260
Phosphorus	100	275
Magnesium (mg)	30	75
Iron (mg)	27	11
Zinc (mg)	2	3
Iodine (mcg)	110	130
Selenium (mcg)	15	20
Copper (mcg)	200	220
Manganese (mg)	0.3	0.6
Chromium (mcg)	0.2	5.5
Potassium (mcg)	400	700
Sodium (mg)	120	370

Source: Dietary Reference Intakes (DRIs): Recommended Dietary Allowances for infants (RDAs) and Adequate Intakes (AIs), Food & Nutrition Board, Institute of Medicine, National Academy of Sciences (NAS), and 1998 - 2010.

2.5 Energy Intake and Growth Rate of infants

Anyone who spends any time with babies recognizes that they grow and change almost before your eyes. In the span of 12 months, most infants learn to sit up, cut many teeth, start to crawl, move from crawling to walking, begin to communicate verbally, and triple their body weight. At no other time in the child's life, will he/she

again experience such rapid growth and development. Good nutrition is the key to ensuring that growth and development proceeds optimally (Andre *et. al.,* 2011).

Infants need energy from food for activity, growth, and normal development. Energy comes from foods containing carbohydrate, protein, or fat. Infants are capable of regulating their intake of food to consume the amount of kilocalories they need (Butte, 1997). A general indicator of whether an infant is consuming an adequate number of kilocalories per day is the infant's growth rate in length, weight, and head circumference. An infant's growth rate can be assessed by periodically plotting the infant's weight, length, and head circumference for age and weight for length on Centers for Disease Control (CDC) growth charts throughout the first year of life (Lucas & Feucht, 2003).

2.6 Infant and Child Mortality in Ghana

Malnutrition is a major cause of illness and death throughout the world. Throughout the developing world, malnutrition affects almost 800 million people, or 20% of the population. Malnutrition often causes disease and disability in the children who survive. Nearly all of these deaths occur in parts of Africa and Asia, where they often result from contamination of the water supply used for the infant's food. The most common form of malnutrition is iron deficiency, affecting up to 80% of the population, as many as four or five billion people (Neil, 2009).

In contrast, young children in many parts of the world are becoming increasingly overweight. What was thought of as a problem for industrialized nations only until recently, is now affecting children in developing countries. A diet deficient in energy, protein, vitamins and minerals can lead to malnutrition in children. Children who are

over nourished may become overweight or obese, which may lead to long-term health problems and social stress (Neil, 2009).

The leading cause of death in children in developing countries is protein-energy malnutrition. This type of malnutrition is the result of inadequate intake of protein and energy. Children who are already undernourished can suffer from protein-energy malnutrition when rapid growth, infection, or disease increases the need for protein and essential nutrients. In Ghana over one-third of child deaths are due to under nutrition, mostly from increased severity of diseases (UNICEF, 2009).

In Ghana, twenty eight percent (28%) of children under the age of five are stunted, 14% are underweight, and 9% are wasted (UNICEF, 2009).Underweight children in 1993 were 27% and have dropped by half (Ghana Demographic and Health Survey 2008). The stunting rate has also decreased by eight percentage points over the same time period but stunting rates are still high, and wasting rates remain virtually unchanged (UNICEF, 2009).

Kwashiorkor

Kwashiorkor is the most prevalent form of protein energy malnutrition (PEM) and was brought into the medical lexicon by Cicely Williams in 1933 working in Ghana. In 1952, an early WHO/FAO report described kwashiorkor as, "...the most serious and widespread nutritional disorder known to medical and nutritional science". The term kwashiorkor means "deposed child" ("deposed" from the mother's breast by a newborn sibling) in Ga dialect in Ghana and "red boy" in another dialect. The latter term comes from the reddish orange discoloration of the hair that is characteristic of the disease.

In Ghana, childhood malnutrition represents the sixth leading cause of death among children under five, with over half of these deaths attributed to kwashiorkor. Those who do not die often suffer from numerous long-term complications, including physical stunting, depending on the age of the child at onset of the disorder (Institute of Statistical, Social and Economic Research, 2001). The low protein intake leads to some specific signs: oedema of the hands and feet, irritability, anorexia, (that is loss of body weight) a desquamative rash, hair discoloration, and a large fatty liver. The typical swollen abdomen is due to two causes: ascites because of hypoalbuminemia (low oncotic pressure), and enlarged fatty liver (Tierney, Emily, Sage, Robert, Shwayder, & Tor, 2010).

Marasmus

Marasmus is a form of severe malnutrition characterized by energy deficiency. A child with marasmus looks emaciated. Body weight is reduced to less than 60% of the normal (expected) body weight for the age (Appleton & Vanbergen, 2013).Marasmus occurrence increases prior to age 1, whereas kwashiorkor occurrence increases after 18 months. Protein wasting in kwashiorkor may lead to edema (Badaloo *et al.,* 2006). Marasmus is caused by a severe deficiency of nearly all nutrients, especially protein and carbohydrates. The malnutrition associated with marasmus leads to extensive tissue and muscle wasting, as well as variable oedema (Appleton & Vanbergen, 2013).

Other common characteristics include dry skin, loose skin folds hanging over the buttocks and armpit. There is also drastic loss of adipose tissue (body fat) from normal areas of fat deposits like buttocks and thighs. The afflicted are often fretful,

irritable, and voraciously hungry (Badaloo, Forreste, Reid, & Jahoor, 2006). It is necessary to treat not only the causes but also the complications of the disorder, including infections, dehydration, and circulation disorders, which are frequently lethal and lead to high mortality if ignored (Badaloo *et. al.,* 2006).

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter discusses the systematic procedures employed for the study. The area covered in the discussion includes research design, selection of study location, population, sample and sampling procedure, development of research instruments used for the study, how the validity and reliability of instruments used for the research were determined, procedures employed to collect data and data analysis.

3.1 Research Design

The research design used for the study was a descriptive survey. A survey involves acquiring information about a group by asking questions, tabulating and describing answers (Jackson, 2009). The information is collected from a group of people in order to describe aspects phenomenon or characteristics, (abilities, opinions, attitudes, beliefs, experiences or knowledge) of the population of which the group is part. Descriptive survey design dwells on a sample of population rather than the whole to make generalizations. The ultimate goal of a descriptive survey is to learn from a large population by surveying a sample of that population. A major strength of a descriptive survey is its ability to acquire information from a larger sample due to instrument used to collect data and the flexibility in administering the instruments (Jackson, 2009).

This design was chosen because it will help answer questions guiding the study as well as the purpose of the study. It will also enable the researcher describe the characteristics of the population by inferring from what was found out about the sample group.

3.2 Selection of Study Location

The study was conducted in Apam, the capital town of Gomoa West in the Central Region. The Gomoa, a Fante-speaking group constitutes the majority of people in the District and they are mainly farmers. However, there are pockets of Ewe speaking fishermen along its coastal beaches who engage in fishing just like any place along the coastal stretch of Ghana. Only a few indigenes are in the formal sector with the rest learning a trade or trading. Factors which influenced the selection of the area were that the researcher had lived in the area before and is well informed about the lifestyle of the people. This made it easy for the researcher to conduct the interview and administer the questionnaire. Being well informed about the lifestyle of the people facilitated easy administration of the instrument and ensured high response rate.

3.3 Study population

Population basically refers to the universe of units from which the sample is selected. A sample is the segment of the population selected for the investigation. It's a subset of the population. It may be very small (individual) or large (an entire population) but generally samples are determined by the nature of the studies and accessibility (Ofori & Dandy, 2011). The population for the research included nursing mothers with their infants aged between 0-12 months old in Apam. The target population of the nursing mothers was categorized into six; comprising housewives, civil servants, traders, artisans, public servants and students. Civil and public servant make up for the formal sector while housewives, traders, artisans and student make up the informal sector.

3.4 Sample and Sampling procedure

According to Gate & McDaniel (2004), all things being equal, a minimum of a hundred respondents is enough samples for a descriptive study. The sample size was considered based on time, financial constraints and management. Sampling technique used for this study was purposive sampling. It is often used when looking at specific phenomena where characteristics may be narrow, easily defined or unusual (Ofori & Dandy, 2011). The type of sampling gave the researcher equal and independent chance to every mother selected for the study.

The total sample size used for the research was 150 respondents. This number was used because it is ideal sample size considering the research design used for the study and also it is convenient to represent nursing mothers from six categories of occupation and also the respondent needed information from a large group thus 150 respondents. Purposive sampling is often used when looking at specific phenomena where characteristics maybe narrow, easily defined or unusual (Ofori & Dandy, 2011). Purposive sampling was used to select three Reproductive and Child Health Care Centers (R.C.H.C) and one hospital in Apam for the study.

R.C.H.C was used because it more appropriate and the researcher will get access to nursing mothers. Also nursing mothers are expected to attend post natal care on scheduled dates making it an ideal site to seek the needed information. This type of sampling also gave the researcher equal and independent chance to interact with every nursing mother selected for the study.

Table 2: Hospital and Weighing Centers used and Number of Nursing Mothers

Hospital/Center	Number of respondent	Percentage
Hospital (St Lukes)	60	40
Main RCH Center	30	20
Mafro Center	30	20
Alata Center	30	20
Total	**150**	**100**

3.5 Development of the Instrument

The data was collected using questionnaire and interview guide. The formation of the questionnaire for nursing mothers was guided by the research questions.

3.5.1 The Questionnaire

A thirty seven (36) item questionnaire consisting of both open and close ended items was constructed. Open ended questions were constructed with which the respondents were free to express their views and opinions on the topic of study. Open ended questions allow for greater variety of responses from participant but sometimes difficult to analyze statistically. Closed ended question are easy to analyze statistically but sometimes limits responses (Jackson, 2009). Open and close ended questions were used because it will enable the researcher get private information from respondent and cover a lot of items on the questionnaire.

3.5.2 Interview

The interview guide for some of the mothers comprised items which probed into breast feeding pattern. It was structured using the same wording and order of questions as specified in the questionnaire. This type of interview permitted uniform

information which ensures data to be compared. This approach does not permit the researcher to ask questions that are not in the guide.

3.6 Reliability and Validity of Instrument

Reliability refers to the ability of a research to produce consistent measurement each time. When an instrument is administered under the same or similar condition to the same population the same or similar result should be obtained (Kumar, 1999). Reliability is based on two assumptions. The first is that the study can be repeated. That is other researchers should be able to replicate the steps of the original research, employing the same categories of the study, the same procedure, the same criteria of correctness and the same perspectives. The second assumption is that two or more people can have similar interpretations by using the categories and procedures (Ofori & Dandy, 2011).

Validity is the appropriateness, meaningfulness and usefulness of the specific reference the researcher makes based on the data collected. The aim is to test the validity and find out whether the instrument is measuring what it was designed to measure (Gates, & McDaniel, 2004). The reliability and validity were done to ensure authenticity and trustworthiness respectively. However the researcher asked herself severally this question "Am I measuring what I think am measuring'' Kumar (1999).

Reliability and validation of the questionnaire were established first by submitting it to the research supervisor for comments. Appropriate changes were made to modify and discard ambiguous and inappropriate items contained in the questionnaire. The questionnaire was pilot tested using 10 nursing mothers in Winneba to determine its appropriateness and quality of information that will be gathered. The result showed similar factors that influenced their feeding practices. The result from the pilot testing

helped to reframe items which helped to elicit irrelevant and undesired information from respondents.

3.7 Procedure for Data Collection

A letter of introduction was written from the Department of Home Economics to the District Health Directorate Gomoa West District Assembly asking for permission to conduct a research study on the topic: Infant Feeding Practices and nutritional knowledge of nursing mothers in Apam. The letter stated clearly the aim of the research and what the study will involve. A letter was given to the researcher to be given to the officer in-charge at the various health facilities.

The researcher began to administer of the questionnaire and interview guide which took a month because the nursing mothers attended weighing once a week on Tuesdays. The purpose of the research was explained to the respondents and the questionnaire items explained to those who needed clarity and those who had any doubt as to the meaning of questions. Questionnaires administered were retrieved the same day.

The instruments for this study were pre-tested at the Winneba RCH center. Ten nursing mothers with infants between the ages of 0-12 months responded to the questionnaires. Pre- testing helped the researcher rectify problems of ambiguity and clarity of some of the questions and also to ascertain the validity and reliability of the responses. It also helped fine-tuned the tools and improved on the data collection technique.

3.8 Data Analysis

Data collected were edited and coded. Percentages, graphs, charts and frequency tables were obtained using the Statistical Package for Social Science (SPSS version 20) software for windows. Relationships between the various variables were obtained by cross tabulations to avoid drawing bias conclusion. The method has the added advantage of using a fixed point in the distribution of different indices and scores across different ages. The data were presented using frequency tables and charts.

CHAPTER FOUR

RESULT

4.0 Introduction

This chapter consists of three (3) main sections: Section A, B and C Section. “A” gives results on demographic and socio-economic data of the respondents, section “B” presents data on the research objectives and “C” gives information on the correlation between variables of the study and presented on frequency distribution tables, percentages and figures.

SECTION A: DEMOGRAPHIC AND SOCIO-ECONOMIC BACKGROUND OF THE RESPONDENT

As indicated in the questionnaire (see appendix "A") the background information of the respondent parents were analyzed while items 1-7 on the questionnaire focused on the background features of the respondents

4.1 Socio-Economic Background of the Respondents

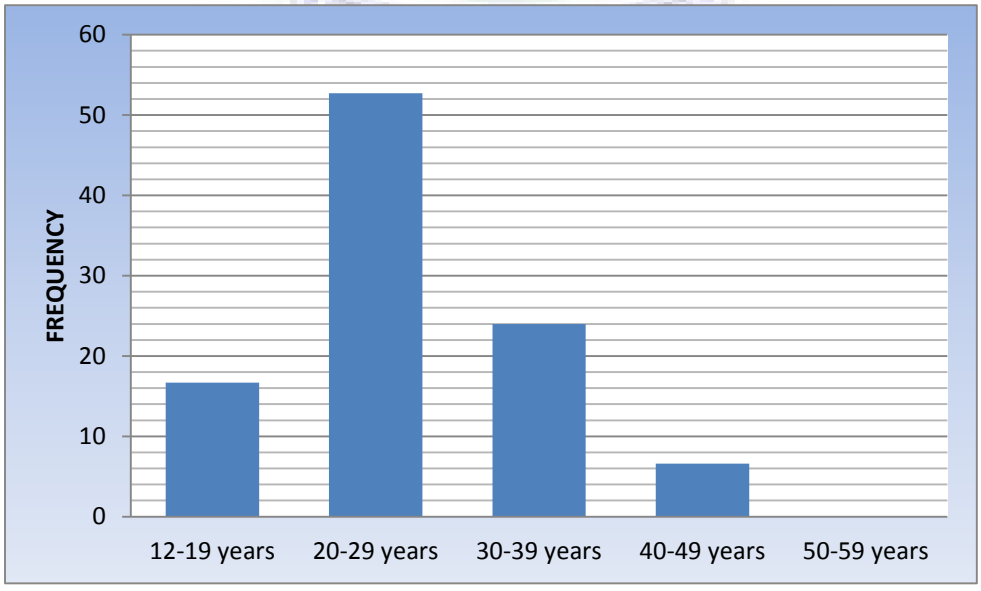

Figure 1: Age distribution of mothers

Fig 1 shows the age of mothers of infants used for the study, 52.7% of the mothers were aged between 20-39 years, 24.0% were between the ages 30-39, and 16.7% were between the ages of 12-19 while 6.6% were between 40-49 years.

Table 3: Age distribution of infants

Age of Infant	Frequency (F)	Percentage (%)
0-2 months	33	22
3-4 months	40	26.6
5-6 months	37	24.7
7-8 months	16	10.7
9-10 months	7	4.7
11-12 months	17	11.3
Total	**150**	**100**

Table 3depicts that 22%of the infants were 2 months and below, 26.6% were between the ages of 3 - 4 months. 24.7% infants were between of 5 - 6 months. However, (4.7%) infants were between the ages of 9 - 10 months while majority of the infants were 3-4 months.

Sex of Infants

Fifty four point seven percent (54.7%) were females and forty five point three (45.3%) were males.

Table 4: Marital Status of Mothers

Marital Status	Frequency (F)	Percentage (%)
Married	83	55.3
Cohabitating	25	16.7
Single	42	28
Total	**150**	**100**

Table 4, shows that 55.3%of the mothers questioned were married, 28% were single with 16.7% cohabitating.

Table 5: Occupation of Mothers

Occupation of Mother	Frequency (F)	Percentage (%)
Housewife	11	7.3
Civil Servant	14	9.3
Trading	73	48.7
Artisan	33	22
Public Servant	7	4.7
Student	12	8
Total	**50**	**100**

Table 5,indicates that 48.7% of the mothers were traders, 22% were artisan, 7.3%t were housewives, 9.3% were civil servants, 8% were students while 4.7% were Public servants.

Table 6: Level of Education of Mothers

Education	Frequency (F)	Percentage (%)
Primary	30	20
Junior High/Middle	54	36
Senior High	22	14.7
Voc/Technical	12	8
Tertiary	21	14
None	11	7.3
Total	**150**	**100**

Table 6, shows 20% of the mothers had primary education, 36% had Junior High School education, 14.7% mothers had Senior High School certificates, 14% mothers had tertiary education. 8% had vocational/technical education while 7.3% had no formal education.

Table 7: The Number of Children of Mothers

No of Children	Frequency (F)	Percentage (%)
1	43	28.7
2	51	38
3	21	14
4	22	14.7
5	6	4
6	1	0.6
7	6	4
Total	**150**	**100**

Table 7, shows that 38% of the mothers had two children, 28.7% had one child, 14.7% had four children, 14% had 3 children while 4% had five children and 0.6% had 6 children.

SECTION B: RESEARCH QUESTIONS

4.2 Research Questions

This section discusses the research questions posed for the study. The four research questions generated were analyzed using frequency distribution tables, percentages, figures and cross tabulations. Items 8 – 36on the questionnaire were focused on this section. The research questions for the study were formulated based on the objectives of the study. Nutritional knowledge of nursing mother, infant breastfeeding practices, the adherence to six (6) months exclusive breastfeeding and benefit of exclusive breastfeeding.

RESEARCH OBJECTIVE ONE:

Nutritional knowledge of mothers

Table 8: Sources of Nutritional Information

Source	Frequency (F)	Percentage (%)
Anti-natal classes	89	59.3
Media	16	10.7
Parent	35	23.3
Friends	7	4.7
No Response	3	2
Total	**150**	**100**

Table 8: shows the source of nursing mothers' nutritional information. From Table 19: 59.3% mothers said they obtained their nutritional information from anti-natal classes, 10.7% said they obtained their nutritional information from the media, 23.3% from their parents, while 2% gave no response.

Table 9: Food Nursing Mothers must eat to produce more Milk

Lactating Mothers Food	**Frequency (F)**	**Percentage (%)**
Fried foods	0	0
Sweets	1	0.7
Soup	147	98
No response	2	1.3
Total	**150**	**100**

From Table 9, 98% thought drinking lot of soups and therefore water during lactation made mothers to produce more milk. (0.7%) stated that sweet helped the nursing mother to produce more milk, one point three percent, (13%) did not comment.

Nursing mothers opinion on increasing energy intakes while breastfeeding

Ninety four percent (94%) of mothers replied "Yes" while 2.7% mothers replied "No", meanwhile 3.3% did not give any response. The mothers who replied "Yes" gave the following reasons: To produce more milk, for the babies to get energy, for nutritious milk and for mothers to get strength to breastfeed.

Asked whether it is advisable for a nursing mother to take food supplement

The mothers where asked whether they think it is advisable for nursing mothers to take food supplement when they were eating well, 21.3% said "Yes" while 30.7% mothers said "No", while as high as 48% mothers gave no response.

Table 10: Maize Meal (koko) as a good source of Vitamins and Minerals

True/False	Frequency (F)	Percentage (%)
True	16	10.7
False	31	20.7
Don't know	103	68.6
Total	**150**	**100**

Table 10, depicts the views of the mothers on whether maize meal (koko) is a good source of vitamin and minerals. 10.7% of the mothers were in agreement that "koko" is a good source of vitamin and minerals, 20.7% mothers disagreed while as high as 68.8% mothers gave no response.

Table 11: Fruits and Vegetables as best sources of Vitamin and Minerals

True/False	Frequency (F)	Percentage (%)
True	58	38.7
False	2	1.3
Don't know	90	60
Total	**150**	**100**

From Table 11, 38.7% were in agreement that fruits and vegetables were the best sources of vitamin and minerals, while 1.3% disagreed, 60% gave no response

Table 12: Protein Foods include Water

True/False	Frequency (F)	Percentage (%)
True	15	10
False	61	40.7
Don't know	74	49.3
Total	**150**	**100**

From Table 12, 10% were in agreement that protein foods include water, while 40.7% disagreed, 49.3% mothers gave no response.

Table 13: Components of a Balanced Diet

Nutrient	Frequency	Percentage (%)
Carbohydrate	54	36
Carbohydrate/Protein	30	20
Carbohydrate/Protein/Vitamins	26	17.4
Carbohydrate/Protein/Vitamins/Minerals	21	14
Carbohydrate/Protein/Vitamin/Minerals/Fats	11	7.3
All nutrients	2	1.3
No Response	6	4
Total	**150**	**100**

Table 13: shows the components of a balance diet. According to the table 36% mentioned one nutrient, 14% mentioned 4 nutrients, and 1.3% mothers mentioned 6 nutrients, while 4% gave no response to the question.

RESEARCH OBJECTIVE TWO

Breastfeeding practices of nursing mothers in Apam

Table 14: The number of times babies were fed a day

Number of times	Frequency (F)	Percentage (%)
4 times	4	2.7
5 times	2	1.3
6 times	3	2.0
7 times	17	11.3
On request	119	79.4
No Responses	5	3.3
Total	**150**	**100**

From Table 14, 2.7% of mothers fed their babies 4 times in a day; 11.3% of the nursing mothers fed their babies 7 times in a day, while 79.4% fed their babies on demand.

Respondents were further questioned whether 3 months maternity leave affected their breastfeeding pattern, 76.2% mothers said "Yes" adding that this affected them because they had to start giving babies other semi solid foods early, while 19.0% mothers replied "No" to whether the 3 month maternity leave affected their breastfeeding pattern, there was one 1 blank which represents 4.8 %.

Hospital influence on the way Babies are fed.

Out of a total of 150 mothers, 86.7% mothers said "Yes" hospitals influenced the way they fed their babies, 13.3% said "No" which implies that they are not influenced by the hospitals. Those who said "Yes" further went on say that;

The nurses taught the nursing mothers how to feed their babies, and taught them the importance of breastfeeding, the hospital influence them on how to hold their babies to latch on and also how to take care of their babies clothing.

Table 15: Who initiated breast feeding the first time after delivery?

Who initiated breastfeeding	Frequency (F)	Percentage (%)
Self	63	42
Midwife	82	54.7
Husband	1	0.7
No Response	4	2.6
Total	**150**	**100**

From Table 15, 54.7% said they were asked to do so by midwives, 42% mothers said they initiated breast feeding on their own, 0.7% said her husband initiated it while 2.6% gave no response.

Table 16: Assistance given to Mothers while feeding their Infants.

Assisters	Frequency (F)	Percentage (%)
Husband	29	19.3
Parent	92	61.3
Caregiver	5	3.3
Family	21	14
No Response	3	2
Total	**150**	**100**

From Table 16, 61.3% mothers involved in the study obtained assistance from their parents, 19.3% were assisted by their husbands while 14% said they obtained assistance from their family members.

Asking whether or not the respondents (mothers) got encouragement from anyone while exclusively breast feeding, 56.7% mothers said they were encouraged, while 39.3% mothers said they were not encouraged, meanwhile 4% mothers gave no responses.

Table 17: Sources of Encouragement to Mothers on Exclusive Breast Feeding

Motivators	Frequency (F)	Percentage (%)
Health worker	40	26.7
Friends	3	2
Parents	64	42.7
Self	40	26.7
Husband	2	1.3
Total	**150**	**100**

Upon further inquiry on who encourages the mothers while exclusively breast feeding their babies, 1.3% mothers commented that it was their husbands, 42.7% also commented that it was their parents. However, 26.7% mothers commented that they personally encourage themselves while exclusively breastfeeding their babes. Meanwhile 26.7% commented it was health workers and 2% commented that they were encouraged by their friends.

Table 18: Advice to Nursing Mothers on what to feed their Infants

Who advices the mother	Frequency (F)	Percentage (%)
Health provider	40	26.7
Friends	3	2
Parents	64	42.7
Self	40	26.7
No Response	2	1.3
Total	**150**	**100**

The Table 18, 42.7% were advised by their parents on what to feed their babies, 26.7% mothers obtained advice from their health providers, 26.7% indicated they knew what to feed their babies, while 1.3% gave no response

RESEARCH OBJECTIVE THREE

Nursing mother's adherence to six months exclusive breast feeding Asked the respondents (mothers) whether they practice exclusive breastfeeding, 62.7% of nursing mothers responded said they practiced exclusive breastfeeding. This was against 37.3% mothers who did not practice exclusive breast feeding.

Upon further enquiry why mothers practiced exclusive breastfeeding 62.7% replied they practiced exclusive breastfeeding and gave the following reasons:

i. 13.3% of the nursing mothers responded that they practiced exclusive breastfeeding because the babies were not strong enough to digest solid food.
ii. 16%mothers said breastfeeding is economical, cheap and available
iii. 6.7% of the nursing mothers said breast milk contains all nutrients in correct proportion.
iv. 7.3% of them others said children fed on milk had a high IQ.
v. 12.7% of them others responded that exclusive breastfeeding saved time.
vi. 6.7% of the mothers said exclusive breastfeeding protected babies from diseases.

However, the number of respondents (37.3% mothers) who replied "No" gave the following reasons:

i. 1.3% of the mothers did not practice exclusive breastfeeding because they were not always available to breast feed the babies
ii. 30% of the mothers did not practice exclusive breastfeeding because they could not produce enough breast milk to meet their babies' needs.
iii. 6% did not practice exclusive breastfeeding because experience taught them that it would be difficult to introduce solid food to their babies after the sixth month.

The respondents (nursing mothers) when asked whether exclusive breastfeeding affected infant growth.

Fifty point seven percent (50.7%) replied "Yes" while 26.7% replied "No", and 22.6% mothers gave no response.

On why some mothers thought exclusive breastfeeding affected growth, the (nursing mothers) said breast milk had essential nutrients and it milk protected babies from diseases.

Table 19: What babies were fed with within the first six month?

First Six Months	Frequency (F)	Percentage (%)
Breast milk only	92	61.3
Breast milk and water	30	20
Breast milk and formulae	10	6.7
Breast milk and "koko"	10	6.7
Breast milk, water, "koko" and formulae	8	5.3
Total	**150**	**100**

From Table 19, 61.3% said their babies were or will be fed breast milk within the first six months, 20% said their babies are fed breast milk and water within the first six months, 5.3% commented their babies are fed breast milk, water 'koko' and formulae in the first six months.

Table 20: What babies were fed with immediately after delivery

Fed immediately after delivery	Frequency (F)	Percentage (%)
Water	11	7.3
Breast milk	137	91.3
Glucose	2	1.3
Total	**150**	**100**

From Table 20, 7.3% of mothers gave their babies water just after delivery, while 91.3% of the mothers gave their babies of breast milk just after delivery, 1.3% said their babies were fed glucose just after delivery.

Table 21: Age (months) at which Mothers should give Complementary Foods

Age (Months)	Frequency (F)	Percentage (%)
1	18	12
2	9	6
3	14	9.3
4	8	5.3
6	88	58.7
No Responses	13	8.7
Total	**150**	**100**

From Table 21, 12% said they started giving other foods aside breast milk to their babies in the first month of delivery, 9.3% mothers commented they introduced other foods to their babies in the third month, 58.7% said that they introduced other foods to their babies in the sixth month.

RESEARCH OBJECTIVE FOUR

Table 22: Benefits of Exclusive Breastfeeding

Benefits of Exclusive Breastfeeding	**True(%)**	**False(%)**	**Don't know**
1. protects the babies against diseases.	92.7	1.3	6
2. provides a nutritious easily digestible food.	89.3	1.3	9.3
3. saves your babies life.	86	4	10
4. is a hygienic food with the right amount of nutrients.	82.7	1.3	16
5. meets all water requirements.	67.3	26	6.7
6. reduces the risk of fatal post-partum hemorrhage for mother.	25.3	6	68.7
7. delays the resumption of ovulation and return of menstrual cycle.	26	34	40

Table 22, indicates the benefits of exclusive breastfeeding, 92.7% of mothers agreed that breast milk protected babies from diseases, 1.3% mothers disagreed that breast milk diseases while 6% had no idea whether breast milk protected babies from diseases. Generally mothers had good idea of the benefit of exclusive breast feeding for six months. However they had poor knowledge of the benefits of exclusive breastfeeding. On poor post partum hemorrhage only 25.3% had knowledge about it. While 6% knew breast milk reduced the risk of postpartum hemorrhage and 68.7% gave no response.

SECTION C

4.3 Correlation between Variables

This section compares the effects of demographic data and breast feeding

Table 23: Age and practice of exclusive breastfeeding.

Age of Mother	Yes	%	No	%
10-19	25	16.67	0	0
20-29	69	46.0	10	6.67
30-39	0	0	36	24.0
40-49	0	0	10	6.67
Total	**94**	**62.67**	**56**	**27.34**

Table 23, shows that 46% of respondents who practiced exclusive breastfeeding and were between the ages of 20-29 years old; 46.0% of these respondents were between 20-29 years old, and remaining 16.67% were between 10-19 years. The entire 10-19 years old breast fed their babies. Thirty percent of the respondents between 30-49 years old did not exclusively breast feed their babies within the first six months.

Table 24: Marital Status of Mothers and Exclusive Breastfeeding

Marital status	Yes	%	No	%
Married	83	55.33	0	0
Cohabiting	11	7.33	14	9.33
Single	0	0	42	28.0
Total	**94**	**62.66**	**56**	**37.33**

All the married respondents' (55.3%) breast fed their babies. According to the Table 24, none of the single mother's (28%) breast fed their babies and less than half the total number of cohabiting nursing mother's breast fed their babies.

Table 25: Education of Mothers and Exclusive Breast Feeding

Education of mother	Yes	%	No	%
Primary	30	20	0	0
JHS	53	35.33	0	0
SHS	11	7.33	12	8
Voc/Technical	0	0	12	8
Tertiary	0	0	21	14
No Response	0	0	11	7.33
Total	**94**	**62.66**	**56**	**37.33**

Mothers with education below SHS (55.33%) breast fed their babies according to this tabulation. Mothers who had higher education like Vocational/Technical and tertiary did not breast feed their babies.

Table 26: Occupation of the Mother and Practice of Breast Exclusive Feeding

Occupation of mother	Yes	%	No	%
Housewife	11	7.33	0	0
Trading	69	46	4	2.66
Public Servant	3	2	4	2.66
Civil Servant	0	0	14	9.33
Artisan	26	17.33	7	4.66
Student	0	0	1	28
Total	**109**	**72.66**	**41**	**27.31**

From Table 26, all housewives (7.33%) exclusively breast fed their babies while civil servants and students did not, all the artisans and public servants did not practice exclusive breast feeding. Most traders (46%) and less than half of the total number and few public artisans also practiced exclusive breastfeeding.

Table 27: Age of Mother and the type of Food given First Six Months

Age	**Breast milk only %**	**Breast milk, formulae %**	**Breast milk, water, koko formulae %**	**Breast milk water %**	**Breast milk, koko%**
10-19	16.7	0	0	0	0
20-29	46	5.3	1.3	0	0
30-39	0	0	4	20	0
40-49	0	0	0	0	6.7
Total	**62.7**	**5.3**	**5.3**	**20**	**6.7**

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Mothers who fell in the 10-19 year group (16.7%) fed their babies with breast milk only in the first six months.

Though 46% the 10-19 year old breast fed their babies water, formulae and 'koko'; 6.7% mothers in the 40-49 age group gave 'koko' and breast milk within the first six months. The 30-39 age groups did not practice exclusive breast feeding at all. The 40-49 year olds breast fed their babies plus additional 'koko'

Table 28: Educational level and those who encouraged mother's to Breast Feed

Education	Self	%	Husband	%	Midwife	%	Total	%
Primary	10	6.6	0	0.6	20	13.3	30	20
JHS	33	22	1	0	19	12.7	53	35.3
SHS	0	0	0	0	23	15.3	23	15.3
Voc/Technical	0	0	0	0	12	8	12	8
Tertiary	5	3.3	0	0	16	10.7	21	14
None	4	2.7	0	0	7	4.7	11	7.3
Total	**52**	**34.7**	**1**	**0.6**	**97**	**64.7**	**150**	**100**

The entire respondents who had SHS education were told by the midwife to breast feed. 22 % JHS graduates initiated breast feeding themselves and (12.7%) by the midwife, majority (20%) of mothers with primary education were told by the midwife to breast feed. ten point seven percent (10.7%) of the mothers with tertiary education waited to be told before they breastfed,2.7% initiated breast feeding by themselves.

Table 29: Occupation and the number of times babies were fed in a day.

Occupation	Four times %	Five Times%	Six Times %	Seven times%	On request%	No response	Total%
Housewife	0	0	2	1.3	4	0	7.3
Trading	0	0	0	2	46.7	0	48.7
Public Servant	0	0	0	0	4.7	0	4.7
Civil Servant	0	0	0	9.3	0	0	9.3
Artisan	0	0	0.7	3.3	18	0	22
Student	0	0	0	0	4	4	8
Total	**0**	**0**	**2.7**	**16**	**77.3**	**4**	**100**

From Table 29, it can be seen that (46.7%) of traders breast fed on demand while (2%) of traders fed their babies7 times a day, all civil servants (4.7%) breastfed on demand. Some of the housewives (2%) fed their babies six times in a day and some of them (4%) fed their babies seven times a day. The majority of the respondents (77.3%) of the mothers fed their babies on demand.

CHAPTER FIVE

DISCUSSION

5.0 Introduction

This chapter discusses the findings of the research and the inference made from them in view of the findings from the literature review. The chapter is put into two main sections. Sections A and B. Section A discusses the demographic and socio-economic data whiles section B discusses the main research questions.

Section A: Demographic and socio-economic data

This section discusses the demographic and socio-economic data influencing the infant feeding practices of mothers in Apam.

In this study most mothers were aged between 20-39 years. A few were below 20 years and also above 39 years. There were no respondents above 50 years. Out of 150 respondent 55.5% were married, 16.7% were cohabitating while 28% were single. A cross tabulation between marital status and breast feeding shows that mothers who are single do not exclusively breast feed their babies. A study of infant feeding practices in North Ontario found that mothers who were single, divorced, or widowed were less likely to initiate breast feeding than married women (Sinclair *et. al,* 2003).

Another study by De La Mora *et. al,* (1999) found, the attitude of married women concerning breastfeeding was more positive than the attitudes of single mothers. This study also seems to suggest the same positive attitude of married women to breast feeding. Mothers who are cohabiting are more likely to be products of single parents or loosely bonded families so are less likely to breastfeed (Klienrnan, 2009). From this study the women who were cohabiting did not exclusively breast feed while married women breastfed their infant compared to single mothers. It appears from this

that mothers who are married and settled in their lives were more stable for family living than unmarried women.

Table 6 shows that 20% of the respondents were primary school graduates, 36% were junior/middle school leavers, 14.7% were senior school leavers, 8% were vocational/ technical school leavers, while 14% were tertiary school leavers and (7.3%) had no formal education. From the data gathered, mothers' level of education and employment status were significantly related to infant feeding practices. Mothers with higher educational background and mothers who were unemployed were not exclusively breastfeeding likewise mothers who were unemployed. Working mothers were less likely to maintain breastfeeding. Educated mothers who were mostly employed are more likely to practice mixed feeding than exclusively breastfeed in the first six months of the child's life. However, in this study however most of the mothers who had some form of education exclusively breast fed their babies.

Table 7 depicts that 28.7% of the nursing mothers had one child. Thirty eight percent (38%) had two children. 14% had 3 children, Five (5) six (6), seven (7) had 4%, 0.6%, 4% children respectively. Regarding the number of children, it revealed that majority of the respondent had between 1-3 children.

SECTION B: MAIN RESEARCH QUESTIONS

This section discusses the main research questions. The questions were generated from the following research objectives:

1. Nutritional knowledge of the nursing mother.
2. Infant feeding practices of nursing mothers in Apam.
3. Nursing mothers adherence to six months exclusive breast feeding.
4. Benefit of six months exclusive breast feeding practices to mothers in Apam.

RESEARCH OBJECTIVE ONE

Nutritional Knowledge of Nursing Mothers

Table 8 shows that 59.3% of mothers obtained their nutritional information from anti-natal classes, 10.7% from the media, 23.3% from their parents and 2% gave no responses. Thus mothers obtained their nutrition information about breast feeding mostly from health centers and health workers and parent. Sixty one point three percent (61.3%) of nursing mothers agreed that water should be given to the new born while a significant percentage gave no response meaning they had no idea. Water is an essential nutrient that must be consumed in a diet for survival. Death occurs within a few days without water. The role water plays in the excretion of waste products by an infant's kidneys is particularly important (Smolin & Grosvenor, 2008).

Evidence emerging from this study indicates majority of the nursing mothers disagreed that water increases the amount of breast milk that the nursing mother produces but rather plays a major role in the excretion of waste products. The kidney needs water to easily excrete waste products, called solutes, via the urine. The higher the renal solute load of a food, the more water is required to properly excrete the byproducts that result from digestion and metabolism of the food. Mothers need to drink a lot of water to help them deal with the renal solute load rather than increase breast milk production (Fomon, 2005).

Ninety eight percent (98%) of the respondent said through drinking a lot of soups during lactation make the mother produce more milk. From Table 9: 0.7% of the mother said that sweets would help the nursing mother to produce a lot of milk while13% did not comment. According to Sswewagudde (2013), a breast feeding mother needs a balanced diet, high in fluids and other essential foods. Fish soup

contains lot of proteins, which can help the mother to improve her hydration. This also stimulates breast milk production and should be taken more often. Soy contains calcium, which is important for both the mother and the baby.

The more it is taken, the more milk production will be realized. Porridge made of maize or millet, contains carbohydrates that help to restore the lost calories during milk production. Nursing requires many calories each day to prevent mothers from suffering fatigue and creating room for best milk production. Oats contain minerals that help in stimulating the oxytocin hormone that produces milk. Nursing mothers in the Apam community take in a lot of soups because of what they have heard from their grandmothers, mothers-in-law, and other relations.

Studies on maternal DHA intake provides evidence that mothers who consume more fish have higher breast milk concentrate (American Academy of Pediatrics, 2012). Fruits and vegetables are the main source of vitamins and minerals needed to regulate body process and also to protect the infants from diseases (Smollin & Grosvenor, 2008). Yet most mothers in this study did not mention fruits and vegetables as part of a balanced diet. This is indicative to the fact that most of the mothers studied did not have the knowledge of what a balanced diet is.

Ninety eight percent (98%) of mothers agreed that it is important to increase the intake of foods that provide energy and other nutrients, only a few disagreed. This minority is formed by those who do not take advantage of antenatal care. Those who attend post natal care are told to drink plenty of soups and eat plenty of food to get more milk.

According to Ssewagudde (2013), breast milk production will certainly draw nutrients and energy from the mother and therefore she is entitled to enough food to replace the

one that is used for milk production. In this case, a mother needs to be well hydrated and should have a well-balanced diet to provide enough milk for her baby. While the baby is still on a full breast milk diet, the mother should always relax and concentrate on feeding. Asked whether nursing mothers really understood the functions of the food they fed their infants and to test their nutritional knowledge, majority gave wrong answers because most of the mothers were not educated and this made it difficult for most of the mothers to understand the underlying nutritional concept hence their poor nutritional knowledge.

Asked to indicate their idea of a balanced diet by mentioning what they taught a balanced diet contained. A lot of them (36%) mentioned 'koko' which is a carbohydrate while 20% respondent mentioned carbohydrate and protein, 1.3% of respondents' taught a balanced diet should contain all nutrients. They mentioned meals like 'koko', milk and fruits as balanced diets. Cereal foods common in the area includes maize and rice. The prices of these cereals are relatively moderate as compared to formulae and processed cereals like cerelac, cerevita and the rest. According to Klienman (2009), infants required high quality protein from breast milk, infant formula, and/or complementary food to perform certain functions in their bodies.

In developing countries, infants who are deprived of adequate types and amounts of food for long periods may develop kwashiorkor, resulting principally from a protein deficiency; marasmus, or marasmic-kwashiorkor from a deficiency of calories and protein (Kleinman, 2009).

RESEARCH OBJECTIVE TWO

Infant feeding practices of nursing mothers in Apam

Eighty six percent (86.7%) agreed that hospital positively influenced the way they fed their babies. A mother giving birth in the hospital may be influenced by feeding practices at that hospital with regards to the initiation and duration of breastfeeding and the introduction of infant formulas. The role of the healthcare professional can be very critical in providing women with the information they need to make the decision on how to feed their babies.

Negative attitudes and lack of knowledge on the part of healthcare providers can be barriers to successful infant feeding practices (Black, *et. al,* 2008). Majority of nursing mothers indeed mentioned that nurses at hospitals and health centers had influenced them. These were how the nurses influenced them: taught them how to feed their babies, the importance of breastfeeding, how to hold their babies to latch on, how to take care of babies clothing. However those who did not find hospitals helpful were those who did not give birth at a hospital and due to time constraints were also not able to attend post natal clinics.

From Table15, 54.7% of mothers said they initiated breast feeding based on advice of midwives and 42% said they initiated breast feeding themselves. A small percentage (0.7%) said their husband initiated them into breast feeding. It is evident from Table 16 that majority of mothers from all categories allowed the midwives to tell them to breast feed before they did so. Nursing mothers in Apam rely mostly on health care providers before initiating breast feeding. The lead question was asked to assess the rooming in practice in hospitals. The mothers who initiated breast feeding on their own said it was because during antenatal classes they were told to put the baby to the

breast immediately it were born so that the baby would be familiar with their body scent.

The mothers who did not start breast feeding the first day said the initial milk (colostrums) was not pure and clean and some had also gone through operative procedures during their delivery after which they were sedated and therefore missed the first day One nursing mother said her husband was allowed in the delivery room so after the nurses finished bathing the baby, the baby was given to him to be given to her to breast feed. A small percentage (1.3%) said they gave birth at home so the traditional birth attendants made them to give glucose instead of colostrums to the babies.

Table 16 depicts that 61.3% of the nursing mothers obtained assistance from their parents on how to feed their babies, 19.3% were assisted by their husbands, 14% obtained assistance from mothers and mother in-laws what to feed their babies with, this offering the importance of mothers and mothers in-lawin the general care of infants which supports Salami (2008) that grandmothers, mothers-in-law, and relations were actively involved in child health including the sustenance of breastfeeding culture. In this study, mothers and mothers-in-law played crucial roles in breastfeeding infants. Some (most) grandmothers felt that the early introduction of complementary feeding and herbal concoction would be better than breast milk only. Awareness of exclusive breastfeeding has focused on nursing mothers and health workers but from this study others such as husbands, mothers and mother in laws also contributed to the success of breast feeding.

When asked whether or not they got encouragement from anyone while exclusively breastfeeding, 56.7% of mothers said “Yes”. Whiles 39.3% said “No”. Further inquiry

on who encourages the mothers while exclusively breast feeding; the respondents mentioned that they were encouraged by health workers, husbands and by themselves.

Lactating mothers are faced with multiple challenges as they strive to practice exclusive breastfeeding. Thus, scaling up of exclusive breastfeeding among mothers requires concerted efforts by close relatives and friends.

In Table 14, 2.7% of the nursing mothers said they fed their babies four times in a day, 11.3% asserted that they fed their babies 7 times in a day. However, 79.4% mothers commented that they fed their babies on demand, from the figures shown above the majority of mother's breastfed babies on demand. When asked why they fed the babies on demand majority said they did not want their babies to be hungry. A study done on the number of times by Perez-Escamilla *et. al,* (1997) reported that frequent breastfeeding the baby contributed to a delay in the return of fertility and helped protect women against anemia by conserving iron that is breastfeeding delays the resumption of ovulation and the return of a woman's menstrual cycle which waste blood and therefore iron thus serving as the physiological basis of Lactation Amenorrhea Method (LAM).Data from the Ghana Demographic and Health Survey (2008) also show that frequent breast feeding bonds mother and child, Breastfeeding provides frequent interaction between mother and infant, fostering emotional bonds, a sense of security, and stimulus to the baby's developing brain.

Most mothers in this survey were not aware of this benefit. Some of the mothers also said breast milk was always available to the babies. All the Public Servant, students and all nursing mothers involved in trading as well as artisans and some students said they breast fed their babies on demand except three artisans who breast fed seven times in a day.

Some of the nursing mothers had specific number of times they fed their babies because they were not always available to feed the babies. This group of people included civil servants, all the students, some Artisans and traders who left their babies at home to caregivers.

Asked the respondents (mothers) who were government workers whether the three months maternity leave given to them affected their breastfeeding pattern, 76.2% said "Yes" and added that they gave their babies water, formulae, '.koko' and solid food before they resume work from maternity leave. Three of the mothers said they expressed the milk but they realized the babies were losing weight because the breast milk expressed wasn't enough for the baby, so they had to start with formula feeding, thus majority of working mothers do not practice exclusive breastfeeding due to increased job control and inflexibility of their supervisors. Those mothers had not affected the breast feeding pattern because they took their babies to work.

RESEARCH OBJECTIVE THREE

Mothers' adherence to six months exclusive breast feeding

According to Gartner (2005), exclusive breastfeeding is the use of breast milk as the only source of food, to the total exclusion of other supplementary foods such as formulas, water, juices or tea. In the present study exclusive breastfeeding was practiced by 62.7% of the nursing mothers in Apam. The remaining mothers 37.3% did not practice exclusive breast feeding in the first six months. From the data gathered the infants who were exclusively breast fed were healthier compared to those who were not exclusively breast fed but were given mixed feeding. Thirteen point three percent (13.3%) mothers who breast fed their babies said they felt that their babies were not strong enough to digest solid food.

Sixteen percent (16%) of the mothers said breast milk was cheap, economical and readily available. This agrees with Escamilla *et. al,* (1997) who stipulates that families save money that would have been spent to treat illnesses due to contaminated and inadequate breast milk substitutes. Exclusive breastfeeding eliminates dependence on costly breast milk substitutes, feeding equipment, and fuel for their preparation. Breast milk is a naturally renewable, sustainable resource that requires no fuel for preparation, packaging, shipping, or disposal.

Sixty seven percent (6.7%) of the respondents said breast milk contained all nutrients in their correct proportion. This collaborates with Dorea (2009) that breast milk is a hygienic source of food with the right amount of energy, protein, fat, vitamins and other nutrients for infants in the first six months and cannot be duplicated. Breast milk is the only safe and reliable source of food for infants in an emergency. WHO (2008) also states that for the first six months of life, breast milk alone is the ideal nourishment, which provides all of the nutrients, including vitamins and minerals, an infant needs, meaning that no other liquid or food is needed during the first six months after birth, Seven point three percent (7.3%) stated that exclusively breast fed children had high IQ, USAID (2001) also states that infants fed breast milk showed higher developmental scores as toddlers and higher IQs as children than those who are not fed breast milk.

Furthermore 12.7% of respondents said that exclusive breast feeding save life. Exclusive breastfeeding is the single most effective intervention for preventing child deaths. Infants less than 2 months old who are not breastfed are six times more likely to die from diarrhoea or acute respiratory infections than those who are breastfed

(WHO, 2008). Six point seven percent (6.7%) of respondent in this study commented that it protects babies from diseases.

WHO (2008) states that an infant is born with an immature immune system that does not become fully functional for about two years. Since immune system cells make antibodies to fight infection, an incompletely developed immune system leaves the infant vulnerable to many bacterial and viral infections. However, the nursing mother has a fully developed immune system, and many of the antibodies and other components of her immune system pass into her breast milk to the infant. These antibodies survive passage through the infant's digestive system and are absorbed into the infant's blood, where they help protect the child against infection.

However, 37.3% respondents said that they did not practice exclusive breastfeeding for the reasons that. (a) They are not always available to breast feed, (b) they had only three months of maternity leave and because of that they have to start feeding their infants formulae and solid food early before resuming work. Ross Production Division (2000) found out in their study that only 11% of mothers who worked fulltime were still breastfeeding at one year, as opposed to 19% of mothers who worked part-time and 22% of mothers who did not work.

The findings here seem to agree that women who work fulltime exclusively breast feed for shorter periods in order to return to work after their three months maternity leave. (c) They do not practice exclusive breastfeeding because they could not produce enough breast milk to meet their babies' needs especially those with index infants and the breast milk was not enough for the baby and also because of ill health. (d) The mothers also did not practice exclusive breastfeeding because they would find it difficult to introduce solid food to their babies after the sixth month. Majority said

they practiced exclusive breastfeeding on their previous children and introducing solid food was very difficult so they decided not to practice it again. Upon further enquiry on why mothers think exclusive breastfeeding affects growth, the mothers said breast milk had all essential nutrients and milk protects babies from diseases

The mothers' assertion agrees with Aune *et. al,* (2014) that breast milk had essential nutrient the infant needed to grow and that breast milk supplied key nutrients that were critical for health, growth, and development. The respondents also agreed with Aune *et. al,* (2014)that it protected babies from illnesses that could cause malnutrition, hearing problems, and learning difficulties. In developing countries, morbidity and mortality from diarrheal disease is high and there is convincing evidence that breast milk provides protection against gastrointestinal infection and diarrheal disease (Kramer & Kakuma, 2012).

Table 19, shows that 61.3% of the mothers fed their babies only on breast milk, mothers below 19 years fed only breast milk. Twenty percent (20%) of mothers in the 30-39 year olds commented that their babies were fed breast milk and water within the six months, 5.3% said that their babies were fed breast milk, water, "koko" and formulae in the first six months. These findings show that majority of the nursing mothers gave breast milk to their infants during early ages. From the evidence gathered it proves that more mothers in the Apam community prefer to breast feed their infants. To them, it is safer, more economical and readily available.

Table 20 indicates the kind of food babies are fed immediately after delivery. From the Table majority of the respondents 91.3% said their babies were fed breast milk immediately after delivery. However 1.3% said that their babies were fed glucose just after delivery and 7.8% gave their babies water. The mothers were asked this question

because prior to the administration of the questionnaire, the researcher was told that some mothers give water to their new born because culturally the infant was a visitor in the family and he or she must be welcomed with water.

From the findings it proves that a relatively high proportion of women actually gave water to their infants immediately after delivery. Another reason some of the mothers gave was that breast milk was not forthcoming and also due to ill health on the part of the mother. One nursing mother actually said it was a tradition to give water first before breast milk or the baby will not be accepted. Even though water plays an important role in an infant's diet it should be given only after the first sixth months (Klienman, 2009). Glucose was also given to the babies delivered at home to strengthen them.

Twelve percent (12%) asserted that they started giving other foods to their babies in the first month of delivery, 9.3% nursing mothers introduced other foods to their babies in the third month. However, 58.7% mothers asserted that they introduced other foods to their babies in the sixth month.

From the evidence gathered (Table 21) a high proportion of mothers had already introduced solid foods or intend to introduce solid food before the sixth months, the reasons they gave were because of ill health and how difficult it was to introduce solid food when the baby was over six months. Two of the nursing mothers said they had pressure from their mother in-laws to introduce solid food by the third month. WHO(2008), recommends that mothers should exclusively breast feed for first 6 months of life and continue breast feeding together with weaning food up to and beyond second year of life. It may be deduced from Table 19 that most mothers introduced or intended to introduce other foods aside breast milk before sixth months.

RESEARCH OBJECTIVE FOUR

Benefits of Six Months Exclusive Breast Feeding

Table 22 showsthat92.7% of the mothers agreed that breast milk protected babies from diseases. Notwithstanding, 1.3% mothers disagreed that breast milk protected babies from diseases, 6%disagreed with WHO (2003)that breast milk especially the first yellow thick milk called colostrum contained anti-bacterial and anti-viral agents and high levels of vitamin A that protect infants against disease. Indeed, breast milk carries antibodies from the mother that helped to combat disease, protecting babies from diarrhoea and acute respiratory infections (Hanson, 2004). A 2013 longitudinal study reported less obesity at ages two and four years among infants who were breastfed for at least four months. The protective effect of breastfeeding against obesity is consistent, though small, across many studies. (Moss &Yeaton, 2014).

Evidence gathered in this study shows that majority of nursing mothers know that when they practice exclusive breast feeding it protects the infants from disease. They also agree that breast milk provides nutritious easily digestible food for babies, 89.3% mothers agreed that breast milk provided nutritious easily digestible food for babies while 1.3% disagreed and the rest had no idea. WHO (2008) stipulates that for the first six months of life, breast milk alone is the ideal nourishment, providing all of the nutrients, including vitamins and minerals, meaning that no other food is needed.

In Ghana, over one-third of child deaths are due to under nutrition, mostly from increased severity of diseases (UNICEF, 2011). However majority of the respondents are not aware that breast milk alone is enough to sustain the child for the first six months of life. One point three percent (1.3%) disagreed due to medical reasons they

were asked by their health providers to give other foods to their babies and the babies are growing well and are healthy, 16% did not know the reason why health providers always tell them to feed exclusively on breast milk.

Majority of the respondent (86%) in the present study agreed that exclusive breast feeding saves infants life but 4% disagreed, while 10% did not know whether it saved life or not. The Table proves that most of the nursing mothers in the survey knew that exclusive breast feeding saved infants life. The World Health Organization (2008) states that exclusive breastfeeding is the single most effective intervention for preventing child deaths yet less than 40% of infants under 6 months old receive the benefits of exclusive breastfeeding. Infants under 2 months old who are not breastfed are six times more likely to die from diarrhea or acute respiratory infections than those who are breastfed (WHO, 2008).

Table 22 also shows that 4% nursing mothers who did believe that continuous breast feeding could save a child's life said she lost her first child one week after delivery. This respondent revealed that she gave her three days old child water when she was discharged from the hospital. The child started vomiting and loosing watery stool and by the time she got to the hospital the baby had died. She still doesn't believe exclusive breast feeding can save her babies lives but she said her second child was three months old and she had not given her water yet.

According to Dorea (2009), Breastfeeding provides a nutritious, easily digestible food when a sick child loses his or her appetite for other foods. Continued breastfeeding during diarrhea reduces dehydration, the severity and duration of diarrhea, and the risk of malnutrition. Continued breastfeeding beyond six months accompanied by sufficient quantities of nutritionally adequate, safe and appropriate

solid, semi-solid and soft foods, also help ensure good nutritional status and protects against illnesses. System and many of the antibodies and other components of her immune system pass into her breast milk also the nursing mother have fully developed antibodies and others component of her immune system pass into her breast milk. These antibodies survive passage through the infant's digestive system and are absorbed into the infant's blood, where they help protect against infection (Dorea, 2009).

From Table 22, eighty two point seven percent (82.7%) of respondents breast milk was a hygienic food with the right amount of nutrients were 82.7%. Evidence affirms that breastfeeding is still the best source of infant nutrition and the safest method of infant feeding (Gaynor, 2003).

Dorea (2009) also affirms that breast milk is a hygienic source of food with the right amount of energy, protein, fat, vitamins, and other nutrients for infants in the first six months. This percentage study shows that most mothers know breast milk is a hygienic food with the right amount of nutrients. The remaining 16% did not have any idea whether breast milk is a hygienic food with the right amount of nutrients or not. This again shows the level of ignorance of some of the respondents.

Majority of the respondent (67.3%) agreed that breast milk met all water requirements, 26% disagreed that breast milk meets all water requirement in the first six months, 6.7% did not know while 26% said they gave water to their infant by the fourth month because to them breast milk alone was not enough to sustain the infant. Erhinyodavwe *et. al,* (2009) state that, breast milk is 88% water and exclusively breastfeeding infants under 6 months old do not need additional fluids,

even in countries with extremely high temperatures and low humidity. The explanation given by the above respondents disagree with Erhinyodavwe.

Offering water before 6 months of age reduces breast milk intake, interferes with full absorption of breast milk nutrients, and increases the risk of illness from contaminated water and feeding bottles. The 32% nursing mothers in this study who disagreed that breast milk alone meets all water requirements and that even though some mothers go ahead to give water, others wait until after the sixth month.

With regards to breast feeding reducing the risk of fatal post-partum haemorrhage of mothers, 25.3% of mothers said that it was true while 6% mothers disagreed, and 68.7% gave no responses which indicated that they had no idea whether breast milk reduced the risk of fatal post-partum hemorrhage or not. This shows that many of the mothers were ignorant of one of the most important benefit of breast feeding.

Again when mothers were asked whether they knew that breast milk delayed the resumption of ovulation and the return of menstrual cycle, 26% of mothers knew of this but 34% said false while 40% did not know whether breast milk delayed the resumption of ovulation and the return of menstrual cycle. Some of the mothers were not in agreement because they became pregnant while breast feeding. According to Figueiredo *et. al,* (2013) nursing mothers who successfully breast feed are less likely to develop postpartum depression (Figueiredo *et. al,* 2013).

CHAPTER SIX

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

6.1 Summary of Findings

The study also aimed to find out the nutritional knowledge of nursing mothers and also to find out whether the food provided during infancy was adequate in quality and quantity for optimum growth.

A total of one hundred and fifty (150) nursing mothers with infants between 0-12months took part in this research work. The research design used for the study was a descriptive survey. Purposive sampling was used to select the sample. Data was collected using questionnaire and interview guide. The result indicated that most of nursing mothers that participated in the research were between the ages 20-29 years of age. The result showed that there were more baby girls than boys and a greater percentages of mothers were married with as many as 28% were single mothers.

Most of the mothers were junior/elementary school leavers. Trading was the main occupation of the mothers with a majority into fish related activities, petty trading and artisans. Majority of the mothers questioned had between 1-3 children. Majority of the mothers responded 'Yes' to practicing exclusive breastfeeding. Sixteen percent (16%)of mothers said 'Yes' to practicing exclusive breastfeeding because it was cheap and economical. Thirty percent (30%) of the nursing mothers did not practice because they were not always available to breastfeed and also because they could not produce enough breast milk. Sixty one point three percent (61.3%) of nursing mothers gave only breast milk to their infants for the first six months. Five point three percent (5.3%) gave a mixture of breast milk, formulae 'koko' and water before the first six months. Ninety one point three percent (91.3%) gave breast milk to their infants

immediately they were born and seventy nine point four percent (79.4%) gave breast milk to their infant on demand.

Out of the one hundred and fifty respondents who took part in the research only twenty one (21%) were civil and public servants. Out of the twenty one, seventy six point two percent(76.2%) said the three months maternity leave has affected their pattern of feeding and nineteen percent (19%) said 'No' and said it had not affected them in anyway. Majority of the nursing mothers knew that breast milk protected the baby against diseases and were aware that soups helped in the production of more milk.

The way nursing mothers fed their infants in Apam was also influenced by the hospital in which they attended post natal and anti natal classes. Most of the nursing mothers (59.3%) questioned got their nutrition knowledge or information from health workers. Most of the nursing mothers (62.7%) practicing exclusive breastfeeding got no encouragement from their spouses, friends or family. More mothers in the informal sector practiced exclusive breast feeding than those in the formal sector.

However the nutrition knowledge of nursing mothers in Apam community was not encouraging as most of the mothers did not know the nutrients and the functions these nutrients performed in the body. A sizeable number of the mothers were able to mention at least one nutrient.

6.2 Conclusions

The findings of the study indicate that majority of the mothers practiced exclusive breast feeding. Some of the mothers (38.7%) had introduced solid foods by the fourth month with maize porridge or 'koko' being the main weaning food.

Majority of the mothers breastfed their infants on demand meaning they did not have any specific time for feeding. The mothers had little idea about nutrition and did not know the functions of the food they gave to their infants. Nursing mothers in the study had fair knowledge of infant nutrition, which was not adequate to equip the mothers to make informed nutritional provision for their infants.

Health workers were the single most important source of information for mothers and therefore the mothers should be encouraged to attend both antenatal and post natal classes. It was observed that majority of the mothers studied had healthy babies whose growth performance was good. This could be attributed to the fact that majority of them practiced exclusive breast feeding and therefore infection was largely eliminated with a significant number of malnourished babies.

Based on the evidence emerging from the study it is indicative that even though nursing mothers were adequately feeding their infant's majority were ignorant or had little or no knowledge on nutrition.

The results of this work has shown that mothers in Apam introduced the infant to complementary food too early in life which may be a major contributory factor for the incidences of underweight, severely underweight, stunting and wasting that was observed in the study. Therefore, there is an urgent need to proper timing of complementary foods given to the babies after six months.

6.3 Recommendations

Based on the foregoing results, the following recommendations were suggested to improve the nutritional knowledge of the nursing mothers and their babies in the Apam community.

1. Nutrition knowledge of nursing mother must be improved. Mothers should be encouraged to attend post natal clinics early to improve on their nutritional knowledge and infant feeding practices
2. Nursing mothers should be especially advised on the influence of giving colostrums to their infants (first milk that comes out when a woman is put to birth) and also nursing mothers should be encouraged babies to feed the infant on demand.
3. Majority of mothers are not aware that breast milk alone is enough to sustain an infant for the first six months. Anti natal clinics should advice pregnant women about this
4. Nursing staff and health workers involved in breastfeeding education should be properly trained in order to advice and counsel mothers and the general public on appropriate infant feeding practices since they work with the mothers directly and majority of the mothers get their information from health workers.

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APPENDICES

Appendix 'A'

Study Questionnaire and Interview guide

Questionnaire on: Infant feeding practices and nutritional knowledge of nursing mothers in Apam…….

INTRODUCTION

This is a study being carried out by the department of Home Economics; University of Education to find out the breastfeeding practices of mothers. I shall be grateful if you would kindly and carefully complete this questionnaire. Opinions expressed on this questionnaire and interview guide would be treated confidentially.

Date ……

DEMOGRAPHIC AND SOCIO-ECONOMIC DATA

1. Age of mother: 10-19 [ ] 20-29 [ ]
   30-39 [ ] 40-49 [ ]
   50-59 [ ]

2. Age of infant: 0-2 months [ ] 3-4 months [ ]
   5-6 months [ ] 7-8 months [ ]
   9-10 months [ ] 11-12 months [ ]

3. Sex of infant: Male [ ]
   Female [ ]

4. Marital status: Married [ ]

Single [ ]

Cohabitating [ ]

5. Occupation Housewife [ ] Civil servant [ ]

Trading [ ] Artisan [ ]

Public servant [ ] Student [ ]

6. Level of Education Primary [ ] Junior High/Middle [ ]

Senior High [ ] Voc/technical [ ]

Tertiary [ ] None [ ]

7. How many children do you have [ ]

Questions on Exclusive Breastfeeding

8. Are you practicing exclusive breastfeeding YES NO

9. If yes why……...

If no why ……

10. Will exclusive breastfeeding affect growth? Yes/No

How has it affected you……

11. What did you feed your babe with in the first six months of delivery?

Breast milk only [ ] Breast milk and water [ ]

Breast milk and formulae [ ] Breast milk and koko [ ]

Breast milk, water formulae and Koko [ ]

12. What did you feed your babe with immediately after delivery?

Water [ ]

Breast milk [ ]

Glucose [ ]

Others specify……..

13. Which month did you start giving other foods to your babe aside from breast milk?

One month	[ ]	Two months	[ ]
Three months	[ ]	Four months	[ ]
After six months	[ ]		

14. How many times do you feed your babe in a day

Four times	[ ]	Five times	[ ]
Six times	[ ]	Seven times	[ ]
On request	[ ]		

15. Has 3 months maternity leave affected your breastfeeding pattern?

Yes [ ]

No [ ]

Reason ……

Benefit of Exclusive Breastfeeding

	Question	True	False	Don't know
16	Breast milk protects the babe against diseases			
17	Breast milk provides a nutritious easily digestible food for the babe			
18	Breast milk saves your babes life			
19	Breast milk is a hygienic food with the right amount of nutrients			
20	Breast milk meets all water requirement			
21	Breast milk reduces the risk of fatal post-partum hemorrhage for mother			
22	Delays the resumption of ovulation and return of menstrual cycle			

Breast feeding practices of nursing mothers

23. Has the hospital influenced the way you feed your babe?

Yes [ ]

No [ ]

In what way has it influenced you ……

24. Who initiated the breast feeding the first time after delivery?

Self` [ ]

Midwife [ ]

Husband [ ]

25. Who assist you in feeding your babe?

Husband [ ] Parent [ ]

Caregiver [ ] Self [ ]

Others specify ……

26. Do you get encouraged from anyone while exclusively breast feeding?

Yes [ ]

No [ ]

Who encourages you?

Husband [ ] Friends [ ]

Parent [ ] Health provider [ ]

27. Who advices you on what to feed your babe with?

Health provider [ ] Friends [ ]

Parent [ ] Self [ ]

Nutritional knowledge of mothers

28. Where do you mostly obtain nutritional information?

Anti-natal classes [ ] Media [ ]

Parent [ ] Friends [ ]

29. Do you think the intake of more water during breastfeeding increases the amount of milk?

Yes [ ]

No [ ]

Don't know [ ]

30. Which food must a lactating mother eat to produce more milk?

Fried foods [ ]

Sweets [ ]

Soup [ ]

31. Is it appropriate for a lactating mother to increase her energy and nutrient intake?

Yes [ ]

No [ ]

Any reason……

32. Is it advisable for a lactating mother to take vitamin-mineral supplement when she is eating well?

Yes [ ]

No [ ]

Don't know [ ]

33. Maize meal (koko) is a very good source of vitamin and minerals

True [ ]

False [ ]

Don't know [ ]

34. Fruits and vegetables are the best source of vitamin and minerals?

True [ ]

False [ ]

Don't know [ ]

35. Protein foods include water?

True [ ] False [ ]

Don't know [ ]

36. What are the components of a balanced diet?

……..

Appendix 'B'

University of Education

Department of Home Economics

Winneba

3rd April 2013

Gomoa West District Health Directorate

P.O.Box16

Apam

Dear Sir,

Permission to Conduct a Research study on the Topic: Infant Feeding Practices and Nutritional Knowledge of Nursing Mothers in Apam

I, KafuiAdigbo, Masters Student at the Department of Home Economics of the University of Education, Winneba hereby requests for permission to undertake a study entitled.

Infant Feeding Practices and Nutritional Knowledge of Nursing Mothers in Apam

This study is to find out whether mothers are adequately feeding their infant and also to find out whether the food provided during infancy is adequate in quantity and quality for their optimum growth. It is for this reason that I find it necessary to create an awareness regarding the association between breastfeeding practices and the nutritional knowledge of mothers.

These studies will involve the following.

- Interviews of mothers during which questionnaires regarding socio demographic factors, usual eating practices and nutritional knowledge will be completed.

This study has been approved by the Department of Home Economics of the University of Education, Winneba. All information gathered in this study will be kept strictly confidential, and no information will be used for the purposes other than those intended for. A respondent's decision to participate in this research will be voluntary and withdraw from the study at any time will be allowed.

I trust my request will meet with your approval.

Thanking you in advance for your cooperation.

Sincerely,

KafuiAdigbo

Student No: 811010001