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TOPIC

ASSESSING THE KNOWLEDGE, ATTITUDE AND PRACTICES OF MOTHERS ON COMPLEMENTARY FEEDING OF INFANTS, AGED 6-23 MONTHS: A CROSS-SECTIONAL STUDY IN TAMALE

By

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(UDS/MPH/0033/19)

DECLARATION

DECLARATION

I Abdallah Abdul-Hanan declare that this thesis on"assessing the knowledge, attitude and practice of mothers with children aged 6-23 months in the tamale metropolis" is as a result of my own original researchcarry out under the supervision of Dr. Sam Bagriand has not been submitted in part or whole for the award of any form of degree elsewhere. However, other resources which served as sources of information have been duly acknowledged.

24/01/2022

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DEDICATION

I dedicate this work to the Almighty Allah for his protection, mercies and blessings bestowed on me. My parents, Asuro Abdallah and Sulemana Bintu, my wife and daughter and the entire Abdallah family for the support offered during the pursuit and the program.

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ABSTRUCT

The time of initiation of complementary feeding marks the beginning of a child susceptibility and risk of nutritional deficiency or excesses. According to the Ghana Statistical Service Infant mortality rate in Ghana is 41 deaths per 1,000 live births, whilst 19% of children in Ghana are stunted, 5% wasted, and 11% are underweight to (GSS et al.2015). Be that as it may, only 2 in 10 mothers' practice optimal complementary feeding in Ghana (Permenkes, 2018). The study was focused on assessing the knowledge, attitude and practice of mothers with children aged 6-23 months in the tamale metropolis.

The study used a facility based cross-sectional study design. A total of 202 mothers with children aged 6-23 months were sampled. Data was collected using questionnaire. Data was downloaded on an excel sheet and analyzed with SPSS version 20.

Out Of the 202 mothers sampled about 89.6% of them knew the right age to initiate complementary feeding, 87.7% appropriately practiced complementary feeding and about 83.7% of mothers attained minimum dietary diversity. However, meal frequency at age 9-11 months and 12-23 months slightly differed (91.1%) and (90.1%) with relatively low (62.4%) frequency of feeding at age 6-8months. Whiles only 34.2% achieved minimum acceptable diet.

Multivariate logistic regression analysis showed that mothers who gave birth at the hospital [AOR-5.5;95% Cl (1.82-16.68) p=0.002] were 5 times more likely to give divers diet than those who delivered at homes. Rural dwellers were about 4 times (3.7) more likely not to practice appropriate complementary feeding as compared to the urban dwellers [AOR—3.7; 95% Cl (1.41-9.54), p= 0.008.]

Except for minimum acceptable diet which was observed to be low among infants, findings from the study showed high knowledge and appropriate practices among mothers.

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KEY DEFINITIONS

Complementary feeding: refers to the process starting when breast milk alone is no longer sufficient to meet the nutritional requirements of infants so that other foods and liquids are needed along with breast milk.

Complementary food: refers to Any solid, semi-solid or soft food, either manufactured or homemade, suitable as substitute of breast milk or infant formula, given to satisfy the nutritional requirements of the infant.

Complementary feeding practice: Mother's complementary feeding practices includes minimum meal frequency, dietary diversity, and minimum acceptable diet. Mother hygiene practices was also computed for because of the important role it plays in complementary feeding practices.

Minimum meal frequency: minimum meal frequency was based on the proportion of breastfed infants who are 6-23 months old and was fed with solid or semisolid. The minimum meal frequency was defined as 2 times for breast fed children aged 6-8 months and 3 times for infants at 9-11months and 12-23 months respectively.

Minimum dietary diversity: refers to the percentage or proportion of infants aged between 6-23 months who received 4 or more food groups from the seven food groups as recommended by WHO. For the purpose of this study the seven food groups were categorized in to four categories as proteins, carbohydrates vegetables and fruits.

Minimum acceptable diet: Minimum acceptable diet is the proportion of infants who received minimum meal frequency and minimum dietary diversity

LIST OF ABBREVIATION

CF -Complementary feeding

WHO-World Health Organization

UNICEF-United Nations Children's Fund

ANC- Antenatal Care

BFHI -Baby Friendly Hospital Initiative

IYCF- Infant and Young Child Feeding

MAM - Modrate Acute Malnutrition

TV- Television

MOHFW- Ministry of Health and Family Welfare

PNC- Post-Natal Care

MAD- Minimum Acceptable Diet

MMF- Minimum Meal Frequency

MDD- Minimum Dietary Diversity

LBW- Low Birth Weight

CWC- Welfare Clinics

CHAPTER ONE
INTRODUCTION

1.1 BACKGROUND

The World Health Organization (WHO) defined complementary feeding (CF) in 2002 as the process when breast milk alone is assumed to be less sufficient or inadequate to meet an infant's nutritional needs, and other meals and liquids are required in addition to breast milk. The time complementary feeding starts usually marks the beginning of children susceptibility and risk of nutritional deficiency or excesses. According to Ghana Statistical Services , Ghana's infant mortality rate is 41 fatalities per 1,000 live births, and 19 % of Ghana's children are stunted, 5% wasted, and 11% are underweight. Be that as it may, only 2 out of 10 Ghanaian mothers adopt adequate supplementary feeding.(Permenkes, 2018)

Empirical evidence points out that most mothers start complementary feeding at a very tender age of the infants which is injurious to the health and general wellbeing of the infant. Giving complementary food very early before 6 months or giving food inappropriately to infant can cause growth faltering(Permenkes, 2018). In recent times the importance of complementary feeding as a component of the foundation for the development of children is often underestimated(Ndolo, 2008). In comparison to the extensive literature on breast feeding, supplementary feeding receives little or no attention particularly in terms of mothers' knowledge, attitudes, and practices. Again more significant achievements are chalked in the area of developing and implementation of policies that are geared towards promoting breast feeding compared to effort invested in improving complementary feeding practices (White et al., 2017).this makes it imperative for more research to be done to close the

knowledge gab in this area. The focus of this research, on the other hand, is to determine the knowledge levels, attitudes, and hygiene behaviors of mothers of infants aged 6 to 23 months.

1.2 PROBLEM STATEMENT

Breast feeding is crucial for the first six month in the development of the baby. However, many Women in poor countries do not adhere to the strict rules of exclusive breastfeeding as recommended by the WHO, but on the contrary introducing their children to complementary food at a very tender age. Giving complementary foods too early could lead to diarrhea and eventually may result to malnutrition and other nutritional problems. Infants in their early stages of growth are incapable of digesting food and as results if food is introduced too early the infant may lack the digestive ability to properly digest the food which subsequently can lead to improper absorption of nutrients that may lead to malnutrition. Also when children are introduced to other food aside breast milk at a very tender age it may lead to replacement of breast milk for foods that may not have the nutritional ingredients essential to suffice the child's growth needs.

According to WHO complementary feeding should start at six months, however most mothers do not take that in to consideration. This takes credence in a study in Ghana that found that only 46% of infants under the age of six months are exclusively breastfed, which goes contrary to the WHO and UNICEF standards. This means that about 54% of the women start complementary feeding at a very tender age (Chand et al., 2018). Mothers in the Tamale metro do not take exception from this finding as many of them do not practice appropriately complementary feeding which may be attributed to poor knowledge or attitudes towards complementary feeding.

1.3 JUSTIFICATION

Taking keen interest in the assessment of complementary feeding is vital to enhance child feeding and nutrition most especially in matters relating to the knowledge, attitude and practices of mothers during the early ages of the child.

Inappropriate complementary feeding practices, particularly those relating to when to begin feeding, the type of food to give, and the sanitary conditions necessary to follow when giving complementary meals, are a major public health risk that must be addressed. A child's first food aside milk matters not only for the survival but for the entire potential and lifelong development or for the child's growth and development. Inappropriate or poor dietary practices during complementary feeding are the cause of malnutrition in children(Permenkes, 2018).

Findings of this study would be important in informing policy decisions to be tailored to educational intervention that would enhance the mother's knowledge, attitude and appropriate practices to help maximize the benefits of complementary feeding. Permenkes (2018) believes that if complementary feeding methods are improved, the rate of malnutrition among the Ghanaian children will decrease.

1.4 RESEARCH QUESTION

What are the knowledge levels of mothers on complimentary feeding?

What are the attitudes of mothers of infant toward complementary feeding?

What are the practices of mothers during complementary feeding?

What are the factors affecting appropriate complementary feeding practice?

1.5 STUDY OBJECTIVES

1.5.1 GENERAL OBJECTIVE

To assess the knowledge, attitude and practices of mothers of children about complimentary feeding

1.5.2 SPECIFIC OBJECTIVES

1. To assess the knowledge of mothers on complementary feeding.
2. To identify the attitudes of mothers of infants towards complementary feeding
3. To find out the practices of mother during complementary feeding.
4. To identify the factors that affect appropriate complementary feeding practices.

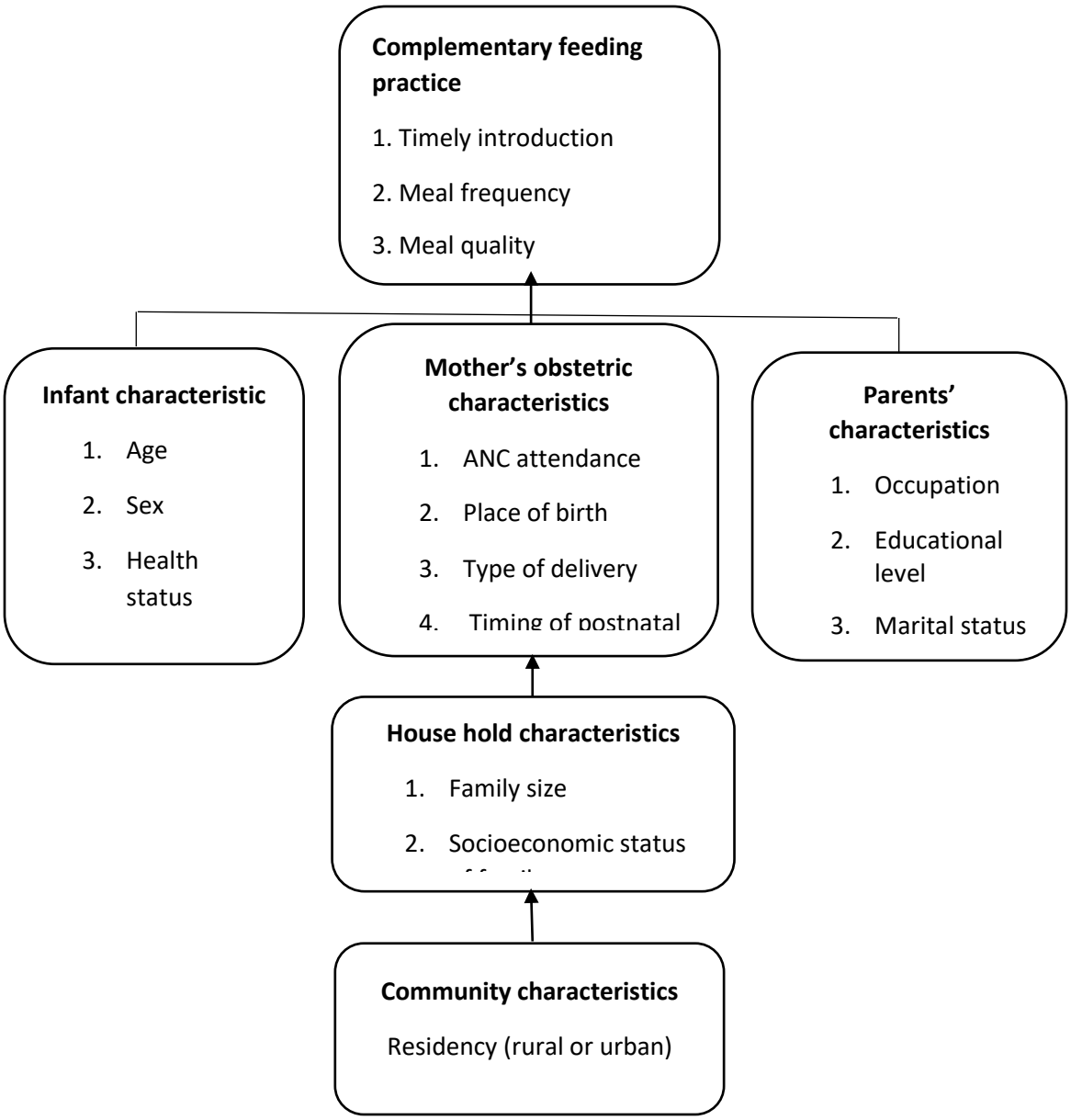


Figure 1: A conceptual framework on complementary feeding adopted from Chen (2013)

The conceptual frame work above points out the relationship between the variables that has influence on complementary feeding. It creates a linkage between the infant characteristic, mother's obstetric characteristics, parents' characteristics, household characteristics and community characteristics and how these influences complementary feeding (CF).

The infant characteristic (age, sex and health status), mother's obstetric characteristics such as ANC attendance, place of birth, Type of delivery, Timing of postnatal visits and the parent's characteristics (occupation, educational level, marital status age of mother and mother's knowledge of complementary feeding) can all have influence on the practice of complementary feeding.

The infant characteristic (age, sex and health status) can in many ways inform the type of food to give, when to start CF and what to food to avoid in other to achieve the full benefit of CF.

Mother's obstetric characteristics ANC services offer mothers the opportunity to learn the importance and how to practice CF. Knowledge acquired is important because it helps improves mothers understanding of CF and the risk that comes with poor practices and non-compliance.

The occupation, educational level of both parents, marital status, age of mother and maternal knowledge has influence on the how and the outcome of complementary feeding.

The other factors on the frame work that includes community and the house hold characteristics all have influence on each other with a resultant influence on the

mother obstetric characteristics which subsequently influence complementary feeding practices and outcomes.

CHAPTER TWO

LITERATURE REVIEW

2.1 Complementary feeding

The change from exclusively breastfeeding to the introduction of both solid and semi-solid food is usually within the period 6-23 month of age. This period coincides with the time when malnutrition in children < 5 sets-in in many parts of the world. During this period complementary feeding is required to make up for the insufficiency in the nutritional requirement of the child (Abeshu, 2016).

In a study done by (Permenkes, 2018) it was revealed that complementary feeding is marked by the period in which infants or children are introduced to nutritious, safe, solid and semi-solid foods at a time when breast milk seems insufficient. Before complementary feeding, children are at higher risk of infections and malnutrition which complementary feeding is proven to be a workable solution to improving child growth(Per menkes, 2018).

There is strong evidence that points out that poor nutrition is responsible for the rise in the risk of illness and also for about 9.5 million deaths of children <5 in the world in 2006. Among the many factors that contributes to <5 malnutrition includes introduction of complementary feeding, types of food, method of feeding, as well as the child age, breast feeding, and sex of the child etc.(Chapagain, 2014). Abeshu, 2016 is also of the view that complementary feeding is characterized by poor practices that are as a result of factors such as poor timely introduction, poor hygiene and child care practice and poor feeding methods(Abeshu, 2016). This indicates that

complementary feeding is important for a child's growth and development (Abeshu, 2016).

UNICEF- United Nation International Children's Emergency Fund launched the BFHI- Baby Friendly Hospital Initiative in1998 as means put in place to give or add strength to maternal practices to support breast feeding. Complementary nutrition is one of the most significant aspects of this program. Complementary feeding is expected to be started after six months during which time breast milk alone cannot suffice the needs in terms of nutrient requirement of the baby. Giving children food along with breast milk (complementary feeding) should be done with timeliness, adequacy, and frequency and with good quality in the food given. However contrary to this inappropriate practices are during CF are identified as the main cause of malnutrition in infants (Chapagain, 2014).

2.1.1 Knowledge of mothers on complementary feeding

Hitherto, assessing the Infant and Young Child Feeding (IYCF) practices was centered mainly on breast-feeding and its associated practices with little consideration on complementary feeding practices. Contrast to that, poor or inadequate information of mothers on complementary food and feeding practices is among the key determinants of malnutrition. According to previous research on mothers' awareness of complementary feeding, only a small percentage of parents were well-versed in the subject. A study conducted in south India indicated that only 8% of mothers with children aged 6-23 months had good knowledge on complementary feeding (Olatona, et al., 2017).

A study that is under taken in Nigeria points revealed that, 14.9% of mother possessed some significant knowledge of complementary feeding indicating low level of knowledge (Olatona, et al., 2017). This is in line with findings of (Shaikh & Shaikh, 2013) who concluded in his work that knowledge of mothers regarding the time to start complementary feeding is inadequate especially in low socioeconomic areas.(Shaikh & Shaikh, 2013). (Chand et al., 2018) also confirms to this by concluding that mothers exhibit little knowledge on complementary feeding and also inappropriately practiced complementary feeding(Chand et al., 2018; Olatona, MBBS, MPH, FMCPH et al., 2017; Shaikh & Shaikh, 2013).

Appropriate complementary feeding relies solely on the measure of the accuracy of information, skill and support from the family. On this score, deficiency or inadequate knowledge about the right food and feeding practice is the key determinant of malnutrition than lack of food. This takes credence in a report by WHO which confirms that lack of knowledge about infants feeding is one of the main causes of the increasing malnutrition in many developing countries (Al-Samarrai et al., 2020; WHO, 2018).

About 87% of mothers had knowledge of the time to initiate complementary, but only 36.6% of women had proper knowledge of how frequent feeding should be done. Again about 9.9% of the women offered more frequent food than recommended(Chapagain, 2014).

In other literature, over 80% of mothers of children were reported to have little knowledge of the negative consequences complementary feeding had on the child,

whiles about 45% of such children were not properly feed or were undernourished, pointing to a situation of inappropriate complementary feeding. This is an indication that when complementary feeding is not properly practiced it can lead to a situation of malnutrition (Egyir et al., 2016).

Having a good understanding and basic knowledge of how to prepare complementary food from home and also the commercial availability is a step to improving child nutrition. However, a study conducted by(Chand et al., 2018) revealed that only 24% women had knowledge about the use of iron reached food in complementary food of children with 76% having no idea and 57% had knowledge of the use of iodized salt with 43% having known idea(Chand et al., 2018).

According to a study by (Hasnain et al., 2013). While 135 (54%) of respondents were aware of the proper age to begin weaning, only 108 representing 43% of them actually did so. Again while 205 (82%) of respondents knew that homemade food is healthy for children, only 106 (42%) of mothers were feeding them homemade food. While 54% of parents had right knowledge on complementary feeding initiation, only 43 percent had put it in practice. Merely 7% of women had good overall practices, while 24 percent of mothers had good overall awareness and 28 percent had weak knowledge of complementary feeding. This is an indication that there is an appreciable amount of knowledge on complementary feeding but putting the knowledge into practice is an issue(Hasnain et al., 2013).

On the awareness and knowledge of complementary feeding and exclusive breast feeding, mothers who were observed demonstrated to have a clear and good

understanding of breastfeeding as more than 92.5% of mothers were found to be knowledgeable about the proper timing and length of exclusive breastfeeding. However, only 83.75% of mothers were aware and had good knowledge of the appropriate age to introduce complementary foods to their children. 8.8% of parents said complementary feeding ought be done before the child is six months old, and 7.5 percent said it should be done before the baby is six months old (Jain et al., 2018)

On the contrary, when knowledge of time to initiate complementary feeding was juxtaposed to time of initiation of exclusive breast feeding, it was found out that a good number of mothers had appropriate knowledge of the time to initiate and end exclusive breast feeding as compared to only 83.75 % of mother with good knowledge of the appropriate time to initiate complementary feeding. A total of 8.57% of mothers out of this figure indicated that complementary feeding should be initiated before 6montths of age and about 7.5% of mother also shared a view that CF should be initiated after 7 months of age. These views by many of the mothers contradict the WHO'S IYCF indicators. It was also found that the primary source of information with respect to both complementary feeding and exclusive breast feeding were – family members (42.5%), health professionals (27.5%), books (13.8%), TV (6.3%) and only 10% were not informed or did not get information from any of the sources(Jain et al., 2018).

In other study, mothers and care givers had appreciable knowledge on the recommended infants and young child feeding. A good number of the mother's knew that the recommended aged to initiate complementary feeding is six months (Bimpong et al., 2020).

According to Nankumbi & Muliira, 2015 mothers stated that children should be weaned off immediately after birth. Whiles other mothers stated that children should be weaned after 3 months. This indicated that mothers lacked sufficient knowledge on complementary feeding. Among the reasons that participants stated for weaning off their children were chronic luck of breast milk, the child being of age(Nankumbi & Muliira, 2015).

Out of the ten (10) knowledge score computed against dietary diversity as well as methods of feeding a child, about three-fourth of the mother (74.1%) responded with appropriately indicating good knowledge. Among the (74.7%) of parents who heard of diversifying their feed or feeding diversity, about (68.45%) of them had information from a health institution while (68.4%) from media and (29.3%) had information from relatives. Mother was also aware that supplemental feeding should begin at the age of six months. Mothers also exemplified knowledge of dietary divert by children should be given at least four of the food groups. About three quarters (74.4%) of mother stated that signs of hunger is not the only indicator of poor nutritional fulfilment (Solomon et al., 2017).

About 60.0% of mothers who participated in the study had good knowledge on complementary feeding. Many of the respondents (82.0%) had knowledge of the duration of exclusive breastfeeding, as well as the recommended period to start complementary feeding. Only a small proportion 32.0% and 22.6% of participants knew the recommended frequency of feeding at 6–8 months and 9–23 months respectively. Only Minority group of the parents (11.5%) were well informed about the recommended minimum or least number of food groups to be given to infants at

age 6–23-month. And about 56.0% of mothers were in the known that a non-breastfed baby needs extra meals(Zone, 2020).

2.1.2 Factors affecting knowledge

A study in Northwest Ethiopia revealed that the mother's educational level, fathers level of education, antenatal care attendance, place of delivery, post-natal care, and IYCF counseling, were all shown by a multivariable logistic regression analysis to be significantly associated with knowledge of on complementary feeding. This is an indication that each of these variable had an influence on feeding and feeding practices (Zone, 2020).

Mothers attitude during complementary feeding

According to a survey of mothers' attitudes, 104 mothers (75.4 percent) believe that complementary foods should be chosen from various food categories to give diversity and balance to the infant. Mothers' attitudes toward feeding their sick children differed. Seventy-eight making up about 56.5% of mothers agreed that less food should be given when the child is sick or ill, also about 30 constituting (21.7%) of the mothers believed that food should be omitted during illness, and 18 (13.3%) believed that the same amount should be given during illness. Just five mothers (3.6%) thought it was appropriate to increase the number. When further asked about food products that were forbidden due to cultural or social taboos, seventy-three (52%) said they avoided them due to reasons of taboo. while (49%) said wheat bread, beef, potato, pulses, oil, honey, nuts, and egg were hard to digest(Bhatia & Jain, 2014).

According to Zone, 2020 a score of attitudes showed that a little above half 51.0% of care givers had appreciable or positive attitude and behavior towards complementary feeding. Wiles many (72.0%) of them had the believe breast-feeding alone is not sufficient for a child after 6 months and should be practiced alongside complementary feeding to improve a baby's health (75.0%). About 45.1% of the mothers agreed giving fruits and vegetables is good the infant whiles 42.0% of mother also believe that giving animal-source foods is good for a baby. Only 12.6 percent of mothers believe that bottle feeding is detrimental to their children's health. Mothers level of education, ANC status, IYCF counseling, and possession of radio, showed significant association with attitude of mothers towards optimal complementary feeding

(Zone, 2020).

2.2 Complementary feeding practices

The WHO recommends giving children only breast milk without water and other foods for the first six months of a baby's life, followed by the introduction of supplementary foods between the ages of six (6) and twenty-three (23) months. However, findings by the UNICEF in report published in the year 2019 suggests that feeding practices in most cases are not optimal. According to UNICEF a great number of women breastfed their children at birth or within the first 10 days after birth as opposed to two out of five mothers introducing food by the time their babies were 8 weeks, most mothers also started combining food with breast milk before their children were 6 months and Some of the mothers as well started feeding late at age of 7 and 9 months. This practice contradicts the principles of appropriate complementary feeding which according to (Amunga, 2015). has been rated as part

of the first three intervention of reducing the rate of under nutrition (Amunga, 2015; UNICEF, 2019).

In other literature, 48.75% of mothers gave complementary food at age 6-8 months whiles 51.28 % gave complementary food at age less than 6 months (Jain et al., 2018).

2.2.1 Poor complementary practices

According to (Jung et al., 2017). appropriate complementary feeding is when a child's diet is measured in both quality and quantity in an effort to fulfill the nutritional and energy gab at the time breast milk is proven not to be sufficient for the child. Appropriate complementary feeding also ensures the proper development of the child. Both inadequate quantity and quality of foods in addition to poor feeding practices have a potential negative implication on the health and nutrition of children. Inappropriate feeding practices are the key barriers to sustainable development and poverty reduction (Jung et al., 2017; WHO, 2018).

Infant and children carry the greatest weight of under nutrition and as results surfer disabilities and death associated with it. Under nutrition contributes to about 3 million global annual child deaths and contributes to 45% of the causes of mortality. During the first year of a child's life, it is estimated that over two-thirds of deaths are due to improper dietary habits. In a related study it was established that inappropriate complementary feeding has an effect on the nutritional status of infant and as a results can lead to infant malnutrition which contribute to about two- third of infant death (Jung et al., 2017; Sisay et al., 2016).

Approximately one third of children aged 4-5 months fed with solid food, whiles about 20% of children 10-11 months old are given solid food late. What calls for great consent is the low (28.2%) rate of children receiving at least a minimum diverse diet. Feeding indicators are sub-optimally reported albeit rate of all indicators is diverse in background characteristics. This points out that poor knowledge as well as cultural factors regarding adequate diet for children are key issues that needs to be addressed(Jung et al., 2017; White et al., 2017).

A good number of parents were able to indicate the recommended age to start complementary feeding. Again, most women with children of age 6 months and above were able to indicate the least number of times children should be fed in a day. However, one out in four mothers specified that vegetables, eggs, meat, fish and other flesh should be introduced after 8 months. According to the study 17.1% of the total number of mothers were of the view that water should be given before the age of six months and 36 % constituting a good percentage of women had already given water since birth (Jung et al., 2017).

Malnutrition and many other related diseases may result from poor or inappropriate feeding practices. However, according to a study done by Olatona, et al.,2017 about half of all children death constituting 45% are attributed malnutrition(Olatona, et al., 2017).

In Ethiopia, poor nutrition in children under the age of two is largely due to improper supplemental feeding methods. (Otaigo et al., 2017).

According to (Ahmad et al., 2018). He demonstrated that majority of the children had appropriate, that nearly half (49.7 %) of children were timely introduced to complementary feeding and met the recommended minimum dietary diversity. Also, more than one-third (39.8 %) met the recommended minimum acceptable diet. Almost three out of every four (74.4 %) of the children studied were fed frequently. The study also found that approximately less than a quarter of children got iron supplementation or multivitamin syrup supplementation and fortified food. More over a quarter were given eggs four times a week, vegetables four times a week, and fruits three times each week(Ahmad et al., 2018).

Contrary to past studies carried out in some Africa countries, a study conducted in Zimbabwe also showed a significant association between knowledge and practice of early initiation of complementary feeding (p=0.003). It was also noted that the rate of exclusive breast feeding was generally high (82.9%) compared to the WHO global minimum target of 50%. Again, mothers who had not practiced exclusive breast feeding gave their children water before 6 months to quench their test. Mothers again were observed to score low (13.4%) with respect to continues breast feeding for 24 month or above. This low score according to (Maciel et al., 2018) was because of mothers believe that prolong breast feeding will make children growth retarded. Mother lack of willingness and cultural believes hindered the application of the knowledge acquired(Maciel et al., 2018).

2.2.2 Hygiene practices

Complementary food should be prepared, stored, and fed to children in sanitary fashion, using clean hands, dishes, and utensils. Caretakers should constantly wash

their hands properly with soap, practice good hygiene (such as safe disposal of their children's feces), and use proper food handling techniques. Exposure to contaminated food and water raises the risk of microbial contamination, which causes diarrhea and nutrient loss (United Nations Children's Fund, 2020).

According to a study done by (Chand et al., 2018). About 68 % of mothers who were practicing complementary feeding did not thoroughly clean their hands and utensils before feeding.

Childhood diseases including diarrhea, as well as poor or inappropriate feeding practices, low meal frequency and poor dietry diversity all leads to delay in recovering from modrate acute malnutrition (MAM) . However, good or proper hygiene practices or habits, most importantly, with respect to washing the hands with soap and other positive factors may result in cutting down the risk of diarrhea by 23%. When paired with the provision of supplemental foods, nutritional education on proper feeding and food hygiene activities that target mothers of children has been confirmed to substantially enhance awareness, nutritional status, and reduce disease As a result, optimal complementary feeding and following hygiene procedures have the ability to avoid growth disorders in breastfed IYC(Kajjura & Veldman, 2019).

In other studies, that involved a thorough examination of hygiene practices of mothers, it was discovered that 128 constituting about 92% of the total population of the mothers washed their hands before cooking. Other practices regarding water

hygiene were also examined, and it was discovered that 97.7% of mothers did not boil their water before using it for domestic purposes(Bhatia & Jain, 2014).

A study that included a total of 604 participants, only 38.9% of the study participants demonstrated good and proper hygiene practice in the course of complementary feeding and about (9.3%) of the women disinfected or washed their hands with soap or detergents and water after visiting toilet and many of the women 393(65.1%) washed their hands with only water after visiting toilet, 54(8.9%) washed their hands with soap and water before feeding whiles 424(70.2%) washed their hands only with water before feeding. The study also concluded that women who live in urban areas were 5 times more likely to prepare complementary food in hygienic conditions than women in rural communities (Demmelash et al., 2020).

According to study by Demmelash et al., (2020) in northwest Ethiopia, it was shown that from a total respondent of 604 that, only 56 making up 9.3% of the respondents washed their hands well with soap and water after attending to natures call whiles about more than half 393(65.1%) of them washed their hands with only water. It was also discovered that 54(8.9%) of the respondents washed their hands with soap and water all the time before feeding and almost three quarters 424(70.2%) of mothers washed their hands with only water before feeding (Demmelash et al., 2020).

knowledge of hygiene and cleaning of feeding bottles was observed to be dependent on family socioeconomic position and mother's education. As such rich families embraced the practice of boiling feeding bottles. Maternal knowledge on practices relating to hygiene and keeping feeding bottles clean by mothers depended on

socioeconomic status and education of the parent. This was manifested in the fact that majority of boiled feeding bottle and practiced good hygiene were high income families. Mother who properly practiced breast feeding, immunization and food hygiene were mostly those who were educated. On the contrary mother who were not educated lacked knowledge about hand washing and adequacy of feeding(Kamble et al., 2020).

Preparing and storing complementary foods in a safe environment can prevent contamination and reduce the risk of diarrhea. Microbial contamination of complementary foods is a key cause of food borne infection among infants of age 6 to 12 months old. On this score the study recommends that all utensils used in feeding and preparation of children meal should be properly washed. It is also imperative that the hands of mothers or caregivers and child be properly wash(Neelam, 2020).

2.2.3 Consequences of poor complementary feeding

Poor supplementary feeding of children aged 6–23 months adds to the prevalence of negative growth and death rates in advanced countries. Data shows that promoting effective supportive feeding activities decreases stunting and contributes to improved health and development outcomes(Kassa et al., 2016).

Mother who generally practiced the recommended IYCF had less chance of being stunted as compared to mothers who did not practice. Surprisingly, the study also found that the majority of stunted children were from those who consumed iron rich or iron fortified food(Maciel et al., 2018).

2.2.4 Timely introduction of complementary food

At 6 month of age there is an increased risk of malnutrition among infants hence timely introduction of age-appropriate complementary feeding is encouraged for good health and development of infants. The timing of complementary feeding is critical in reducing morbidity, mortality, and malnutrition. Available research shows that introducing the appropriate and safe complementary food at the right time reduces the risk of infant malnutrition, morbidity, and death(Hibstu et al., 2018).

Recent literature indicates that the initiation of complementary feeding at age 6 months is 104(52%), 8 months is 64(32%) and 4-5 months is 32(16%). This indicates an inappropriate time of initiation of complementary feeding(Chand et al., 2018).

In a related studies it was found out that mothers and care givers had knowledge about the recommended feeding practice but did not put the knowledge in to practice and as such most mothers and caregivers initiated CF before 6 months(Katepa-Bwalya et al., 2015).

The degree of timely initiation of CF in south Asian countries has been lower than the standard of 80-90% of complementary feeding, and as such about 71%,70%,55%and 39% of infants in Bangladesh, Nepal, India and Pakistan respectively are reported to have timely initiated complementary feeding as juxtaposed to the low rate of timely initiation in Africa (Sisay et al., 2016).

Timely introduction of CF at the appropriate time of 6 months is a contributor to good and better health and the promoter of proper infant growth and development. However, timely initiation of CF in Ethiopia at 6 months was 51%.the study

concluded that about two-third of women with children-initiated CF at the right recommended age of six months, this representing a high prevalence as juxtaposed to other developing countries. However a very good number of mothers constituting illiterates and mothers who only had primary education did not initiate CF at its right time and still need much attention and education(Shumey et al., 2013).

In a study done in India, approximately 51.25 % of women began introducing complementary feeding at 6 months, whereas 48.75 percent began at 6–8 months(Jain et al., 2018).

According to recent research, around 36% of parents with infants under the age of 6 months had given their children water since birth, albeit a higher number (80.9%) exclusively breastfed their child in the previous 24 hours. 65.5 % of children aged 6 months or older were given water. whereas 20.9% were introduced to supplementary meals before 6 months(S. et al., 2014).

According to recent studies, the majority of all parents could identify the right age at which food should be offered or introduced to children, and again majority of mothers with children aged 6 months and above could also identify the minimum number of times their child should be fed in a day. Moreover, about a quarter of mothers indicated that vegetables, eggs, and flesh foods (meat, poultry and fish) be introduced after 8 months, while 17.1% also indicated that vegetables, eggs, and flesh foods (meat/fish/poultry/organ meats) should be introduced before that child is 6 months(S. et al., 2014).

A study in Dessie Referral Hospital indicates that 65.1% initiated complementary feeding at the appropriate time with [95% CI (59.3%–70.5%)]. About 123 (44.7%) of mothers initiated breast feeding less than an hour after given birth while many 179 (65.1%) of the mothers initiated complementary feeding at 6 months of age(Andualem et al., 2020).

In a similar study it was found that mothers who had education above grade 9–12 were shown by multivariable logistic regression to be almost 3 and 4 times more likely to timely introduce complementary feeding than their counterpart illiterates' mothers respectively. In the same vain mothers of infants who were counseled on timely introduction of complementary feeding were about 3 times more likely to timely initiate complementary feeding than those who did not get [AOR= 2.83; 95% CI (1.54–5.21), *P*= 0.001].mothers with children aged 6–24 months and had poor knowledge on complementary feeding was almost 63% [AOR = 0.37; 95% CI (0.19–0.72), *P*=0.004] lower as compared to those mothers having good knowledge on CF(Andualem et al., 2020).

Similarly, 21.4 % of participants started complementary feeding before 6momths whiles 60.4% initiated feeding at 6 months and about 18.2% began giving food later after 6 months. However, among these the total number of mothers studied almost all (95.4%) had ever breastfed their children(Fanta & Cherie, 2020).

2.2.5 Factors associated with timely initiation of complementary feeding

There are many factors that can influence or affect the time conducive for the introduction of complementary feeding, this influence may be positive or negative as

it may cause the timely, late or in some cases early introduction of family food to children.

A study conducted in Ethiopia Showed that maternal level of education, profession, marital status, income or wealth status, fathers level of education, occupation, possession of TV, ANC attendance, place of delivery, postnatal care attendance and heath extension visits were the factors significantly associated with timely initiation of complementary feeding (Sisay et al., 2016).

According to research, religious faith of mothers has a greater chance of influence on them not introducing complementary feeds on time. Again when compared to babies whose mothers could read, those whose mothers couldn't read had a greater chance of receiving insufficient supplemental feeding (Issaka et al., 2015).

A study done by (Tette et al., 2016). found a significant association between early initiation of complementary feeding and malnutrition. The study established that one-third (33.7%) of malnourished infants were given complementary foods at age less than 6 months and only one-fifth (21.2%) of infants in their right nutritional status were given complementary foods at age less than 6 months (Tette et al., 2016).

Comprehensive National Nutrition Survey (2016-18) conducted by Ministry of Health and Family Welfare (MOHFW) reported that more than half (53%) of the children between 6 to 8 months were introduce to complementary food at the appropriate time. The study also discovered that a significant number (59%) of children living in cities were given complementary foods starting from six months of age, compared to their rural counterparts (51%). House hold wealth was associated

with an increment in timely initiation of complementary feeding from 42% in the lowest wealth quintile to 68% in the highest wealth quintile(Neelam, 2020).

2.2.6 Infant and Young Child Feeding (IYCF)

Globally, under nutrition is estimated to be associated with about 60% of mortality in children under the age of five. Approximately one-third of infant and young child deaths in developed countries are attributable to underlying factors of malnutrition, with an estimated two-thirds of cases resulting from inadequate complementary feeding activities and practices. IYC between 6 and 23 months in Sub-Saharan Africa with mild acute malnutrition are at an increased vulnerability to poor food intake due to inappropriate feeding and hygiene practices (Kajjura & Veldman, 2019).

A similar study in Rwanda revealed the minimum dietary diversity to be 29.7% for all children aged 6-23 months. Minimum dietary diversity was more likely to be met by non-breastfed (45.4%) children as compared to children who were breastfed (28.5%). Similarly, Minimum dietary diversity was observed by the study to be increasing with age 6-8 months (20.1%), 12-17 months (33.1%) 18-23 months (36.6%). Minimum meal frequency was also higher among children who were breastfed (51.9%) when compared to non-breastfed children 26.6%. However, the overall minimum meal frequency was found to be 50.1%. Minimum acceptable diet could only be calculated for breastfed children and has a prevalence of 20.2% for children between 6-23 months(Kampman & Winkels, 2015).

2.2.7 Minimum meal frequency

A large number of women, most of whom had children aged 6 months or older, were able to say when it was appropriate to introduce complementary foods and how many

times their children should be fed. Contrary to popular belief, approximately, a quarter of mothers believe that fruits, eggs, and flesh meals such meat, fish, poultry, and organ meats should be introduced or given to children once they reach the age of eight months. Water and other liquids should be introduced before the infant is 6 months old, according to 17.1% of respondents. Again, nearly 44.7% of mothers with children practiced insufficient meal frequency. In addition, children aged 6 to 11 months were compared with children aged 12–17 and 18–23 months and this age categories were about 2.4 and 8 times more likely to get the appropriate amount of meals, respectively(Aemro et al., 2013; S. et al., 2014).

Minimum meal frequency of the percentage of breast fed and children not breastfed who aged between 6-23 months was found to be twice for breast fed infants of age 6-8 months, three times for breast fed infants of age 9-23 months and four times for non-breast fed 6-13 mouths. This is an indication that the age in months and the breast feeding status of a child is pivotal in informing mother's decisions regarding the meal frequency of their children (Beyene et al., 2015).

The number of children who were fed with diverse meal and also met the required meal frequency were 27.3% and 68.9% respectively. However, results from Fanta & Cherie, 2020 showed otherwise that a little over half of the children (51.4%) had received minimum meal frequency. In the same vein the number of participants who met the required minimum acceptable diet were 21.1%. Findings of the research observed that dietary diversity declined as age increases. On the flip side (Mekonnen et al., 2017). observed that meeting meal frequency increases as age increases. Again majority of infants aged 6-8months (50.9%) met the standard of minimum dietary

diversity as opposed to children of age 18-23 months (22.3%)(Fanta & Cherie, 2020; Mekonnen et al., 2017).

Among the variables considered for the study house hold head, occupation, maternal or care givers level of education were the variables significantly associated with minimum meal frequency. Children whose parents or care takers were government workers who met the required minimum meal frequency reduced by about 40% [AOR = 0.6; 95% CI (0.4–0.9)]. The odds of attaining the requirement of minimum meal frequency were also reduced by 50% if the child was fed by mother/caregiver who did not have any form of education relative to mothers/ caregivers who had education and attained grade 10 and above [AOR = 0.5; 95% CI (0.2–0.9)]. Meal frequency amongst girls was about 2 time likely than meal frequency amongst boys (Mekonnen et al., 2017).

The age of the infant in the months was revealed to be a significant predictor of meal frequency (P=0.001). surprisingly, when compared to moms with no education, mothers with primary, secondary and higher education were 42% and 63% less likely to insufficiently practice meal frequency (OR = 0.579) and (OR = 0.364), respectively. The study also revealed that Media exposure was shown to be substantially related to meal frequency at (P = 0.001). also when juxtaposed to mothers who were poorly exposure to media, mothers who had good media exposure had but 29% lower chance of practicing insufficient meal frequency (OR = 0.707, 95 percent CI: 0.567, 0.882)(Aemro et al., 2013).

A multivariate logistic regression analysis of a study conducted by Belew et al., 2017 revealed accessing postnatal care services (PNC), involvement in child development monitoring and follow-ups, media exposure, and the age of mothers and that of children were all significantly associated with the low level of dietary diversity. In contrast, residence, information sources, the status of family wealth, and kid age were all substantially linked with minimal meal frequency(Belew et al., 2017).

In other studies, A multivariable analysis was conducted and results of the study indicates that age in months of the child, sex of child and number of postnatal care visit were the variables that predicted minimum meal frequency. As a result, infants in the age category of 12–17 months and 18–23 months were about 3 times (2.8) and 5 times (5.3), respectively, more likely to be fed frequently as recommended than those in the age categories of 6–11 months. Male children were also about 3 times (2.6) more likely to be given the minimum meal frequency than their colleague female children. I the same vain children whose parents had postnatal care visits were about 2 times more likely to receive the recommended meal frequency as opposed parents who had virtually no postnatal care visits(Wuneh et al., 2019).

Other studies also showed that age, house hold family size, parity of the mother, maternal counseling status with regards to IYCF were factors strongly associated with meal frequency. On this score the chance of children aged 6-8 months to receive minimum meal frequency was about 7 times (71%) less likely compared to children aged 12-23 months [AOR = 0.29, 95% CI: 0.28–0.94]. again para-one and two

mothers were about 3 times (2.8) more likely to give their children food more frequently than para-five and above (Tegegne et al., 2017).

About 194(55.1%) of the children were frequently fed four or more times in the past 24 hours while about 124(35.2%) of them were fed three and 34(9.7%) were fed one to two times in the past 24 hours 37(10.5%) of mothers reported to have initiated complementary feeding before their children were 6 months. On the flip side the majority of the mothers 81.8% initiated feeding at six months as recommended. A total of 27(7.7%) responded initiated complementary feeding after six months(Solomon et al., 2017).

According to (Wagris et al., 2019). predictors of minimum meal frequency were timely initiation of breastfeeding, breastfeeding status, minimum dietary diversity and household food insecurity at P value <0.05. it therefore revealed that respondents who had experienced initiated breastfeeding in time were about 2 times more likely to meet minimum meal frequency comparing with their counterparts, AOR= 2.2, 95% CI (1.17, 4.18). Children who were still breastfeeding were about 8 times (7.5) more likely to achieve minimum meal frequency comparing with their counterparts, AOR= 7.5, 95% CI (3.95, 14.4). Children who fed with diverse diet and had met minimum dietary diversity score were about 4 time (3.7) more likely to achieve the recommended minimum meal frequency relative to their counterparts, AOR= 3.7, 95% CI (1.85, 7.44). and finally Children born to families with relatively no or little hunger scale were 5 times more likely to achieve minimum meal frequency than children from households with hunger scale that ranged from moderate to severe , AOR= 5.3, 95% CI (1.5, 12.5)(Wagris et al., 2019).

2.2.8 Dietary diversity

Every child has the fundamental right to adequate nutrition. Children who are fed enough of the right foods, in the right amounts, and at the right time in their development have a better chance of surviving, growing, developing, and learning. They are better prepared to thrive in the face of disease, disaster, or crisis (UNICEF, 2020).

Minimum dietary diversity refers to the percentage of children aged 6–11 months who consume food or food products from at least four or more food groups. The food group is a score derived from the number of seven food groups eaten in the previous 24 hours. If food is eaten, each food group receives a score of one. The rate of feeding children the minimum dietary diversity was 31.5 %. This rate was relatively smaller for infants aged 6–8 months (25.5 %) than for infants aged 9–11 months (43.2%) (Udoh & Amodu, 2016).

The prevalence of Minimum dietary diversity was 15.8% among children. When compared with children born in a health facility, children born at home were 87 % more likely to fail to meet the minimum dietary diversity requirement (AOR=1.87; 95 percent CI 1.24, 2.81). Infants born in the Northern part of Ghana had a higher chance of not fulfilling the minimum meal frequency criterion (AOR=11.08; 95 percent CI 4.91, 24.99) than infants born in the other region. This observation may be occasioned by the low socioeconomic status and poor access to health care services in the northern part of the country. On this score the study recommends a community

based income generation to aid improve access to infant food (Fanta & Cherie, 2020; Issaka et al., 2015).

What has been established by preview research reveals that the proportion or fraction of mother with infants 6-23 months who practiced adequate dietary diversity ware 10.8%. It was also established that mothers with children within the ages of 12-17 months (67%) and 8-23 months (78%) were less likely to practice adequate dietary diversity as against mothers with children 6-11 months. In line with this findings (Agbadi et al., 2017). share the similar conclusion by opining that infants aged 6-11 months had more chances of receiving adequate dietary diversity. Other factors that affect dietary diversity were concluded to be birth order, mothers education and family income status (Aemro et al., 2013; Agbadi et al., 2017).

According to the percentage of children given the WHO recommended minimum dietary diversity constitute only 17%. Food made from tubers, roots, and grains were given to about 84.6% of children as against only few children constituting only 5.5 % who were given fruits and vegetables.

Another study done in Ethiopia also found out that 80.2% of children were given some food groups such as grains, roots and tubers and only 12.6% of children revived the recommended dietary diversity (Belew et al., 2017; Beyene et al., 2015).

Except minimum meal frequency all other indicators of the IYCF were low with only 30.8% of the children meting achieving minimum dietary diversity and only 30.2% of the achieved minimum acceptable diet (Rakotomanana, 2018).

A study in Northern Ghana found that maternal dietary variety was significantly associated with child's dietary diversity. The study also indicated that parents with varied diets had a greater chance or in other words were more likely to provide their children with varied diet(Agbadi et al., 2017).

Recommended dietary habits were more likely to be followed by mothers with infants under 6 months old as compared to mothers with older children. More over half of children over the age of six months had meals prepared from less than four food groups, indicating a lack of dietary diversity(Gyampoh S. et al., 2014).

In the research published by (Aemro et al., 2013). about 10.8 % of infants had an appropriate dietary diversity. Indicating that dietary diversity was generally low among study participants. Insufficient meal frequency for complementary meals was practiced by almost half of youngsters (44.7%).

After comparing findings of various countries on dietary diversity (Aemro et al., 2013). also found that about 10.8% of children feed with food containing the recommended number of food groups. They however blamed this on poor food production, consumption and also the purchasing power of mothers(Aemro et al., 2013).

The percentage or fraction of children who achieved the WHO's guidelines for minimum dietary diversity and meal frequency was 21.8% and 43.8 % respectively.

The majority of mothers (77.8 %) stated that their children had ingested cereals, roots, and tubers in the twenty-four hours preceding the survey, followed by dairy products (71.2 %). Legumes, nuts, and meat and meat products were eaten by 61.0%, 29.3 %, and 29.3 % of the youngsters, respectively. More than 19.9 % and 25.7% of youngsters also given food containing vitamin A and other fruits and vegetables, respectively(Wuneh et al., 2019).

Almost, infants aged 6-23 months (94.4%) consumed foods prepared using grains, roots and tubers and over half of the children were fed with grains, roots and tubers. About 47.8% of the children were given food containing Vitamin A rich fruits and vegetables.

However dairy products were consumed by 32.1% of the children whiles fruits and other vegetables consumed by (31.2%). approximately (18.2%) of the infants aged 6-23 months old were given legumes and nuts. Only small proportion of children (4.6%) were fed with animal source food(Kimiywe & Chege, 2015).

In similar studies conducted among a total of 233 children it was discovered that about 46.3% of the children were given breast milk within the first hours after birth. However, with respect to WHO core indicators for infant and young child feeding (IYCF), only 47·1% of the children were fed with diverse diet at 6 months of age and subsequently increased to 68·5% at 8 months of age. This was an indication that there was some improvement after the intervention(Maciel et al., 2018).

A multivariable analysis in a study by Solomon showed that mother's level of education, household wealth or income status, knowledge level on dietary diversity and child feeding were the variables found to be significantly associated with

minimum dietary diversity. On the contrary, other variables such as mother's age incomplete years, occupation and that of father's level of education and occupation did not show any significant association. Again according to the study, variables such as obstetrics and health service characteristics of mothers were found not to show any statistical or significant association at both levels of binary and multivariable logistic regression model(Solomon et al., 2017).

The probability of giving diverse foods to children aged 6–23 months showed significance association with mothers' level of education, this was exemplified in the fact that mothers who had secondary and above level of education fed their children with more diverse diets relative to mothers who had no formal education. Also, knowledge of mothers on dietary diversity and child feeding practices was significantly associated with minimum dietary diversity, [1.98 (95% CI: 1.11–3.53)]. Furthermore, children from household with monthly income above 3000 Ethiopian Birr had higher chances of practicing minimum dietary diversity relative to those from a family of a monthly income around 1500 Ethiopian Birr (Solomon et al., 2017).

According to the findings of a study conducted in Rwanda, about 66 % of the children were fed cereals, roots, and tubers. Porridge and grain-fortified meals were also offered to infant. Unfortunately, a 24 hours dietary recall revealed that only 35% of the infants consumed fruits and vegetables rich in vitamin-A, and about 66% of the infants received other fruits and vegetables. Again, two-thirds of the infants ate legumes and nuts the day before, whereas 17% ate meat, chicken, fish, or shellfish. The average consumption of newborn formula, milk other than breast milk, cheese,

yogurt, and other milk products was 19 % across all age groups. All categories foods were consumed less by youngsters aged 6-8 months, although intake increased as they grew older. Eggs were an exception, children of 9-11 months received a relatively larger proportion of eggs (8%) compared to the other age groups(Kampman & Winkels, 2015).

2.2.9 Factors associated with minimum dietary diversity

According to previews studies, mothers who resides in urban areas are about 3 times more likely to diversify children meal by providing them with the recommended minimum meal frequency relative to mothers residing in rural centers. Finds also indicates that maternal education is amongst the factors that determines the practice of minimum dietary diversity practices of mothers(Aemro et al., 2013).

A study done by (Beyene et al., 2015). confirmed that children born to mothers who were educated and had a secondary or higher level of education had a greater chance of being fed variety of meals. This could be that educated mother stand more chance of understanding the positive impact of diversifying the meals of their children that uneducated mothers(Beyene et al., 2015).

A study done in Wolaita Soda town in South Ethiopia discovered that house hold head, occupation and child's age were the variable that showed association with minimum dietary diversity. It was observed that infants who were from household headed by housewives were about 2 times more likely to have been fed with food made of more than four food groups in each day as compared to infants born to families headed by private worker [adjusted odds ratio (AOR) = 2.3; 95% CI (1.01–

5.4)]. Also, the chances of attaining the recommended minimum dietary diversity among infants born to families headed government workers were about four times more than the chance that of attaining minimum dietary diversity amongst children from families headed by private workers [AOR = 3.7; 95% CI (2.3–5.9)]. Minimum dietary diversity amongst children aged 6-8 months were almost 5 times more likely than minimum dietary diversity older children [AOR = 5.2;95% CI (2.9–9.1)](Mekonnen et al., 2017).

In related study published in Addis Ababa the age of the child in months was strongly associated with dietary diversity at ($P \leq 0.001$). Also, when juxtaposed to infants aged 6–11 months, children aged 12–17 and 18–23 months were 67% and 78% less likely to practice appropriate dietary diversity (OR = 0.322, 95% CI: 0.220, 0.472) and (OR = 0.215, 95% CI: 0.148, 0.313), respectively. Birth order has also identified as a significant predictor of dietary variety. Third born children had nearly twice the chance of being fed improperly as compared to first born children (OR = 1.951, 95% CI: 1.152, 3.304). Women with elementary and secondary education were 67% and 70% less likely, respectively, to practice inadequate dietary diversity (OR = 0.314, 95% CI: 0.226, 0.438) and (OR = 0.296, 95% CI: 0.156, 0.562). This study also discovered that having two children had a 31% lower probability of exercising enough dietary diversity than having three children (OR=0.690, 95% CI: 0.481, 0.992)(Aemro et al., 2013).

A study done in Ethiopia also holds a similar view that maternal education and, maternal occupation (AOR = 4.2, 95% CI = 2.3–7.8), child sex (AOR = 2.6, 95% CI = 1.5–4.5), and history of postnatal care visit (AOR = 1.8, 95% CI = 1.1–3.2) were

all significantly associated with minimum dietary diversity. As a result, Wuneh et al., 2019 concluded that children born to mother who had primary and secondary or above education were about 3 times and 4 time more likely to receive diverse diet respectively than their counterparts who did not get any formal education. Again, children who were born to mothers mainly being housewife were about 4 time more likely to receive dietary diversity than working mothers. Does this reflect the fact that educated mothers are more likely to utilize or get access to information than their counterparts? (Wuneh et al., 2019).

Similarly, according a research findings Factors that had significant associated with minimum meal frequency were mothers' educational status, child illness and maternal counselling status on issues relating to IYCF during post-natal care service visits. As a result, minimum dietary diversity amongst smothers was about 4 times (48%) less likely among illiterate mothers than mothers who had formal education [AOR = 0.52, 95% CI: 0.28–0.94]. again. A child's history of illness also resulted in a decreased practice of minimum dietary diversity scores. Also the odds of minimum dietary diversity practice of the child were 2.6 times higher among mothers counseled on IYCF practice during PNC visits [AOR = 2.6, 95% CI: 1.59–4.51](Tegegne et al., 2017).

The age of the child was identified as one of the predictors of not meeting minimum dietary diversity, meal frequency and minimum acceptable diet, especially among children aged 6-11 months. Similarly, educational level of the mother was significantly associated with meeting minimum dietary diversity, meal frequency and minimum acceptable diet. Mothers with secondary education or higher had only 35%

chance of not meeting the minimum dietary diversity compared to mothers with of primary and lower level of education. Minimum dietary diversity and an acceptable diet were associated to the Wealth Index. Except for children in the richest homes compared to children in middle-class households, the link was weak. Furthermore, maternal age, employment status of the mother and the breastfeeding status of the child were significant determinants of minimum meal frequency. Children who were not breast fed had 72% chance of not meeting minimum meal frequency compere to children who were breast fed at the time of the study(Kampman & Winkels, 2015).

2.3.0 Minimum acceptable diet

The Minimum Acceptable Diet (MAD) for children aged 6-23 months is among the eight key indicators developed by the WHO for assessing infant and young child feeding (IYCF) practices. This was made official at the World Health Organization (WHO) Global Consensus Meeting on Indicators of Infant and Young Child Feeding (IYCF) in 2007. These eight indicators were all founded to provide simple, valid, and dependable benchmarks for assessing the many aspects of IYCF that are of interest to the general public.

The other seven indicators are: early introduction to breast milk, exclusive breast-feeding for 6 months. Thus, continuing with breast-feeding after one year, introduction of complementary foods, minimum dietary diversity, minimum meal frequency and consumption of iron-rich or iron-fortified foods. The minimum acceptable diet MAD indicator is a compound and a complex indicator comprised of the Minimum Dietary Diversity (MDD) and the Minimum Meal Frequency (MMF)(Analysis, 2021).

According to a study conducted in Nigeria, when juxtaposed to children aged 9–11 months, the prevalence of minimum acceptable diet was pegged at 7.3 %, which was lower at age 6–9 months. The study concluded that, children who were not given the minimum acceptable diet were at a greater chance of becoming underweight (36.0.7%) than children who received the recommended minimum acceptable diet (25.7%)(Udoh & Amodu, 2016).

Findings from a study conducted by (Agbadi et al., 2017). revealed that children complementary feeding practices improves with age, thus older children were more likely to receive minimum acceptable diet. This findings according to the study was in line with similar studies in sub-Sahara and South East Asia countries but contradict findings of studies done in Ghana and Nigeria (Agbadi et al., 2017; Udoh & Amodu, 2016).

In other recent literature S. et al., 2014. found that about 32% of children aged 6–23 months received a minimum acceptable diet(S. et al., 2014).

According to Maciel et al., 2018 out of a total of 233 children studied less than half (46.6%) of the children aged 6months had received minimum acceptable diet, but at 8 months this was slightly increased to 68.8% (Maciel et al., 2018).

2.3.1 Barriers to IYFC

Food acquisition and preparation, as well as seasonal variations in food availability, and caregiver knowledge, beliefs, and behaviors were shown to have a major influence in assessing elements that acted as obstacles to optimum IYC feeding. Seasonal variations have a detrimental impact on the majority of family food

demands. Again, the majority of the items used in meal preparation were purchased(Armar-Klemesu et al., 2018).

Findings from a study in Uganda showed that knowledge cultural influence and work and home chores serves as the primary barriers imparting negatively on appropriate infant and young child feeding practices (IYCF. It was observed that the primary care givers did not have knowledge on the recommended practices of breast feeding and complementary feeding. This gross lack of knowledge by care givers was found to be associated with investing little time to feeding and also given less inadequate food to meet the child energy requirements. The study concluded that primary care givers were incapable of adopting IYCF to improve the nutritional status of their children due to time, cultural influence and lack of knowledge.(Nankumbi & Muliira, 2015).

In addition to scarcity of affordable foods, Osendarp & Roche, 2016 found that, the other barrier of IYCF that hindered mothers from offering certain foods to children leading to a poor meal diversity includes cultural constrain. Furthermore, some communities were primarily reliant on food aid and thus resisted participating in activities that did not provide food (Osendarp & Roche, 2016).

2.3.2 Factors affecting complementary feeding

Previous research into the parameters that influence complementary feeding has found that, higher maternal and paternal education, stronger family income status, sufficient antenatal and postnatal attendance, child's sex and age, institutional delivery, low parity, maternal occupation, urban residency, experience and frequency of complementary feeding have all been found to have an influence on effective complementary feeding activities and practices in children aged 6–23 months.

Nutritional problems such as Iron, zinc, calcium, and vitamin deficiency may occur if CF is introduced too soon or too late. As a result, CF must be nutritionally sufficient, healthy, and properly fed to satisfy the energy demands and the young child's nutritional requirements(Kassa et al., 2016).

Cultural considerations, attitudes, and parental awareness of acceptable behaviors all affect CF. Psychosocial intervention, healthy cooking, hygiene and storing of compatible ingredients, and good grooming are also essential determinants of proper CF activities (Saleh et al., 2014).

In developed countries, the change or shift from EBF to CF is associated with a number of problems, including infrequency of feeding, low energy and nutrient dense diets, inadequate food storage and sanitation, and food taboos. These limitations make meeting the food and energy needs of a growing infant almost impossible as a result increasing the risk of under nutrition during this period(S. et al., 2014).

Studies recently revealed that, A Child's age, educational status mothers and child's birth order were found to be associated with appropriate. Infants within the ages of 6-11months were observed to be 80.5% times less likely to be fed appropriately comparable to those with aged 18–23. Also, mothers with no formal education were 88.5% times less likely to appropriately practice complementary feeding compared to those who had educational status above secondary school [AOR = 0.115;95% CI: (0.002,0.290)]. Besides, first time mother were 72.9% times less likely to practice appropriate complementary feeding than those mothers who gave birth more than once [AOR = 0.271:95% CI:(0.011,0.463)](Fanta & Cherie, 2020).

2.6 Socio demographic characteristics of mothers

According to recent studies, care givers were mostly female and had at least one child who fell within 0-24 months of age. Many of the care giver (87%) were confirmed to be biological mothers of the children they took care. About 94% of the mother were house wives whiles about 93% of them were had low level of education(Nankumbi & Muliira, 2015).

In other literature it was shown that a significant number (48.0%) of the participants attained a secondary education and about 3 in every ten mothers (32.1%) had primary education. Also, about one third of the mothers were traders (30.6%) and about 27.3% were either housewife or not employed. Only 0.6% was professionals or specialist. The study also showed that majority (68.8%) of the mothers worked outside home and about 31.2% were home based workers. Many of the mothers of children had more than three children (44.3%). Mothers were also observed to be mainly multipara and had more than one year of education(Maciel et al., 2018; Udoh & Amodu, 2016).

A study of the socio demographic characteristics and anthropometry of parents showed that the mean or average age of mothers at birth of their children was 30·7 (SD 4·6) years whiles that of fathers was 32.7 (SD 5.5) years. It was shown that a good number of the mothers (56.4 %) were married during the time of the study. The mean body mass index (BMI) of mothers was 24.3 (SD 4.8) kg/m2 as compared to that of fathers was 26.0 (SD 3.5) kg/m2. At the 13 months of age the mean BMI of mothers experienced a slight increment 25.2 (SD 5.3) kg/m2 and that of fathers almost remain the same 26.9 (SD 3.9) kg/m2. The index child was mostly firstborn in

about more than half (53.1%) of the families included in the study. Also there were more male children (52.1%) than female children (47.9 %) in the study(Vaarno et al., 2015).

In a facility based cross sectional study which was conducted among 365 samples in three sub-cities in Addis Ababa, it was showed that a significant proportion of the children 154(44.3%) were around the age 6-11 months with almost half of them being first born. Many of the mothers were around 25-29 years of age with a good number of then being married (94.9%) and staying with their partners. About 6 in every ten mothers were Christian with only 3 in ten mothers attaining secondary education. With regards to the employment status of parents about (69.9%) of mothers were unemployed with only (18.5%) of fathers being unemployed(Solomon et al., 2017).

In a related study among a total of 612 mothers with mean (±SD) age of the mothers as28 (±5) years, almost all the mothers were married (93.6%) without formal education (77.3%). Majority of the respondents were also housewives (85%) with all their husbands being farmers. All of the study participants were also found to be Christians by faith. The mean family size of the respondents was 5.4±1.8. The study constituted equal proportion of male and female children. The many of the (82.5%) of mothers had given birth more than once. Whiles nearly 86% of mothers had less than four ANC visits. Also, two out three (59.2%) of respondents reported to have given birth to the index child in their home and nearly three- fourth (74.5%) of them had never attended postnatal care (PNC). Almost one out of three (32.2%) of mothers

were giving some form of counseling service about child feeding during their pregnancy of the index child(Zone, 2020).

It was revealed that majority of the women (86.66%) were within the age group 18-30 years. About 65% of the total population of mothers were in the category of high socio-economic status whiles rest of the mothers were of the lower socio-economic status category. A bout half (50%) of the participants had college education and about eight in every ten mothers (80%) were housewives(Journal, 2012).

Findings from other studies also indicates that out of the total of 323 respondents participants included in the study, with about 99.4% responds rate to the questionnaires, the average age of children was 15.04 months ± 4.36 (SD) and that of mothers was 28.90 years with± 6.575(SD). The occupation of many (67.5%) of the respondents were farmers and close to half (40.9%) of them attaining primary education(Fanta & Cherie, 2020).

A total of 364 sampled by (Wagri et al., 2019). In during a study in North East Ethiopia revealed that the mean age of mothers to be 26.4(± 5.40) years. According to results of the study more than half of study participants were within the ages of 20–34 years. Also close to half (44%) of mothers could not read and write. Whiles 47.8% and 44.5% of the households were made of 3-4 and above 5 household members. About 297 (81.6%) of the total respondents were married and 255 (70.1%) were Muslim by religion(Wagris et al., 2019).

2.7 Socio demographic characteristics of child

About 43% of the population of children studied were females and 57% constituting boys. A total of 88% were delivered in a hospital and 12% born at home. Mothers who exclusively breastfed for six months were about 68%. Children who were appropriately fed at one year of age were about 61% of the total population. At one year, the breast-feeding rate was 100%, while bottle-feeding was just 2%(Banapurmath, 2013).

The demographic characteristics of a similar study reveals that over half of the children (51.5%) were male children, whiles nearly two in every three boys (62%) were around the ages of 12-23 months. It was also observed that only about 13.5 % recorded as low birth weight (LBW). More over half of the children constituting 51.0 % of the total percentage completed the age-appropriate immunization, and several of the children had been reported sick in the past two weeks preceding the research(Ahmad et al., 2018).

The mothers mean age was 31.83 (SD+6.83) with a range of 18–65 years. The children's mean (+SD) age was 1417 (SD+8.007) months. The sample consisted of 5.59 % male children, with the bulk of the children aged 12–23 months. Many respondents (49.5%) had not been through formal schooling at all, and 863 percent were married. Farming (308 percent) was the most frequent employment among moms(Saaka, 2020).

2.8 House hold characteristics

In a study that recruited about 575 mothers with children, it was observed that close to two third (62%) of the house hold were made of 5 members. Over half (54%) of

the mothers had children under 5 years of age, whiles many (96%) of the infants was in households with the family head being a male. There were more mothers (72.3%) with formal education than fathers (53.6%). It was also showed that Households with land capacity less than 0.25 hectares, with fathers who have not been through any formal education, as well as mothers who confirmed not to increase their meal consumption or intake during the time, they were pregnant and finally breastfeeding were completely associated with late initiation of complementary food. The finding of the study again revealed that household with land capacity less than 0.25 hectare was about 2 times more likely to initiate complementary foods late compared to their counter parts (AOR=2; 95%CI: 1.1 - 3.3). Surprisingly, children whose fathers did go through any formal education were 2 times not likely to introduction food to their children late than those with formal education (AOR=2; 95%CI: 1.3 - 3.4). On the other side parents who did not consume any additional food during the time of gestation and breastfeeding were 2 times more likely to initiate complementary late when compares to their counterpart(Tessema et al., 2013).

CHAPTER THREE

METHODOLOGY

3.0 Study Design

To get an even representation of the sample this study adopted a facility based cross-sectional study design by selecting health facilities across each of the sub-district by means of simple random sampling. The study was a quantitative study. Data was collected using questionnaires.

3.1 Study Area

The Tamale Metropolitan Assembly was founded in 2004 as a result of legislative instrument (LI 2068) that elevated the status of the then Municipal Assembly to that of a Metropolis. It is now among the country's six Metropolitan Assemblies and double as the only Metropolis in the northern regions. Tamale serves as the metropolitan capital city and also double as the Northern Region's regional capital. (Ghana Statistical Service, 2014).

The Tamale Metropolis is one of the Northern Region's 26 districts. It is situated in the center of region, and shares boundaries the Sagnarigu District to the west and north, Mion District to the east, East Gonja to the south, and Central Gonja to the south-west. Tamale Metropolis has a total estimated land size of 646.90180sqkm (GSS2010.The Metropolis is located between $9^{o}16$ and 9^{o} 34 north latitude and 0^{o} 36 and 0^{o} 57 west longitude. Tamale is strategically placed in the Northern Region, and as a result of its location, the Metropolis has a market potential for local goods from the agricultural and commercial industries in the region. Aside from the Metropolis' relative location within the region, the area stands to benefit from markets in the

West African region, including Burkina Faso, Niger, Mali, and the northern portion of Togo, as well as en-route through the area to Ghana's southern half. The Metropolis is made up of 115 different communities. The majority of rural settlements have extensive stretches of land suitable for agricultural activity, and they serve as the Metropolis' food basket. However, these communities continue to lack fundamental social and economic infrastructure such as good road networks, school buildings, clinics, marketplaces, and recreational facilities, impeding socioeconomic growth, poverty reduction, and the overall phenomena of rural-urban migration(Ghana Statistical Service, 2014).

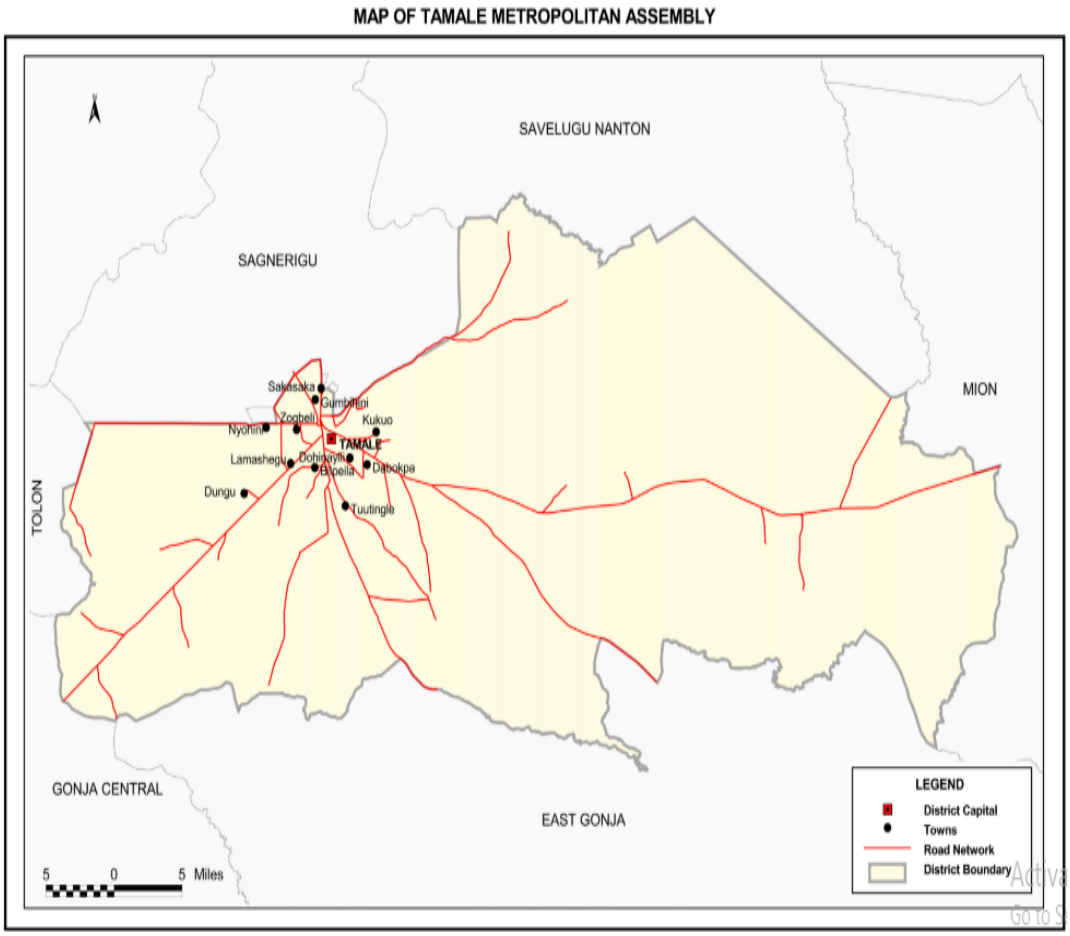


Figure 2:Map of Tamale metropolis

3.2 Study Population

The study population for this study were mothers with children who were around the ages of 6-23 months and whose visited the child welfare clinics (CWC) at the selected health facilities within Tamale metropolis. A total of four facilities were selected randomly across the sub-district using balloting method to aid reduce bias.

3.3 Study Variables

The independent variables of the study includes mothers' obstetric characteristics (ANC attendance), place of birth, type of delivery, timing of postnatal visits, parents characteristics (occupation, educational level, marital status, age of mother, maternal

knowledge of complementary feeding), infant characteristics (age, sex, health status), house hold characteristic (family size, socioeconomic status of family), community characteristics (rural or urban residency).The dependent variables includes knowledge of complementary feeding, complementary feeding practices and attitude towards complementary feeding.

The operational definitions of the variable include: ANC attendance referred to the number of ANC attended before delivery by the mother. Place of birth is where (home or hospital) the child was given birth to. Type of delivery is the mode of delivery either caesarian session or normal birth resorted to in giving birth to the child. Parent's occupation referred to the work or the means of economic sustenance of the parents as reported by the respondent during the interview. Educational level of parents is the highest level of education attained by the parents as reported by the mother. Marital status is the status of marriage of the responded. Age of mother is the age of the mother in completed years. Mother's knowledge of complementary feeding is the level of knowledge possessed by respondent about complementary feeding.

Infant characteristic was defined as the actual age in months and the health status reported by the mother. House hold characteristics is the total number or size of inhabitants in the household and the socioeconomic status of the respondent. Community characteristics refers to the rural or urban residency of the respondent.

Complementary feeding practices is the measure of how respondent met the complementary feeding indicators (timely introduction minimum meal frequency and minimum dietary diversity).

3.4 Sample size

Using the Cochran's formula for cross-sectional studies, a total sample size of 202 was used. This was arrived at as follows:

$$n = \frac{\mathrm{Z}\alpha/2^2 \times \mathrm{P}(1-\mathrm{P})}{\mathrm{d}^2}$$

Where:

Zα/2 = 1.96 at 95% confidence interval

d= 5% margin of error.

P= 14% prevalence of appropriate complementary feeding practice from previous studies (Saaka et al., 2016)

Therefore, putting the values in to the equation

$$n = \frac{(1.96)^2 \times 0.14(1-0.14)}{(0.05)^2}$$

n=184

To take care of design effects 184 was multiplied by 0.1(10% design effect for simple random sampling) and the result added to 184 increasing the sample size to 202

184 × 0.1= 18.4

184+18=202

Therefor the sample size used in this study was 202.

3.5 Sampling procedure/ techniques

Two stage sampling was used by first selecting a total of four health facilities from randomly from the list of hospital that offers CWC services in Tamale metropolis using balloting. Secondly, a sampling frame that constitutes the CWC register was obtained from each facility and the serial numbers of mothers who fell within the inclusion criterion were extracted. The serial numbers were then selected randomly using balloting. Each of the facilities had deferent level of enrolment, and as a result the study used quota sampling to ensure a proportionate representation of each facility. A total of 100 respondents were sampled from RCH which had the highest ANC attendance and a total of 70 and 32 respondents were selected from Builpela and Nyohani health center respectively, these facilities had a relatively lower ANC attendance hence the relatively lower sample.

3.6 Data collection

The study collected data using questionnaires. The questionnaire was uploaded on to Kobo collect software. The questionnaire was administered by the researcher through the kobo collect App. Components of the questionnaire was adopted and modified from previous studies. The questionnaires were put in to sections. Section A was made of set of questions used to assess socio-demographic characteristics of respondents. Section B was used to assess knowledge of mothers/parents on complementary feeding. Section C of the questionnaire was used to assess the

attitude of mothers towards complementary feeding. Section D was made of set of questions used to assess complementary feeding practices of mothers and the factors that affect appropriate complementary feeding practices during complementary feeding.

3.7 Quality control

To ensure validity and reliability of the research tool. The questionnaires were pre tested on a sample of 15 mothers with children aged 6-23 months at the Builpela health center. This was done to ensure that the questions would measure what it was intended to measure. The necessary adjustment was done after the pretest. All respondents were administered with the same questionnaires as such all questionnaires contained the same set of questions which was asked in the same manner. The questionnaires were checked for completeness and possible corrections in the event any came out.

3.8 Data processing and analysis

Data was analyzed using statistical package for social sciences (SPSS). The data was downloaded from the Kobo collect software on to an excel sheet. Data was cleaned on the excel sheet, codded and analyzed on SPSS. Both descriptive and analytical statistics were used in presenting the results of the data.

Descriptive statistics such as standard deviation, cross-tabulation, mean, graphs and tables were used to present data.

Chi-square and multivariate analysis was also used to measure significance of association between variables.

3.9 Ethical consideration

Clearance was obtained from the university. An introductory letter was obtained from the school, this was served to the various stakeholders in other to gain access to facilities to take data. Permission was also obtained from the various health facilities through the Tamale Metropolitan Health Directorate before data was collected in the various facilities. The participants were given Consent forms to sign before the questionnaires were administered. The participants were given some time for consideration to either participate or decline. The consent form was read out and in some case translated to participants who could not read and understand to seek their consent before the questionnaire were administer. The researcher read out the questions to the respondent and the response recoded. Confidentiality of participants participation was assured to participants.

The data was taken during the period of covid-19, the researcher as well as the research assistants complied to the to all the covid protocols by constantly using nose mask, observing physical distancing and regular washing of hands.

CHAPTER FOUR

RESULTS

The core objectives of the study were to assess the knowledge, attitude, practice and factors that affect appropriate complementary feeding (CF) of mother of children aged 6-23 moths. A total of 202 mothers were sampled for this study.

4.1 Characteristics of the Study Population

4.1.2 Socio Demographic Characteristics of Mother

Table 4.1 the socio demographic characteristics of mothers. The study was done in four randomly selected health facilities in Tamale metropolitan: Bilpela, RCH, Tamale central, and Nyohani health center. Among the various age groups many of the mothers were within 26-35 with the mean age being 27.56±4.9 years. The minimum and maximum ages were 19 and 37 respectively. Among the study participants more than eight (181) in every ten mothers were married as against only a little above one 10.4%) in every ten mothers being single (divorced, widows or separated). Most of the mothers studied were Molidagombas 150(74.5%) and the rest being Akans 9(4.5%) and others 43(21.3%). Generally, mothers had low level of education; almost 30 percent 73(29.2%) of the population has never been to school and over 30 percent 70(34.7), 73(36.1) of the total population had secondary (or above) and basic education respectively. More than half 141(69.8%) of the mothers fell under the category of low economic status as over 50 percent 119(58.9%) of the mothers were petty traders. Less than 20 percent 27(13.4%), 34(16.8%) and 22(10.9%) of the mothers were civil servants, house wife, and unemployed

respectively. Also, about 174(86.1%) of mothers delivered in a hospital whiles only 28(13.9%) delivered at home.

Table4.1a: Socio Demographic Characteristics of Mothers

Variable	Category	Frequency	Percentage (%)
Age of mother			
	15-25	72	35.6
	26-35	114	56.4
	36 and above	16	7.9
Mean Age 27.56 ± 4.9			
Marital status			
	Married	181	89.6
	Single	12	10.4
Mothers ethnic group			
	Molidagomba	150	74.3
	Akan	9	4.5
	Others	43	21.3
Mother's religion			
	Islam	165	81.7
	Christianity	37	18.3
Mother's level of education			
	Basic	70	34.7
	Secondary and above	73	36.1
	No education	59	29.2
Mother's occupation			
	Petty trader	119	58.9
	House wife	34	16.8
	Civil servant	27	13.4
	Unemployed	22	10.9
Mother socio economic status			
	Low	141	69.8
	Upper	61	30.2
Place of delivery			
	Home	28	13.9
	Hospital	174	86.1

4.1.3 Socio Demographic Characteristics of Children

Children aged 6-23 months were selected for inclusion in this study. The minimum and maximum age in months of the children were 6 and 23 months respectively with mean age being 10.76 ± 4.7. There were a little more female children 107(53.3%) than there were of males 95(47.0%) during the study. Majority of the children were within the 6-11 months 119 (58.9%).

Table 4.1b: Socio Demographic Information of Child

Variable	Frequency	Percentage (%)
Sex of child		
Male	95	47.0
Female	107	53.0
Age of child		
6-11	119	58.9
12-17	48	23.8
18-23	35	17.3
Mean (SD) Age 10.76 ±4.7		

4.2 Mothers Knowledge on Complementary Feeding

The overall knowledge of complementary feeding was high amongst mothers as it was revealed by the studies that almost 90% of the total population knew that complementary foods should be introduced to children after age 6 months 181 (89.6%) with less than ten percent 9 (4.5%) and 12 (5.9%) reporting that CF should be initiated at age 2 and 9 months respectively. A very good percentage of the

mothers 194(96.0%) also new that complementary feeding should be done alongside breastfeeding and as such about 198 (98.0%) of the study participants agreed that breast milk coupled with complementary feeding is healthy for children aged >6 months.

Close to half 99 (49.0%) of the mothers reported have first heard of complementary feeding from health workers and the rest 47 (23.3%) and 56 (27.7%) of the population reported hearing from family members and friends respectively.

Majority of the mothers 105 (52.0%) and 146(72.3%) in each case new the frequency of feeding at breast feeding age 9-11 months and 12-23moths respectively. However less than half 50(24.8%) of the population new the appropriate WHO recommended frequency of feeding at 6-8 months.

The study revealed that eight in every ten (80.2%) women new that a child would risk being malnourished if complementary feeding is delayed hence about (84.2%) and (93.1%) of the study participants indicated complementary feeding should not be delayed and should be given early at the recommended age of 6 months respectively

Table 4.2: Knowledge of Mothers of Complementary Feeding

Variable	Categories	Frequency	Percentage (%)
At what age should CF start			
	6 Months	181	89.6
	2 Months	9	4.5
	9 Month	12	5.9
Where did you hear of CF			
	Health worker	99	49.0
	Friends	56	27.7

Family member	47	23.3
Would you still breast feed after introducing food		
Yes	194	96.0
No	8	4.0
Frequency of CF at age 6-8 months		
2-3 Times	50	24.8
4-5 Times	26	12.9
On Child's request	126	62.4
Frequency of CF at age 9-11months		
2-3 Times	18	8.9
3-4 Times	79	39.1
4-5 Times	105	52.0
Frequency of CF at age 12-23 months		
2-3 Times	20	9.9
3-4 Times	36	17.8
4-5 Times	146	72.3
Should complementary feeding be delayed		
Yes	32	15.8
No	170	84.2
What is the risk of delaying CF		
Don't Know	14	6.9
Healthy growth	11	5.4
Malnutrition	162	80.2
No risk	15	7.4
Giving food early is good for child health		
Agree	188	93.1
Disagree	14	6.9
Nutritional supplement ensures adequate nutrition of children		
agree	137	67.8
Disagree	65	32.2
Breast milk coupled with complementary food healthy for children aged >6 months		
Agree	198	98.0
Disagree	4	2.0

4.2.1 Knowledge Score of Mothers on Complementary Feeding

The knowledge level of the study participants was scored on two scales ("1") and ("0"). A score of one ("1") was awarded to mothers who responded appropriately to question addressing knowledge and ("0") was awarded to those that inappropriately responded to questions. A total score was calculated for each responded out of a total of 8. Knowledge of mothers was then grouped in two categories as low and high knowledge. Low category were mothers whose total score was between 1-3 and high score was those with total score between4-8. It was found that more than three quarters of the total respondents 186 (92.1%) had high knowledge on complementary feeding and about less than 10% of the mothers who participated in the studies had low knowledge on complementary feeding 16 (7.9%).

Table 4.3: Maternal Knowledge on Complementary feeding

Variable	Categories	Frequency	Percentage (%)
Maternal Knowledge			
	Low knowledge	16	7.9
	High knowledge	186	92.1

Close to all the mothers (91.1%) knew that complementary feeding is the introduction of both solid and semi-solid foods to children alongside breastfeeding.

Whiles only about 7% of mothers were of the views that complementary feeding is giving infants food only when breast feeding stops and about 3% had no idea of complementary feeding.

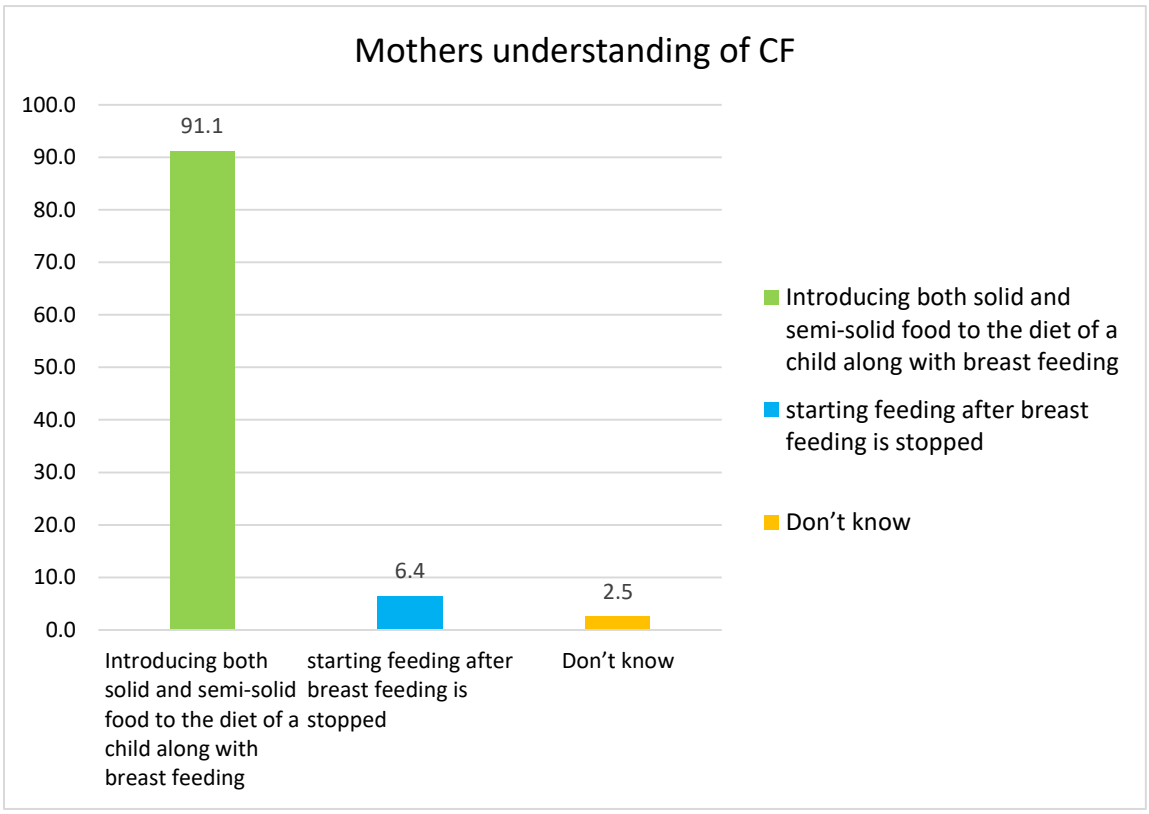


Figure 3: Mothers understanding of CF

4.3 Cross Tabulation of Knowledge and Socio Demographic Characteristics

From the chi-squared analysis, the categories: religion, occupation, socioeconomic status, number of children, number of deliveries, ANC attendance and place of delivery were statistically significant with knowledge at p-values p=0.03, p=0.04, p=0.030, p=0.01, p=0.001, p<0.001 and p<0.001 respectively as shown in the table 4.4 below

Table 4.4: Knowledge and socio demographic characteristic

		KNOWLEDGE			
Variable	**Categories**	**Low Knowledge**	**High Knowledge**	**(χ^2)**	**P-Value**
Age				1.96	0.37
	15-25	2(4.0)	48(96.0)		
	26-35	13(9.8)	119(90.0)		
Mean Age 27.56 ± 4.9	36+	1(5.0)	19(95.0)		
Marital status				2.01	0.15
	Married	16(8.8)	165(91.2)		
	Single	0(0.0)	21(100)		
Ethnicity				3.24	0.19
	Molidagomba	10(6.7)	140(93.3)		
	Akan	0(0.0)	9(100)		
	Other	6(14.0)	37(86.0)		
Religion				4.27	0.03
	Islam	10(6.1)	155(93.9)		
	Christianity	6(16.2)	31(83.8)		
Education				4.3	0.11
	Basic	7(10.0)	63(90.0)		
	Secondary above	2(2.7)	71(97.3)		
	Non-educated	7(11.9)	52(88.1)		
Occupation				8.32	0.04
	Petty trader	7(5.9)	112(94.1)		
	House wife	5(14.7)	29(85.3)		
	Civil servant	0(0.0)	27(100)		
Socioeconomic status				4.72	0.03
	Low	15(10.6)	126(89.4)		
	High	1(1.6)	60(98.4)		
Number of children				7.9	0.01
	1-3	7(5.1)	129(94.9)		

	4-6	7(11.7)	53(88.3)		
	7-9	2(33.3)	4(66.7)		
Number of deliveries				8.05	0.01
	1-3	7(5.1)	130(94.9)		
	4-6	7(11.9)	52(88.1)		
	5-10	2(33.3)	4(66.7)		
ANC Attendance				28.6	p<0.001
	1-4 times	7(38.9)	11(61.1)		
	5-8 times	6(9.4)	58(90.6)		
	8> times	3(25)	117(97.5)		
Residence					
	Rural	9(7.6)	110(92.4)	0.05	0.08
	Urban	7(8.4)	76(91.6)		
Place of delivery				26.14	p<0.001
	Home	9(32.1%)	19(67.9%)		
	Hospital	7(4.0%)	167(96.0%)		

4.4 Mother's attitude on complementary feeding

From the results it was revealed that about three quarters (74.8 %) and more than half (67.8%) of the study participants agreed that practicing complementary feeding is expensive and nutritional supplements ensures infants has adequate nutrition respectively. Whiles about 188 (93.1%) agreed that complementary is good for child health and growth and 198 (98.0%) agreed that breast milk complementary foods are heath for children aged > 6 months

Table4. 5:Factors that affect practice of complementary feeding

Attitude of Complementary feeding			
Variable	**Categories**	**Frequency**	**Percentage (%)**
CF is expensive	agreed	151	74.8
	disagreed	51	25.2
CF is good for child health and growth			
	Agree	188	93.1

	Disagree	14	6.9
nutritional supplement ensure infants has adequate nutrition			
	agree	137	67.8
	Disagree	65	32.2
breast milk and CF are healthy for children aged >6 months			
	Agree	198	98.0
	Disagree	4	2.0

4.4.1 Attitude score

Table 4.6 shows attitude score of mothers. Attitude was categorized into two scales. A score of ("0") was awarded for wrong response to the set of questions addressing attitude and a score of ("1") was awarded for correct or right response to the questions. Attitude of mothers was then categorized as good attitude and poor attitude. Poor attitude categories were those who score 1-2 out of a total of 4 and good attitude categories were those that scored 3 to 4. From the frequency analysis it was revealed that over three quarters 162 (80.2%) of the participants had good attitude toward complementary feeding and only 40 (19.8%) had poor attitude toward complementary feeding.

Table 4.65: Attitude of Mothers towards Complementary feeding

Variable	Category	Frequency	Percentage (%)
Attitude			
	Poor attitude	40	19.8
	Good attitude	162	80.2

4.4.2 Relationship between mothers' attitude and socio demographic characteristic

Table 4.7 represents the relationship between mother's attitude and socio-demographic characteristic. From the chi-square analysis the study revealed that only residential status was significantly related with attitude of mothers on complementary feeding.

Table4. 6: Relationship between mothers' attitude and socio demographic characteristic

Attitude of Mother on CF and Socio Demographic Characteristics					
Variable	**Category**	**Poor Attitude**	**Good Attitude**	**Chi-Square**	**P-Value**
Age					
	15-25	17(23.6)	55(76.4)	1.08	0.59
	20-25	20(17.5)	94(82.5)		
	36+	3(18.8)	13(81.2)		
Marital status				0.23	0.62
	married	35(19.3)	146(80.7)		
	Single	5(23.8)	16(76.2)		
Religion					
	Islam	36(21.8)	129(78.2)	2.3	0.129
	Christianity	4(10.8)	33(89.2)		
Education					
	Basic	14(20.0)	56(80.2)	0.37	0.83
	Secondary	13(17.8)	60(82.2)		
	non-educated	13(22.0)	46(78.0)		
Socioeconomic status					
	Low	27(19.1)	114(80.9)	0.12	0.72
	high	13(21.3)	48(78.7)		
Residence					
	Rural	13(10.9)	106(89.1)	14.37	<0.001
	Urban	27(32.5)	56(67.5)		
Place of delivery				3.11	0.07
	Home	9(32.1)	19(67.9)		

Hospital	31(17.8)	143(82.2)

4.4.3 Mothers Complementary feeding Practices

Table 4.8 below shows Mother's complementary feeding practices which was assessed using minimum meal frequency, dietary diversity, and minimum acceptable diet. Mother hygiene practices was also computed for because of the important role it plays in complementary feeding practices.

The study revealed that high proportion (83.7%) of mothers appropriately practiced complementary feeding. However only a few proportions (16.7%) of the mothers studied inappropriately practiced CF.

Table 4.7: Practice of Complementary Feeding

Variable	Category	Frequency	Percentage (%)
Maternal Complementary feeding practices			
	Inappropriate practice	33	16.3
	Appropriate practice	169	83.7

4.5 Mothers Complementary feeding Practice score

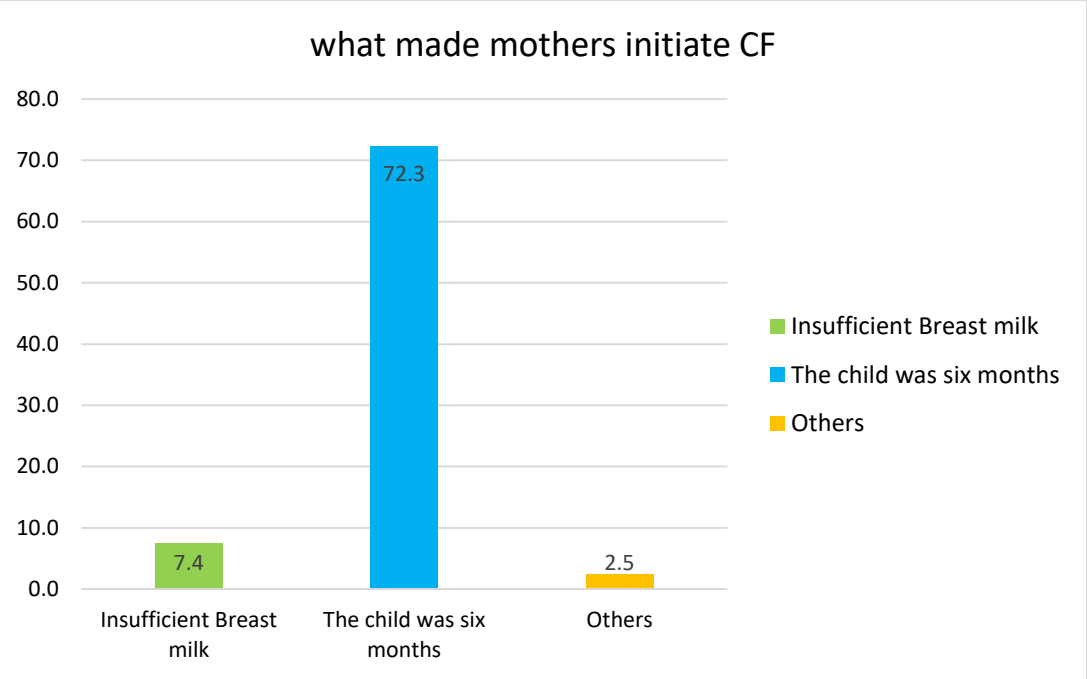
Mothers Practices of complementary feeding was measured on two scale ("0" and "1"). A score of one ("1") was awarded to mothers who appropriately responded to questions addressing practices of CF and a score of zero ("0") was awarded to

mother who did not correctly respond to question. Individual scores were calculated out of a total score of nine (9). Practice of complementary feeding was then put into two categories as appropriate and inappropriate practice. The outcome of a frequency analysis revealed that about more than 80% of mother appropriately practiced complementary feeding with only a little above 10% inappropriately practicing complementary feeding.

4.6 Introduction of complementary food

Majority of the participants had started complementary feeding and had also feed their children on assessment of a 24hour dietary recall. However, mothers were compelled by various reasons to introduce complementary feeding. Less than a quarter (7.4%) of mothers had introduced CF because of insufficient breast milk and about 3% of them (2.5%) introduce complementary feeding because of other reasons (work of mother, ill health) respectively. Almost three quarters 72.3% of the respondents introduced complementary feeding because the child was six months.

Figure 4:Introduction of complementary food



4.7 Minimum Meal Frequency

The study indicator for minimum meal frequency was based on the proportion of breastfed infants who are 6-23 months old and was fed with solid or semisolid. The minimum meal frequency was defined as 2 times for breast fed children aged 6-8 months and 3 times for infants at 9-11months and 12-23 months respectively. There was no significant difference between the 9-11 and 12-23 categories. Majority of mother who archived minimum meal frequency fell in the categories of 9-11 and 12-23 with 184 (91.1%) and 182 (90.1%) respectively.

Table4.9: Minimum Meal Frequency

Variable	Category	Feeding frequency	Frequency	Percentage (%)
Breast feeding age of child				
	6-8 months	<2	126	62.4
		≥2	76	37.6
	9-11 months	< 3	18	8.9
		≥3	184	91.1
	12-23 months	<3	20	9.9
		≥3	182	90.1

4.8 Minimum Dietary Diversity

Dietary diversity refers to the percentage or proportion of infants aged between 6-23 months who received 4 or more food groups from the seven food groups as recommended by WHO. It was measured based on a 24hour dietary recall. For the purpose of this study the seven food groups were categorized in to four categories as proteins, carbohydrates, vegetables and fruits. About 79.7 %, 89.6%, 76.2% and 77.7% of the infants were fed with food containing protein, carbohydrates, vegetables and fruits respectively. This shown in table 4.10

Table 4.10: Dietary Diversity

Variable Category	Frequency	Percentages (%)
Food group		
Protein		
Yes	161	79.7
No	41	20.3
Carbohydrates		
Yes	181	89.6
No	21	10.4
Vegetables		
Yes	154	76.2
No	48	23.8
Fruits		
Yes	157	77.7
No	45	22.3

4.8.1 Dietary diversity Score

This is an index used to measure whether an infant is given a balance diet. Thus, food containing at least four of the seven food groups. For the purpose of this study the seven food groups were categorized in to four groups as protein, carbohydrates, vegetable and then fruits (food containing vitamin A). A score of ("1") was awarded to infants who were given at least four of the seven food groups and a score of ("0") awarded to infants who were given anything less than that. As shown in table 4.11 below.

Table 4.11: Dietary Diversity Score

	Dietary Diversity		
Variable	**Category**	**Frequency**	**Percentage (%)**
Dietary diversity			
	Did not achieve dietary diversity	33	16.3
	Achieved dietary diversity	169	83.7

4.9 Minimum Acceptable Diet

Minimum acceptable diet is the proportion of infants who received minimum meal frequency and minimum dietary diversity. The study revealed that more than half of the women who were included did not archive minimum acceptable diet.

Table 4.12: Minimum Acceptable Diet

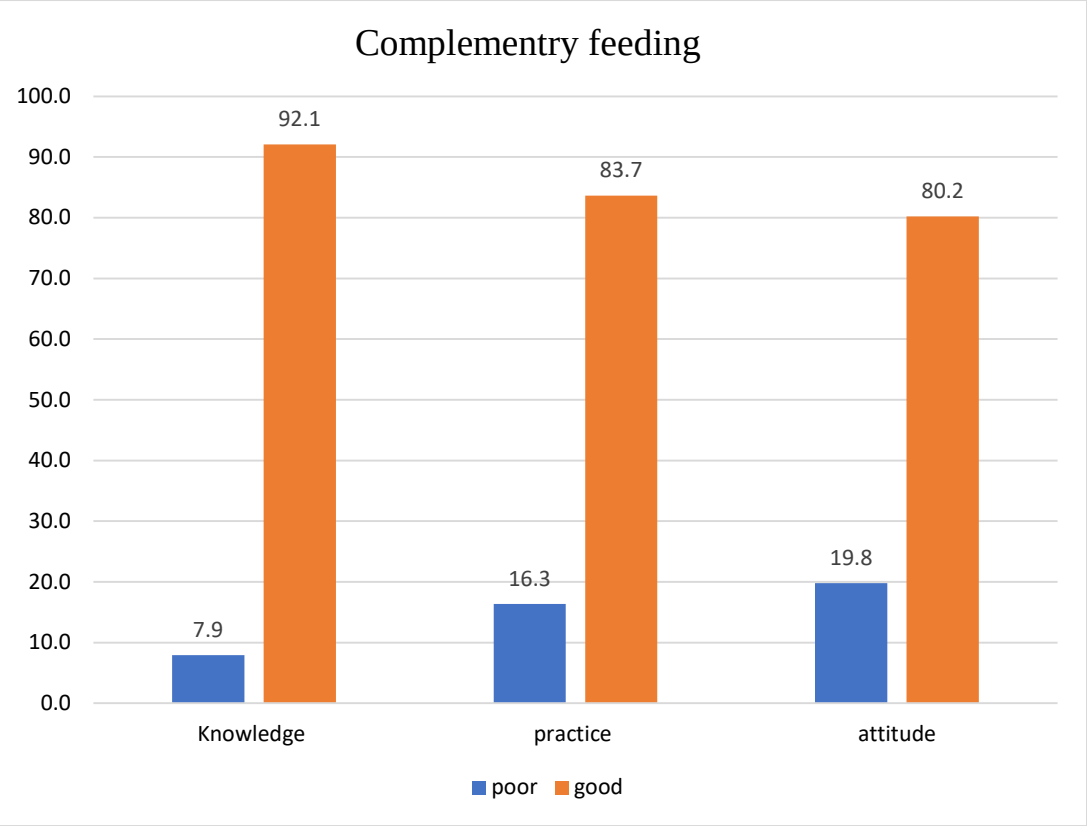
Variable	**Categories**	**Frequency**	**Percentage (%)**
Minimum acceptable diet			
	Not Archived	133	65.8
	Archived	69	34.2

4.9 Outcome variables of complementary feeding

The dependent variables of complementary feeding of this study were knowledge, attitude and practice. Even though the outcome of the analysis conducted indicated high knowledge (92.1%) among mothers there was however slight reduction in

practice (83.7%) and subsequently a slight reduction in attitude at 80.2%. as indicated in figure 5 below.

Figure 5: Complementary feeding



5.0 Factors affecting complementary feeding practices

5.1 Relationship between Demographic Characteristics and Complementary Feeding Practices

Table 4.13 shows the relationship between socio demographic characteristics of mothers such as age of mothers, socio economic status, occupation, number of children, number of deliveries, ANC attendance, religion, educational levels and residential status and complementary feeding practices was determined. A chi-square analysis conducted to measure association between complementary feeding and mother's practices show that the categories Age and residential status were the only variables significantly associated with practice at p-values p=0.01, p=0.003.

Table 4.13: Relationship between Practice of CF and Socio Demographic Characteristics

		Mothers practice of CF			
Variable	**Categories**	**Inappropriate**	**Appropriate**	**Chi-Square**	**P-Value**
Age					
	15-25	15(30.0)	35(70.0)	9.13	0.01
	26-35	16(12.1)	116(87.9)		
	36+	2(10.0)	18(90.0)		
socioeconomic status				0.66	0.41
	Low	25(17.7)	116(82.3)		
	High	8(13.1)	53(86.9)		
Occupation				0.22	0.92
	House wife	6(17.6)	28(82.4)		
	Civil servant	4(14.8)	23(85.2)		
	Unemployed	3(13.6)	19(86.4)		
number of children					
	1-3	23(16.9)	113(83.1)	1.2	0.54
	4-6	10(16.7)	50(83.3)		
	7-9	0(0.0)	6(100)		
number of deliveries				1.2	0.54
	1-3	23(16.3)	114(83.2		
	4-6	10(16.9)	49(83.1)		
	5-10	0(0.0)	6(100)		
ANC					
	1-4	3(6.7)	15(83.3)	0.03	0.98
	5-8	10(15.6)	54(84.4)		
	>8	20(16.7)	100(83.3)		
Religion					
	Islam	27(16.4)	138(83.6)	0.00	0.98
	Christianity	6(16.2)	31(83.8		
Residential status					
	Rural	27(22.7)	92(77.3)	8.55	0.003
	Urban	6(7.2)	77(92.8)		
Education					
	Basic	13(18.4)	57(81.4)	0.58	0.74
	Secondary and above	12(16.4)	61(83.6)		

5.1.2Relationship between knowledge and mothers practice of complementary feeding.

The relationship between complementary feeding practices was computed for. A chi-square test indicated significant relationship between knowledge of mothers, dietary diversity and minimum meal frequency at p-values, p= p<0.001 and p<0.001 respectively. However, the same test did not show any significant relationship between knowledge and minimum acceptable diet at p-value, p=0.42.

Table 4.14: Relationship between Knowledge and mothers practice of complementary feeding

		knowledge of CF			
Variable	**Category**	**Low Knowledge**	**High Knowledge**	**Chi-Square**	**P-Value**
Minimum acceptable diet			121(91.0)	0.64	0.42
	not archived	12(9.0)			
	archived	4(5.8)	65(94.2)		
Dietary diversity				14.4	p<0.001
	not achieved	8(24.2)	25(75.8)		
	archived	8(4.7)	161(95.3)		
Meal frequency					p<0.001
	6-8 months				
		9(7.1)	117(92.9)	0.22	
		7(9.2)	69(90.8)		
	9-11 months				
		7(38.9)	11(61.1)	25.9	
		9(4.9)	175(95.1)		
	12-23months				
		7(35.0)	13(65.0)	22.31	
		9(4.5)	173(95.1)		

5.1.3 Factors that affect practice of complementary feeding

Multinomial logistic regression analysis was done to determine the relationship between all significant variables against practices. It was revealed that among the variable tested against practice only residential status was significant at p=0.008. From the study, rural dwellers were about 4 times (3.66) more likely not to practice appropriate complementary feeding as compared to the urban dwellers [AOR—3.7; 95% Cl (1.41-9.54), p= 0.008.]

Table 4.15: Factors that affect practice of complementary feeding

Variable	Wald	Sig.	AOR (95%)	95% Confidence Interval for Exp (B)	
				Lower Bound	Upper Bound
Age					
15-25	2.365	0.124	5.257	0.634	43.58
26-35	0.592	0.442	2.303	0.275	19.28
36+		1			
Residential					
Rural	7.097	0.008	3.668	1.41	9.54
Urban		1			
Knowledge					
low knowledge	0.880	0.660	0.120	0.520	2.960
high knowledge		1			
ANC Attendance					
1-4times	0.27	0.87	1.131	0.26	4.89
5-8 times	0.24	0.62	1.24	0.52	2.96
>8 time		1			

CHAPTER FIVE

DISCUSSION

5.0 Introduction

The risk of malnutrition increases after six months when breast milk alone is not sufficient for child growth and development, hence the need to introduce other food to complement breast milk(Permenkes, 2018) . Complementary feeding is essential for optimum nutrition and growth of infants. However, available literature revealed that many children from developing world do not meet the standard indicators of appropriate complementary feeding practices. A review of literature revealed that many published works only focus mainly on exclusive breastfeeding practices hence a gap in assessing complementary feeding practices. This study was therefore conducted to assess the knowledge, attitude and factors that affect practices of complementary feeding among mothers with children aged 6-23 months in the Tamale metro. In this study majority of the children were within the age 6-11 months with mean age 10.76 ±4.7. The minimum and maximum age of the children were 6 and 23 months respectively. The study included both male and female children. This was in line with similar study done in Madagascar that only focused on both male and female sex in the study. (Rakotomanana, 2018). The study also concurred with that of (Banapurmath, 2013). who also focused his study on both sex with about 43% of the children studied been females and the remaining 57% been males.

Among the various age categories majority of the mothers were within category of 26-35 with the mean age been 27.56±4.9 years. The minimum and maximum age of mothers ware 19 and 37 respectively. The study showed that about 181(89.6%) of

mothers were married as against only 12(10.4%) mothers been single (divorced, widows and separated).This finding was in agreement with a similar study done in the Kpandai district in northern Ghana (Bimpong et al., 2020).

Mothers generally had low level of education; less than half (29.2%) of the population has never been to school and a little above 30% (34.7) and (36.1) of the total population had secondary and above and basic education. It was also noted that majority of the mothers were Muslims 165(81.7%) and only few were Christians 37(8.3%). The high number of the Muslim group is because the study area was dominated by Muslims.

5.1 Knowledge of mothers on complementary feeding

Another conclusion of this study revealed that most mothers had a good understanding of complementary feeding. This was justifiable in the fact that almost 90% (89.6%) of mothers knew that complementary feeding should be initiated at age 6 months, however less than ten percent (4.5%) of them reporting that CF should be initiated at age 2 and 9 months respectively. A significant percentage of the mothers (96.0%) also knew that complementary feeding should be practiced alongside breastfeeding and as a result of this high knowledge among mothers, about 98.0% of them agreed that breast milk coupled with complementary feeding is healthy for children aged >6 months. However this finding disagrees with findings in Nigeria, Pakistan and India (Bhatia & Jain, 2014; Chand et al., 2018; Olatona, MBBS, MPH, FMCPH et al., 2017) . The disagreement of the findings of this study may be as a result of the differences in methodology used.

Many of the mothers who were well-versed in or had good knowledge on complementary feeding were Muslim women. Could this observation suggest that religion is a determinant of knowledge of complementary feeding or it was because the study area was dominated by the Muslim group? The answer to this question was not covered under the scope of this research and a recommendation for further studies.

The study revealed that about 80.2% mothers sheared the view that a child is at risk of been malnourished if the time of initiating complementary feeding is delayed, as a result of that many of the mothers 84.2% and 93.1% indicated that complementary feeding should not be delayed and should be initiated early at appropriate or recommended age of 6 months respectively.

Also, findings from the study showed that over half 52.0% and 72.3% in each case had knowledge on the frequency of feeding at age 9-11 months and 12-23moths respectively. However only 24.8% of the population new and practiced the appropriate WHO recommended frequency of feeding at 6-8 months This finding reflects that of (Chapagain, 2014). This suggests that at 9-11 months and 12-23 months, mothers were more likely to achieve minimal meal frequency than at 6-8 months. Even though the result of the study agreed with that of Chapagain, et al. it however slightly contradicts that of the findings of Olatona, et al. who posits that the general knowledge of mothers minimum meal frequency was low as only about 100(29.6%) of mothers knew that children aged 6-8 months should be fed at least 2 times per day whiles less than half 151(45.9%) and 226(63.6%) of the mothers

knew children at 9-12 months and above 12months should be given food at least 3 times a day respectively.

Knowledge score from a chi-square analysis was found to be significantly associated with religion (p= 0.03), occupation (p= 0.04), socioeconomic status (p= 0.030), number of children (p= 0.01,), number of delivery (p= 0.01), ANC attendance (p= 0.00) and place of delivery (p= 0.000). However, a multivariate analysis revealed that among the significant variables ANC attendance was the only variable among all the significant variable that was significantly associated with knowledge. The study showed that mothers who attended ANC 4 times and below were about 20 times less likely to have good knowledge on complementary feeding as juxtaposed to those who had a greater number of attendances AOR-20.39; 95%Cl (3.33-124.8), p=0.001. The study also revealed that mother who delivered at hospitals were about 7 times more likely to have high knowledge of complementary than mothers who delivered in the house. This finding may be as a result of the education offered to mothers at the CWC and point of delivery. It however implies that much focus should be placed on improving conditions that may motivate more mother to increase ANC attendance.

5.2 Attitude of mothers on complementary feeding

Generally, majority of the mothers (80.2%) had good or positive attitude towards complementary feeding. Even though, it was found that about three quarters (74.8%) of the mothers consented to the fact that practicing complementary feeding was expensive. But surprisingly, about nine in every ten mothers agreed that

complementary feeding is good for the child growth and health. In the same vein almost all the mother (98.0%) agreed that introducing complementary feeding and still continuing with breast feeding ensures nutritional adequacy and subsequently promote healthy growth of children. This may imply that mothers are willing and also have an appreciable knowledge on complementary feeding as indicated in the earlier finding of this study but the barriers that results in poor attitude and practice of some of the mothers towards complementary feeding might be as a result of the fact that many of the mother (58.9%) were petty traders and as such were among the category of low economic status.

The results of a chi-square analysis of the relationship between socio demographic characteristics and attitude of mothers towards complementary feeding indicated that only residential status was significantly associated with attitude at p= (0.000).

5.2 Maternal practice of complementary feeding

The general findings of the study on mother's practices of CF showed that majority of the mothers (83.7%) appropriately practiced complementary feeding. This resulted from the fact that many of the mothers exhibited good knowledge of complementary feeding. Practice was measured using the IYCF indicators (minimum meal frequency, dietary diversity, and minimum acceptable diet).

5.2.1. Minimum meal frequency

In this study, minimum meal frequency was referred to as the proportion of infants aged between 6-23 months who were fed with the recommended liquid, solid and semisolid food. For the purpose of this study the recommended frequency was

defined as 2times for infants aged 6-8 months and 3 times for those aged 9-11 and 12-23 months respectively. The results of the analysis indicate no significant difference of frequency of feeding between the ages categories of 9-11 months (91.1%) and 12-23 months (90.1%). As a result, many of the infants who were fed with the recommended meal frequency were within these age categories 9-11 months and 12-23 months with relatively low 126 (62.4%) percentage of meal frequency among infants or children aged 6-8 months. This findings was also reported by the 2017/2018 multiple indicator cluster survey for Ghana (Ghana statistical service, 2018), but contradicts study conducted by Saaka et al., 2016 . In northern Ghana. In their findings it was revealed that more than half (57.3%) of infants met the recommended minimum meal frequency. These disparities may be as a result of the factors such as different timing and location the study was conducted or might have been the results of some of the mother initiating complementary feeding late or improve on their practices as a result of signs of malnutrition or ill health.

5.2.2. Minimum dietary diversity

The proportion of infants aged 6-23 months who received at least 5 of the 8 recommended food groups is referred to as minimum dietary diversity. (Ghana statistical service, 2018). For the purpose of this study these food groups were categorized in to four categories: protein, carbohydrates (grains, tubers, roots etc.) vegetables and fruits. Majority 181(89.6%) of the children were fed with food containing carbohydrates (grains, tubers, roots etc.). Generally, about eight in every ten 169(83.7%) mother achieved minimum dietary diversity. This contradicts findings of the 2017/2018 Ghana multiple indicator cluster survey which observed

that young children 6-23 months were not fed or given variety of diet. This contradiction may be due to the fact that the Ghana multiple indicator cluster survey was done across the nation and subsequently on a larger sample relative to the current study. In addition, Ghana multiple indicator cluster survey was conducted on population constituting a wider range of ethnicity which may negatively affect different child feeding practices than this current study. Saaka et al., 2016 is also with a contrary view to the findings of this study, in their findings less than half (35.5%) of infants received minimum dietary diversity. More than three quarters of the mothers also gave food containing the other three food group. In the same vein Aemro et al., 2013 also had a contrary view that only about 10.8% of children were feed with food containing the recommended number of food groups. They however blamed this on poor food production, consumption and also the purchasing power of mothers(Aemro et al., 2013).

5.2.3. Minimum acceptable diet

In northern Ghana, a study conducted among 778 children revealed that less than 30% of the children (25.5%) had received minimum acceptable diet whiles in the same vain a sample of 355 infants studied indicates revealed that less than a quarter of the infants received minimum acceptable diet (Saaka et al., 2016). The findings of this current study however indicates that more than half (65.8%) of the infant did not receive minimum acceptable diet. This finding and observation is obviously in agreement with the low rates reported by the preview studies and the 12% of infants receiving minimum acceptable reported by the 2017/2018 multiple indicator cluster survey.

5.3. Factors affecting practices

Age of mothers, residence status, nutritional diversity, and minimum meal frequency were the variables significantly associated with practice, according to a chi-square test. However, a multivariate logistic regression analysis indicates that among the entire significant variable tested against practice only residential status was significant at p=0.008. From the study, rural dwellers were about 4 times (3.66) more likely not to practice appropriate complementary feeding as against the urban dwellers [AOR—3.7; 95% Cl (1.41-9.54), p= 0.008.]. The finding in this study is in agreement with that of a study done by Belew et al., 2017 in Dabat distric in North west Ethiopia.which states that mother who resided in the urban areas were about 3 times more likely to give the required minimum meal frequency than mothers who lived in the rural areas (AOR = 3.02; 95% CI: 1.41, 6.48).

In Northwest Ethiopia, Demmelash et al., 2020 found that out of a total respondent of 604, about 56(9.3%) washed their hands with soap and water after visiting the toilet whiles on the other hand about 393(65.1%) washed their hands with only water. It was also found that8.9%of the mothers consistently washed their hands with soap and water before feeding and about 0.2%) of mothers washed their hands with only water before feeding. These findings were slightly in disagreement with findings of this study which found that about 84.2% washed their hands with soap and water before cooking and feeding, whiles only 11.9% of mother washing their hands with only water and 4.0% of mothers washed their hands before cooking or feeding. The study also found that more than three quarters (79.2%) of mothers fed their children

with homemade food with half of the total respondents feeding their children using bowl and spoon as recommended by the WHO.

CHAPTER SIX

SUMMARY, CONCLUSION AND RECOMMENDATION

6.0 Introduction

The study was a cross sectional studies done in the two Tamale metropolitan sub-districts: Tamale central and Tamale south. It was set out to focus on assessing the knowledge, attitude, practice and factors that affect appropriate complementary feeding among mothers with children aged 6 to 23 months. A total of 202 participants were sampled for this study based on the Cochran's formula.

6.1 Summary of Findings

The study sampled both male and female children with a high proportion of the children studied falling within 6-11 months of age. The study has identified that mothers were generally young.The research has also found that many of mothers were married with only few of them being single (divorced, widows and separated).

The study also confirmed that knowledge of complementary feeding among mothers was generally high. Majority of mothers had knowledge about the right age to initiate complementary feeding. In line with this finding the study also found that majority of the women knew that CF should be initiated whiles still continuing with breast feeding till the child is two years. Again more than three-quarter of mothers also strongly held the believe that complementary feeding along with breast feeding helps in healthy growth and development of children above 6 months.

The modalities for measuring practices were built on IYCF indicators (minimum meal frequency, dietary diversity, and minimum acceptable diet). A score of practice

showed that majority of the mothers appropriately practiced complementary feeding. A good proportion of mothers attained minimum dietary diversity. However, meal frequency at age 9-11 months and 12-23 months was almost the same and with relatively low frequency of feeding at age 6-8months.Minimum acceptable diet was found to be relatively low among the infants sampled for the study.

Age of mothers, residential status, dietary diversity and minimum meal frequency were the factors that emerged as the predictors of practice. Urban dwellers were also more likely to practice appropriate complementary feeding compared to their rural dwellers.

6.2 Conclusion

According to the findings of the studies, mothers had a high level of knowledge about complementary feeding, particularly when it came to the timing of its introduction. Feeding practices among mothers was also observed to be appropriately practiced especially with respect to minimum meal frequency, and minimum dietary diversity. However, it was noticed that minimum acceptable diet was low amongst infants. The present study lays the ground work for further studies in to what brings about the low level of minimum acceptable diet even though meal frequency and minimum dietary diversity was high among mothers. The study also revealed that mothers who dwelled in urban regions were more likely to practice complementary feeding than mother who dwelled in rural arrears.

6.3 Recommendation

- The study found that rural women were more likely not to appropriately practice complementary feeding. This may be occasioned by the poor access to information. Educational intervention and sensitization should be intensified at the rural areas.

- Dietary diversity and meal frequency for children between the ages of 6-8 months was not met. This may also be the result of poor education on the need to diversify the meal of children. More education should be given around this area.

6.4 Recommendation for further studies

1. The study was a cross sectional studies and as such did not allow enough time to observe study participant to observe the changes that may arise with time. It is recommended that a longitudinal or interventional studies be done on the topic to observe long term changes that may arise.

2. The study is a cross sectional studies conducted in an urban area (Tamale metropolitan assembly), this is likely to make finding of this study not a true reflection or not replicable in that of rural areas. It is however recommended that similar studies be conducted in rural areas to ascertain the veracity of the findings of this research in the rural areas.

3. This study did not pay attention to how knowledge, attitude and practice of complementary feeding affect the health and nutritional status of children.

Further studies should be done to measure the effects that knowledge, attitude and practice might have on the health and nutrition of the child.

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APPENDIX

Appendix One: Inform consent

Title: Assessing the knowledge, attitude and practices of mothers on complementary feeding: a cross-sectional study in tamale

Tel: 0540635350/0509417411

Principal investigator: Abdallah Abdul-Hanan

Address: Department of Community Health and Family Medicine, University for Development Studies Tamale.

I am Abdallah Abdul-Hanan, a final year Master of Public Health student of the University for Development Studies. I am conducting a study which is focused on Assessing the knowledge, attitude and practices of mothers on complementary feeding: a cross-sectional study in tamale. I would like to invite you to assist me by responding to the following questionnaire. Your participation in this study is purely voluntary and confidentiality will be observed in the entire process and afterwards.

Aims of the study: To assessing the knowledge, attitude and practices of mothers on complementary feeding: a cross-sectional study in tamale

Potential Discomforts and Risks

Procedure: I would be administering questionnaire to you to assess the factors that affect the knowledge, attitude and practice of complementary feeding among mother with children aged 6-23 months. It may take at least 15-30 minutes to complete the questionnaires.

During the exercise you may dislike some of the questions of which you can skip. You may also feel tired in the process of responding to the questionnaire. There is no known risk as far as this exercise is concern.

Potential Benefits

This research may not have any direct monetary benefit to you. However, the response you provide will greatly add to the knowledge on complementary feeding

and at large, findings as well as recommendations could help improve or modify policies towards complementary feeding.

Confidentiality

The response or information you provide us in the course of this interview will be guided and kept confidential. Name or any identity will not be linked with the response you provide. As such you are only identified by codes or serial numbers.

Compensation/ cost

There will be no cash compensation in any form given to participants during or after this exercise. Again, there is no direct cost in the form of monetary or material to be incurred by the respondent. However, word of appreciation and gratitude will be granted to members for their effort given to the work.

Right of Participants

It is purely voluntary to respond to this questionnaire, as such a participant should or is at free will to stop, skip or opt out of the exercise.

QUESTIONNAIRES

S/N	QUESTION
1	Age of mother as at last birthday …….
2	Marital status A. Single ☐ B. Married ☐ C. Divorce ☐ D. Widow ☐
3	What is your ethnic group……
4	Which religion do you belong to A. Islam ☐ B. Christainity ☐ C. Others ☐
5.	Highst level of education A. Primary ☐ B. JHS ☐ C. Secondary ☐ D. Tetiary ☐ E. Non- formal education ☐ F. No education ☐
6	Occupation A. Petty Trader ☐ B. House wife ☐ C.Civil Srvant ☐ D. Unemployed ☐
7	Socio economic status A.lower ☐ B. Middle ☐ C. Upper ☐
8	Number of children ……..
9	Number of deliveries …….
10	If died at what age did they die ……..
11	Age of child A. 6-11 ☐ B. 12-17 ☐ C.18-23 ☐
12	Sex of child A. Male ☐ B. Female ☐
13	House hold size …….
14	Residence A. Rural ☐ B. Urban ☐
15	Place of delivery A. Hospital ☐ B. Home ☐
16	How many time did you attend ANC when you were pregnat A. 1-4 ☐ B.5-8 ☐ C. >8 ☐

SECTION A: SOCIO-DEMOGRAPHIC CHARACTERISTICS

SECTION B: KNOWLEDGE OF COMPLEMENTARY FEEDING

S/N	QUESTION
17	What is complementary feeding A. introducing both solid and semi-solid food to the diet of a child along with breast feeding ☐ B. starting feeding after breast feeding is stopped ☐ C. Don't know ☐
18	Where did you hear of complementary feeding A. Health worker ☐ B. Friend ☐ C Family member ☐
19	At what age should complementary feeding start? A. 2 months ☐ B. 6 months ☐ C. 9 month ☐
20	Would you still breast feed you child after introducing other food? A. Yes ☐ B.No ☐
21	How often should complementary feed be given in a day at age of 6-8 months A. 2-3 Times ☐ B. 4-5 Times ☐ C. 5-6 Times ☐ D. On childs request ☐
22	How often should complementary feed be given in a day at age of 9-11 months A. 3-4 Times ☐ B 2-3 Time ☐ C. 4-5 Times ☐
23	How often should complementary feed be given in a day at age of 12-24 month A.3-4 Times ☐ B. 2-3 Times ☐ C. 4-5 Times ☐
24	Should complementary feeding be delayed A. Yes ☐ B.No ☐
25	What is the risk of late starting of complementary feeding A. Malnutrition ☐ B. Healthy growth ☐

	C.No risk ☐

SECTION C: ATTITUDES OF MOTHERS OF INFANTS TOWARDS

S/N	QUESTION
26	Practicing complementary feeding is expensive A. Agree ☐ B. Strongly agree ☐ C. Disagree ☐ D. Strongly disagree ☐
27	Giving children food early is good for their health and growth A. Agree ☐ B. Strongly agree ☐ C. Disagree ☐ D. Strongly disagrees ☐
28	Nutritional supplement ensures infants has adequate nutrition A. Agree ☐ B. Strongly agree ☐ C. Disagree ☐ D. Strongly disagree ☐
29	Breast milk coupled with complementary foods are healthy for children at age > 6 month A. Agree ☐ B. Strongly agree ☐ C. Disagree ☐ D. Strongly disagree ☐

COMPLEMENTARY FEEDING

SECTION D: PRACTICES AND FACTORS THAT AFFECT MOTHERS DURING COMPLEMENTARY FEEDING

S/N	Question
30	Have you started complementary feeding? A. Yes ☐ B. No ☐
31	If yes what made you introduce your child to other food. A. the child was six months ☐ B. insurficient brest milk ☐ C. Others ☐
32	If No Why haven't you started complementary feed A. child is not of age yet ☐ B. Breast milk is enough for the child ☐ C. child is not in good health ☐
33	Do you still breast feed you child after introducing other food? A. Yes ☐ B.No ☐
	Answer any of questions 30-32 that applies to your child's age
34	How often do you feed your child in a day at age 6-8 months? 2-3 Times ☐ B. 4-5 Times ☐ C. 5-6 Times ☐
35	How often do you feed your child in a day at age of 9-11 months? A. 3-4 Times ☐ B 2-3 Time ☐ C. 4-5 Times ☐
36	How often do you feed your child in a day at age of 12-24 month ? A.3-4 Times ☐ B. 2-3 Times ☐ C. 4-5 Times ☐ D. On demand ☐
37.	What prevents you from feeding more often? A. Ill-health ☐ B. Nature of work ☐ C . Others ☐
38	who feeds your child ? A. My self ☐ B.Care taker ☐ C. others ☐

39	Where do you obtain food to feed your child ? A. Home made food ☐ B. Processed food ☐ C. Buy from road side ☐
40	How do you always wash your hands before feeding ? A. with soap and water ☐ B. Using only water ☐ C. I do not some times wash my hand ☐
41	What do you use in feeding your child? A. Bowl and spoon ☐ B. bottle Feeding ☐ C.Bowl with hand ☐
42	Do you face difficulties in practicing complementary feeding? A. Yes ☐ B. No ☐
43	What has made it difficult to practice complementary feeding A. Work ☐ B. Finance ☐ C. Taboo ☐ D. Child's health ☐ E. Others ☐
44	Do you give snack in between meals? A. Yes ☐ B. No ☐
45	**Indicate which of the following food groups you gave to your child for the pass 24 hours**
	Protein (egg, meat, beans, fish, groundnut, cowpea.) A. Yes ☐ B. No ☐ Carbohydrate (yam, TZ, Banku, bread, rice.) A. Yes ☐ B. No ☐ Vegetables (carrot, lettuce.) A. Yes ☐ B. No ☐ Fruits (mango, banana, pawpaw.) A. Yes ☐ B. No ☐