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**Aumi Chhetri**

JUNE 2021

**KNOWLEDGE AND PRACTICES OF EXCLUSIVE  
BREASTFEEDING AND COMPLEMENTARY  
FEEDING AMONG MOTHERS ALONG WITH  
NEWBORN CARE IN A RURAL AREA OF COX'S  
BAZAR DISTRICT IN BANGLADESH.**

**Aumi Chhetri**

Roll No. 0119/06

Registration No. 664

Session: January- June 2019

**This is to certify that we have examined the above master's thesis and have found that it is complete and satisfactory in all respects and that all revisions required by the thesis examination committee have been made.**

-----  
**(Dr. Md. Masuduzzaman)**

**Supervisor**

**Department of Pathology & Parasitology**

-----  
**(Taslima Ahmed)**

**Co-supervisor**

**Department of Applied Food Science  
and Nutrition**

-----  
**(Associate Prof. Kazi Nazira Sharmin)**

**Chairman of the Examination Committee**

**Department of Applied Food Science & Nutrition**

**Faculty of Food Science & Technology**

**Chattogram Veterinary and Animal Sciences University**

**Khulshi, Chattogram-4225, Bangladesh**

**JUNE 2021**

**DEDICATED  
TO ALL  
MOTHERS**

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The Author

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## Table of Contents

<b>Content</b>	<b>Page no.</b>
Authorization .....	i
Acknowledgement .....	iv
Abstract.....	xi
List of Tables .....	viii
List of Figures .....	ix
List of Abbreviations .....	x
Chapter 1: Introduction .....	1
Chapter 2: Review of literature.....	5
2.1. Exclusive Breastfeeding (EBF) and Complementary feeding (CF).....	5
2.3 Importance of Breastfeeding .....	6
2.4 Importance of Complementary feeding.....	7
2.5 Knowledge and practices of Exclusive Breastfeeding and Complementary feeding with associated factors .....	8
2.6 Importance of Newborn care practice .....	10
2.7 Nutritional status of 6-23 months child.....	11
Chapter-3: Materials & Methods .....	12
3.1. Experimental Area.....	12
3.2. Inclusion criteria.....	12
3.3. Exclusion Criteria.....	12
3.4. Experimental Design .....	12
3.5. Sample size estimation .....	13
3.6. Anthropometric measurement .....	14
3.6.1 Measuring Mid-Upper Arm Circumference (MUAC) .....	14
3.6.2. Procedure of Weight measurement (followed by UNICEF, 2022) is given below .....	15

3.6.3. Standardize the weighing scale (followed by UNICEF, 2022) .....	15
3.6.4. Length and Height measurement procedure (followed by UNICEF,2022)	15
3.7. Statistical Analysis .....	16
Chapter-4: Result .....	17
4.1 Socio-demographic information of the parents .....	17
4.2. Mother's Knowledge of EBF.....	19
4.3. EBF practices of mothers .....	20
4.4. Mother's knowledge of CF .....	21
4.5. Mother's practices on CF .....	21
4.6. EBF knowledge according to socio-demographic characteristics.....	24
4.7. Practices of EBF according to socio-demographic characteristics. ....	24
4.8. Knowledge of CF according to socio-demographic characteristics.....	26
4.9. Practice of CF according to socio-demographic characteristics .....	28
4.10. Newborn care practice.....	30
4.10.1. ANC visit history of mothers during pervious pregnancy.....	30
4.10.2. PNC visit history of mothers after previous delivery .....	30
4.10.3. Place of delivery .....	30
4.10.4. Type of delivery.....	30
4.10.5. Instruments used during delivery to cut the umbilical cord .....	32
4.10.6. Ingredients used for Umbilical Cord dressing.....	32
4.11. Nutritional status by using Anthropometry measurements .....	33
4.12. History of food intake in last 24 hours .....	34
4.13. History of feeding according to age .....	35
4.13.1. History of feeding according to age (6-8 months).....	35
4.13.2. History of feeding according to age (9-11 months).....	36
4.13.3. History of feeding according to age (12-23 months).....	37
Chapter-5: Discussion.....	39

Chapter 6: Limitations & Recommendation .....	43
Chapter 7: Conclusion.....	44
References .....	45
Appendix-I .....	53
Appendix-II.....	57
Brief Biography of the Student .....	59

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## List of Tables

---

<b>Table No.</b>	<b>Title</b>	<b>Page no.</b>
2.1	Bangladesh Nutritional Data (DHS 2017, MICS 2019)	12
4.1	Socio-Demographic Characteristics of the respondents (Total participants, 350)	19
4.2	Mother knowledge of Exclusive Breastfeeding (Total mothers were 350)	21
4.3	EBF practices of mothers (Total respondents, 350)	22
4.4	Mother's knowledge of Complementary feeding (Total respondents were 350)	23
4.5	CF practices of mothers (Total respondents were 350)	24
4.6	EBF knowledge according to Socio-demographic characteristics	24
4.7	Effects of Socio-demographic factors for knowledge of EBF	26
4.8	Practice of EBF according to Socio-demographic characteristics	27
4.9	Effects of Socio-demographic factors on the practice of EBF	28
4.10	Knowledge of CF according to Socio-demographic characteristics	29
4.11	Practice of CF according to Socio-demographic characteristics	30
4.12	Effects of Socio-demographic factors according to CF practices	31
4.13	History of feeding among 6-8 months children according to age	36

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## List of Figures

---

<b>No. of Figures</b>	<b>Title</b>	<b>Page no.</b>
1.1	Breastmilk composition by Boquien CY (2001, January 1).	1
4.1	ANC visits history of mothers in the rural area	31
4.2	PNC visits history of mothers in the rural area	32
4.3	Place of delivery	32
4.4	Type of delivery	33
4.5	Ingredients used for umbilical cord dressing	34
4.6(a)	Different kinds of food intake for the last 24 hours by children	35
4.6(b)	Different kinds of food intake for the last 24 hours by children	36
4.7	The amount of food intake by children (6-8 months) according to their age in the last 24 hours	37
4.8	The amount of food intake by children (9-11 months) according to their age in the last 24 hours	38
4.9	The amount of food intake by children (12-23 months) according to their age in the last 24 hours	39

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## ABBREVIATIONS

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ANC	Ante Natal Care
AOR	Adjusted Odd Ratio
BMI	Body Mass Index
CF	Complementary Feeding
DHS	Demographic and Health Surveys
EBF	Exclusive Breastfeeding
EIBF	Early Initiation of Breastfeeding
fl oz	Fluid ounces
IQ	Intelligence quotient
IYCF	Infant Young Child Feeding
MAM	Severe Acute Malnutrition
MICS	Multiple Indicator Cluster Surveys
MUAC	Mid-Upper Arm Circumference
PNC	Post Natal Care
SAM	Severe Acute Malnutrition
UNDP	United Nation for Development Program
UNICEF	United Nations International Children's Emergency Fund
WHO	World Health Organization

## Abstract

One of the essential elements in a child's survival, birth spacing and ability to avoid illness is Breastfeeding. This study was conducted to evaluate the knowledge and practices of exclusive breastfeeding and complementary feeding among rural mothers and identified the factors that influence feeding practices and knowledge. For this study, about 350 number of mother-child pairs have been purposively selected from kauerkhope union, ramu upazila of Cox's Bazar district, Bangladesh by a pre-designed questionnaire. The features in this study have been determined by using cross-sectional descriptive analysis for identifying general characteristics, correlations between independent variables (Age in years, educational qualification, occupation of mothers, family income, religion, types of family, no. of children and place of delivery) and dependent variables (knowledge and practices of EBF and CF) and logistic regression with a p-value of  $<0.05$ . Nutritional status is determined by anthropometry methods.

The prevalence of knowledge and practices of EBF has been found about 63.7% and 68.3% respectively whereas the prevalence of knowledge and practices of CF has been found about 68.3% and 46.9% respectively. From the binomial logistics regression analysis, Mothers who have primary and secondary educational qualification (adjusted odds ratio, (AOR)=6.966 and 2.632; 95% confidence interval, (CI):2.660-18.240 and 1.596-4.341) have shown good EBF practice than others. On the other side, Mothers who have secondary & higher-level educational qualification (adjusted odds ratio, (AOR)=13.649; 95% CI:1.937-12.383) and who also have chosen house as delivery place (AOR=6.803; 95% CI: 2.803 - 14.551) are more likely to have good practice of CF compared to their counterparts. There have been only 54.9% mothers who have completed ANC visit during previous pregnancy period. In comparison, 64.9% mothers do not attend any PNC visit after delivery and rural mothers are more likely to choose house as delivery place. Around 21% children have eaten the right amount of food according to their age. Finally, 8.1% malnourished has been found in this study.

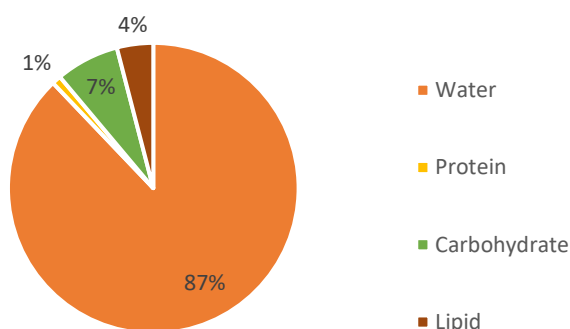
So, it is recommended that, to reduce health disparities, community health extension activities should be strengthened with nutritional health educators.

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**Key words:** Ante natal care, complementary feeding, exclusive breastfeeding.

## Chapter 1: Introduction

Breast milk is the best choice for newborn survival, and it contains enormous nutrients (Abigail et.al.,2013). Basically, breastmilk contains oligosaccharides, amino acid proteins, enzymes, growth factors, hormones, vitamins and minerals, antibodies, long-chain fatty acids, and live cell etc. Generally, a mother can produce forty to fifty ml (1.4 to 1.8 fl oz) milk in one day (Neville et.al.,1988). Initially, the stomach of a baby is very small, or marble sized, so, 40-50 mL milk is enough for a baby in the beginning of life. Breastmilk is easily digestible for children.



### 1.1. Breastmilk composition by Boquien (2001).

There is no lactoglobulin in human milk. Many minerals like calcium, phosphorus, magnesium, potassium, and sodium are present in human milk. Lactoferrin and other small proteins, and the non-protein nitrogen fraction are more common in human milk (urea, free amino acids, including taurine). As a result, human milk has a low protein content (10 g/L) and digestible for child.

Breast milk composition can change with time and feeding. Initially, mother produces 'watery' milk is known as "Foremilk". And at the end of the feeding mother produces "Hindmilk" which contains more nutrients than "Foremilk". Hindmilk and Foremilk both are rich in nutrients. Children diet is completed by feeding hindmilk and foremilk.

According to World Health Organization (WHO, 2019), optimal breastfeeding includes EIBF, EBF for first six months, frequent feeding, continuous breastfeeding for up to two years, and an increase in feeding frequency during illness (WHO, 2007). For the world, EBF practice is one of the nutritional goals that must be met on a priority basis by 2025

for mother and child health worldwide (Shetty et.al., 2014). But the practice of breastfeeding is decreasing gradually due to various factors.

In Bangladesh, the EBF and CF percentage was 65% and 34%, respectively (NIPROT, 2018). However, after completing first six months of life infants and children do not received proper amount of feed. In comparison, only 44% of newborns globally between the ages of 0 and 6 months were exclusively breastfed from 2015- 2020 (WHO, 2021). In 2019, only 28% of breastfed children (6-23 months) were receiving a minimum acceptable diet (BBS & UNICEF, 2019).

Different Studies was carried out to evaluate women's knowledge, perceptions, and practices concerning breastfeeding, complementary feeding, and newborn care. Knowledge, attitudes, and practice of breastfeeding among mother with children under five (Mbada et.al.,2013; Oche et.al., 2011) and knowledge and practices of EBF in Nigerian populations (Hackett et.al., 2015) has shown global trends in EBF. The relationship between school-going girl's perceptions and knowledge of Breastfeeding (Hackett et.al., 2015) and mother's knowledge and practices regarding exclusive breastfeeding related study was conducted in Ethiopia (Asfaw et.al., 2015) has drawn particular attention.

According to WHO standards, complementary feeding helps in child growth and avoids stunting in children aged 6 to 23 months (Radwan et al., 2013). Complementary feeding lasts typically from six to twenty-four months of age. It is a crucial time for child. At this age, many infants begin to suffer from malnutrition due to lack intake of complementary food. A study was conducted by Olaton in 2017 on Complementary feeding knowledge, practices, and food diversity among mothers with under-five children in an urban area in Lagos State, Nigeria. This study found poor knowledge of complementary feeding practice among mothers due to mother's age, early marriage, and low education level. Another study had conducted by Chapagain in 2013 with mothers and child pairs in Nepal and found lack of knowledge on complementary feeding among mothers. Researchers from Ethiopia (Misgna et al., 2014) identified the factors that influenced mothers' attitudes regarding complementary feeding methods and newborn care. Udoh et. al., (2016) had conducted a study on Complementary feeding practices among mothers and nutritional status of infants in Akpabuyo Area, in Nigeria was identified some cultural and social factors that influenced complementary feeding

practice. Research was found that age-inappropriate complementary feeding has a deleterious impact on energy intake and baby weight-for-length, potentially increasing the risk of obesity by influencing infant hunger, food choices, and digestion (Thompson et al., 2013).

Newborn care practice starts with ANC visit during pregnancy period. Rural mothers have less idea about newborn care practice due to lack of knowledge about newborn care. A study was carried by Kabwijamu et.al., (2016) on Newborn care practices among adolescent mothers in Hoima District in Uganda. BW et.al., (2020) had conducted a study on postnatal mothers in Nekemte city, western Ethiopia to find associated factors that influenced mother's level of newborn care practice. Another study was conducted by Sreeramareddy et.al., (2006) on home delivery and newborn care practices among urban women in western Nepal by using a pre-test questionnaire. On the other hand, Abdullah et.al., (2021) was conducted a study on the perception and practices on Newborn care and managing complications in rural communities in Bangladesh and investigates rural populations perception and behaviors towards newborn care and techniques for addressing newborn problems.

EBF and CF knowledge and practices is affected by different socio-demographic factors. Significantly associated factors are found through this study and described widely. Furthermore, it is found that past studies did not addresses the EBF and CF knowledge and practices among mothers along with Newborn care in rural area. Most study was concentrated on a small number of indicators. Various socio-demographic factors have been included in this study to get a better experience. Evaluation of EBF and CF knowledge and practices is the main objective of this study. Newborn care practice and nutritional status are also determined in the observed area. Rural mothers were typically uneducated in developing nations like Bangladesh. Even though they frequently showed little concern for feeding their babies. Their socio-demographic condition, and the difficulties they faced are responsible for poor feeding practice. The outcome of the study will guide new researchers and policymakers in deciding the way to enhance EBF, CF, and newborn care practice among rural mothers. Data of EBF and CF knowledge and practices could be helpful to guide nutritional promotion in our country. Community monitoring system may help to increase the proper newborn care practice in village area.

## ❖ Objectives

- To determine socio demographic factors of the participants.
- To evaluate the knowledge and practice of EBF among mothers in a rural area.
- To evaluate the knowledge and practice of CF among mothers.
- To determine the practice of newborn care.
- To determine the nutritional status of children (6-23). months.

## **Chapter 2: Review of literature**

### **2.1. Exclusive Breastfeeding (EBF) and Complementary feeding (CF)**

According to the World Health Organization (WHO), exclusive breastfeeding (EBF) is; when a baby consumes breast milk from their mother for the first six months and drops or syrups (containing vitamins and minerals supplements or medications) are not allowed (Elias et.al., 2017). Baby can also get breastmilk from wet nursing process. In 2015, only 40% of newborns were exclusively breastfed throughout the world, which is anticipated to grow 50% by 2025. Breastfeeding is also known as nursing and chest feeding. Usually, breast milk is given directly from the breast of the mother. However, it can be pumped, stored for a certain period (6-8 hours), and offered from a bottle. But bottle feeding is discouraged for infants. Colostrum is thick, sticky, and known as 'liquid gold. It is yellowish and orangey in color.

EBF helps infants to fight against gastrointestinal infections, protect against obesity and non-communicable disease, and promote the bonding between mother and baby. Breast milk should be given to the child after two hours intervals. The mother must give breast milk eight times a day and four times at night to the child. A baby should breastfeed whenever they want in a day at night (on demand), stimulating the breasts to produce an adequate supply of breast milk. Appropriate timing of exclusive breast feeding is first six months of life. Mothers should continue breastfeeding practice up to two years age of child.

According to the World Health Organization, CF is "the process that begins when breast milk alone is no longer adequate to fulfil the nutritional needs of newborns, and additional meals and liquids, in addition to breast milk, are required." (WHO, 2017). It is a bad idea to start CF too soon or wait too long. Early starting of complementary feeding may increase the risk of diarrheal diseases for children. After six months of life breast milk cannot generate adequate energy and nutrients for children and it is the reason of growth faltering and malnutrition (Cattaneo et.al., 2006). As a result, the World Health Organization has recommended that complementary feeding begins six months after birth (WHO, 2017).

From 6 to 8 months, the child needs two times of meals ( $\frac{1}{2}$  of 250 mL/meal) with healthy snacks per day and from 9 to 11 months, the child needs three times meals ( $\frac{1}{2}$  of 250



mL/meal) with two healthy snacks (Dewey et.al., 1984). Other half of the calories must be required from a family meal. At last, at 12 months to 2 years, the child needs three times of meals (250 mL/ meal) with two healthy homemade snacks. It is better to feed children one food at a time. It may help to know which food is allergic for children (Marriott et. al., 2003).

The amount of energy required by an infant or child is determined by the amount of food intake at each meal. Children who have been breastfed only require nonliquid foods, whereas milk and semi-solid or solid foods should be provided to non-breastfed children (Shi et.al.,2010 & WHO, 2008). Feeding children between 6 to 23 months is a difficult task.

The minimum acceptable diet integrates nutritional diversity, frequency of feeding, and breastfeeding status into one indicator. It helps in tracking progress toward enhancing children's diets simultaneously (WHO, 2008).

It is important to remember that healthy complementary foods should be clean and safe to make sure the child growth and development. Complementary food should be enriched with calorie, protein and micronutrients (especially iron, zinc, calcium, vitamin A, vitamin C, and folate) etc. (WHO, 2000). Proper nutrition comes from proper amount of feeding.

### **2.3 Importance of Breastfeeding**

Colostrum is composed of lots of antibodies, immunoglobulin & white blood cell. It is known as natural vaccine. Colostrum stays for 3-5 days after delivery. After colostrum mother requires a couple of weeks to produce "Mature milk". Breast milk has become matured in 4 weeks. Mature milk contains calorie, protein, vitamins and minerals and enormous bioactive components (like hormones, growth factors, enzymes, and live cells) to support child's healthy progress (Hamosh et.al., 2001). It helps in organ development, healing and change, activates the immune system, develops and protects neurons in the brain, prevents infections and lowers the risk of brain inflammation. Motee et.al., (2014) assessed the importance of exclusive breastfeeding and came up with various problems that obstruct breastfeeding among mothers. This study discussed the propriety of complementary feeding and the challenges infants face regarding feeding. According to WHO, breastfeeding is the most cost-efficient plan to reduce

childhood morbidity (such as obesity, hypertension, and gastroenteritis) as well as mortality.

According to Rouw et.al., (2018), Breast milk has a range of immunostimulatory, anti-inflammatory, and antibacterial compounds and its helps in lowering the risk of short- and long-term morbidity. It favorably affects a child cognitive and psychomotor development. The incidence of respiratory tract infections, otitis media, and gastroenteritis can be reduced by proper breastfeeding. Breastfeeding increases brain development and it has the potentiality to improve eating habits and also reduce the chance of overweight.

Improper breastfeeding is caused premenopausal breast cancer, ovarian cancer, retained gestational weight gain, type-2 diabetes, myocardial infarction and metabolic syndrome (Stube et.al., 2009).

Yamamoto et.al., (2022) stated an association between nursing and postpartum mother weight gain. According to the study, Lactating mothers were significantly higher postpartum weight loss than others. The obese and overweight groups and mothers with a higher pre-pregnancy BMI lost more weight. On the other hand, the underweight group did not lose weight than their pre-pregnancy weight. However, having an excessive BMI pregnancy prone to impair breastfeeding inauguration and prolongation. This study may encourage pre-pregnancy obese mothers to start breastfeeding as early as possible. Breastfeeding helps to reduce their extra weight after delivery.

#### **2.4 Importance of complementary feeding**

Moghaddam et.al., (2015) stated that breast milk is not enough to cover the infant's nutritional demands after six months of life; complementary foods must be added to the child's diet. Every child should breastfeed up to two years of life or older according to IYCF. Practice of responsive feeding is good for child health. For example, feed the child gently and calmly, encourage but not pressure them to eat, engage in conversation with the child while maintaining eye gaze, ensure adequate cleanliness, and properly handle food. Complementary feeding should be started with 2-3 spoons of homemade foods. Later the amount of food must be increased with time. Gradually improves the variety and uniformity of the meals. Infants should occasionally receive vitamin and mineral supplements or fortified supplemental foods. From 6 to 8 months of infants

needs 2 meals per day, and 1-2 extra snacks (WHO, UNICEF, 2015). Transition from breast milk to family food is an important for child development and growth.

Complementary feeding fulfils nutritional needs at this age and preventing nutritional shortages which can be harmful for early and later health of infants. Food availability and cultural variables should be considered while making CF recommendations by health worker.

However, more studies on CF content, timing and health outcomes need to be conducted to attain nutritional goal. Nutritional program for child could be implemented in multi-dimensional way where healthcare professionals, community and parents focusing on child's health and proper growth. To achieve a standard weight, growth and minimize obesity risk during childhood should avoid unnecessary protein content in complementary feeding (Monteiro et.al., 2005; Ong et.al., 2006).

Most RCTs and observational research had found no link between the time of CF introduction and later obesity risk (Daniels et al., 2015).

Other research had found that age-inappropriate CF had a deleterious impact on calorie intake and baby weight-for-length, potentially increasing the risk of obesity by influencing child's consumption, food choices, and metabolism (Thompson et.al., 2013). This data supports the theory of early-life consumption influences growth and body composition throughout development (Hopkins et.al., 2015).

## **2.5 Knowledge and practices of Exclusive Breastfeeding and Complementary feeding with associated factors**

Howlader et.al., (2020) was conducted study on selected mothers aged (18-35 years) and having at least one child aged (one week to 6 years) from Tungipara, Dhaka district of Bangladesh. They identified the general characteristics of the respondents by general descriptive statistics. The study used univariate logistic regression to determine the factors and considering p-values less than  $< 0.01$  and  $< 0.05$ . The study found that most women had a positive attitude as regards breastfeeding and around 68.46% of mothers had given breast milk to their children for up to 6 months. On the others hand around 91.6% of children fed colostrum by their mothers.

Ketbi et.al., (2018) and Joshi et.al., (2012) were conducted a study in UAE and Nepal and claimed that about 46% and 41% of mothers believed that breast milk helps in child's development and prevents infection in UAE and Nepal respectively.

Mushaphi et.al., (2008) has conducted study on mothers. The study found that almost 77.30 % of women began complementary feeding to their infants before six months; most typically, they did so on the advice of elders were about 45%.

Yadav et.al., (2004) had discovered that 17.70 % of urban and 13.10 % of rural mothers started complementary foods before six months of age, while 53.70 % of urban and 54.20 % of rural mothers started complementary foods between 6 and 12 months of age. The finding was they believed that breast milk would not be enough, so they started early weaning (30% in urban areas and 28.90% in rural areas).

Rahman et.al., (2020) was conducted survey on woman-child pairs. Multilevel logistic regression models were applied independently for individual, household, and community-level components to identify factors associated with EBF.

Medium and highly educated mothers are strongly associated with breastfeeding practice was observed by Sanlio et.al., (2021) in Catania, Italy. Besides this factor maternal age and employment status was also influenced breastfeeding.

Multidimensional barriers were associated with EBF in China was found by Shi et.al., (2021). Factors that influenced breastfeeding in this study were maternal higher education, formal employee with  $\geq 6$  months of paid maternity leave, support of the husband and best friends for breastfeeding, a breastfeeding supporting society, a better breastfeeding knowledge and experience etc.

Lack of complementary feeding practices have a harmful impact on children health and growth in the first two years of life claimed by Kabir et.al., (2012).

Inadequate complementary feeding was responsible for child stunting even if they receive optimum Breastfeeding (Black et.al., 2008). By ensuring optimal complementary feeding, an estimated 6 % of deaths among children under five years of age could be prevented (Black et.al., 2003).

Inappropriate complementary feeding after six months of age is one of the major causes of malnutrition in Ghana. Malnutrition is currently the leading cause of the global disease burden (Ezzati et.al., 2002) has been identified as the underlying factor in about 50% of deaths of under-fives in developing countries (Black et.al., 2003).

Semahegn et.al., (2014) was found that lack of education and gender-based discrimination was affect complementary feeding among mother in Eastern Ethiopia.

Khanal et.al., (2013) was found that whose father had at least one secondary educational qualification were more likely to meet the recommended acceptable diet standards.

## **2.6 Importance of Newborn care practices**

Islam et.al., (2010) was conducted a study in six randomly selected unions (sub-subdistrict) of Monohardi Upazila (sub-district) of Narsingdi district, Bangladesh. They collected data from mothers (75.6% of mothers had home delivery) through face-to-face interviews using a pre-tested questionnaire. Most of the responders were between the ages of 20 and 34 years. The finding was there only 6% had been delivered by professional midwives. Drying and wrapping neonates as soon as possible and providing colostrum to newborns were nearly ubiquitous. They also found unhealthy behaviors such as dirty cord care (42%), delayed breastfeeding beginning (60%), usage of pre-lacteals (36%) and early washing (71%) were all quite frequent. The findings of this study reveal that in Bangladesh's rural areas, unsafe infant care behaviors such as unclean cord care, delayed breastfeeding beginning, usage of pre-lacteals, and early washing are common. Women's education and religion were crucial deterrents to such conduct. Early and exclusive breastfeeding, delayed bathing, and WHO-recommended cord care might improve newborn survival in Bangladesh if an extensive education campaign for the community was organized by home health workers.

Efa et.al., (2020) had conducted a survey on randomly selected women with babies under six months at three public health institutes in Nekemte City, Ethiopia. Epi-Data version 3.1 was used to code, clean and input the data. This study found that the level of essential newborn care practice was 44.1% and the mothers general safe cord care practice was 68.3%. In comparison, the optimal thermal care practices and good neonatal feedings were 78.7% and 77.2%, respectively, in that area. The level of necessary newborn care practice in the research region was found inadequate. Promoting critical newborn care through community education and counselling on essential newborn care and neonatal danger indications for all pregnant mothers should be emphasized.

Ayiasi et.al., (2016) stated that the village health care team promoted newborn care in Masindi and Kiryandongo districts, Uganda. The village health care team can answer inquiries and refer patients accurately; they can help to promote good cord and thermal care for newborns and increase prompt care-seeking for health facility deliveries and infant sickness.

## 2.7 Nutritional status of 6-23 months child

The "critical window" for optimal growth, health, and behavioral and cognitive development occurs between birth and 24 months (Onis and Branca, 2016). Proper IYCF practice is vital for preventing malnutrition during the critical time of life during pregnancy and the first two years of a child. IYCF practices protect children from malnutrition and health complication. The implications of IYCF practice in the first two years of life helps to reduce the risk of illness and mortality in infants

**Table2.1 Bangladesh Nutritional Data (DHS 2017, MICS 2019).**

	<b>DHS 2017</b>	<b>MICS 2019</b>
<b>Prevalence of stunting among children under five years (0-5months)</b>	31%	28%
<b>Prevalence of underweight among children under five years (0-59 months)</b>	22%	23%
<b>Prevalence of wasting among children under five years (0-5 months)</b>	8%	10%
<b>Prevalence of Low birth weight (&gt;2.5kg)</b>	NA	15%*
<b>Prevalence of children under 0-5 months exclusively breastfeed</b>	65%	63%
<b>Prevalence of children under 4-5 months exclusively breastfeed</b>	40%	NA.
<b>Prevalence of children's early initiation of breastfeeding (breastfeed within 1 hour after delivery)</b>	69%	47%
<b>Prevalence of breastfeeding children 6-23 months receiving minimum acceptable diet</b>	NA	2%

NA: Not available.

(\*) This data is not probably representative of the entire population.

## **Chapter-3: Materials & Methods**

### **3.1. Experimental Area**

This study has been conducted at the Kauarkhope union, located in Ramu Upazila of Cox's Bazar district of Bangladesh. Total 350 mothers have been selected for the study. Data have been collected from October 2021 to February 2022.

### **3.2. Inclusion criteria**

- The mother who gave verbal consent for the study.
- Those mothers who had at least one child (special children were also included) aged between 6 and 23 months.
- Most importantly, if any of them were practicing breastfeeding and complementary feeding or not also allowed for this study for interviews.
- The mother who lived in the Kauarkhope union of Ramu upazila of Cox's Bazar district.

### **3.3. Exclusion Criteria**

- Those mother who did not give verbal consent.
- Those mothers who were absent.
- Those mothers who were in hospital due to illness.

### **3.4. Experimental Design**

A community-based cross-sectional and purposive descriptive study has been conducted by using a close ended questionnaire. This study was carried out in the Kauarkhope union at Ramu Upazila of Cox's Bazar district, Bangladesh. All the participants willingly gave verbal consent for this study. A pre-tested questionnaire was developed in six segments. Questionnaire for knowledge and practices of breastfeeding and complementary feeding part was made by following IYCF guidelines for Bangladesh which published in 2021. On the other hand, Madhu et.al., (2009) was followed to prepare questionnaire for newborn care practice. Anthropometry measurements was used to determine nutritional status among selected children. Questionnaire was used for conducting face-to-face interviews for this study. The research ethics committee approved the present study protocol of Chattogram Veterinary and Animal Sciences

University, Bangladesh. Ethical consent was obtained from all the participants before their inclusion in the study.

The questionnaire was divided into six segments. The first segment was about socio-demographic factors (Age of mothers, educational qualification of mother, Mothers occupation, age during first delivery, educational qualification of fathers, occupation of fathers, fathers' income, religion, Type of family and no. of children) of participators.

The second segment was included the knowledge and practices of EBF. Here, seven closed-ended questions related to EBF knowledge, and another seven closed ended questions related to EBF practices were asked in interview. The third section focused on complementary feeding knowledge and practices. Here, seven closed-ended questions were asked about complementary feeding knowledge. The remaining seven questions were asked regarding complementary feeding practices. Each question for knowledge and practices of EBF and CF was based on two scales ("0", "1"); a score of "0" was awarded for "No". In contrast, a score of "1" was awarded for "Yes".

The fourth segment was about newborn care practices; mothers were asked about the number of ANC and PNC visits; the type of delivery; the instruments used to cut the umbilical cord; and how umbilical cord dressing was done after delivery.

The fifth segment was about the Nutritional status of a Child. For anthropometry measurements, the length of the babies was measured by a flat wooden length measuring board, and weight was measured by SECA. Nutritional status was categorized into three segments. These are severe acute malnutrition, moderate acute malnutrition and normal. MUAC tape was used for categorizing nutritional status in this study.

Lastly, the six-segment was the frequency of food intake, and the variety of food group was eaten in last 24 hour by children was also recorded in the study

Before starting the interview, the objectives of this study were described to the mothers with friendly behavior, and their verbal consent was taken consciously.

### **3.5. Sample size estimation**

Sample size was estimated by following "Taro Yamane Method" (Yamane, 1967).

The method is

$$n = \frac{N}{1 + Ne^2} \dots\dots\dots(I)$$

where, n signifies the Sample size, N signifies the Population size and e signifies the



margin error. Margin error for the study was 0.05 or 5%.

### **3.6. Anthropometric measurement**

The most popular method for determining the existence and severity of protein-energy malnutrition is anthropometry. The measurement of body parameters to determine nutritional status is known as anthropometry. Anthropometry can be used to assess an individual or it can be used to determine a group of people to see if malnutrition is an issue. Anthropometric measures include length or height, Weight, Circumference of the upper arm in the middle (MUAC) etc.

#### **3.6.1. Measuring Mid-Upper Arm Circumference (MUAC)**

The circumference of the left upper arm measured at the mid-point between the top of the shoulder and the tip of the elbow is known as the Mid-Upper Arm Circumference (MUAC) (olecranon process and the acromion). The MUAC test is used to determine nutritional status. It's an excellent predictor of mortality, and in several trials, it outperformed any other anthropometric parameter in predicting death in children. When the length of follow-up was short, the benefit of MUAC was highest. Even the most disabled people can do the MUAC measurement because it takes little equipment and is simple. Although personnel should be educated on how to take the measurement, even poorly qualified health workers and community-based volunteers may learn the correct procedure. MUAC is indicated for use with children aged six to fifty-nine months and assessing acute energy insufficiency in adults during times of famine.

**The procedure of MUAC measurement (UNICEF, 2020) is given below:**

- Comfortable work environment was maintained during the study. Mother was told to raise the child left arm for MUAC measurements.
- The top of the child's shoulder and the tip of the elbow was identified with fingertips.
- The tape was kept at eye level and placed it at the top of the elbow (endpoint).
- The middle of the upper arm was found by carefully folding the endpoint to the edge of the tape. Left thumb was placed on the point where the taps folds (midpoint). The midpoint was marked with a finger or pen.
- The arm was straightened, and the tape was wrapped around the arm at the midpoint. The tape was placed through the window and correct the tape extension. Ensure that the tape is flat on the skin.

- The tape was double check that isn't too tight or too loose.
- Read and call out the measurement to the closest 0.1cm and record the color.
- The tape was taken from the child arm.
- A note of the measurement was taken as soon as possible.

**3.6.2. Procedure of Weight measurement (followed by UNICEF, 2022) is given below**

- Extra clothes were taken off from child's body.
- The scale pan was covered with a towel to keep the child warm.
- The scale was reset into zero with the cloth in the pan.
- Baby was placed gently in the pan.
- The baby was allowed to calm down.
- Weighing to the closest 0.01 kg (10 g) or as accurately as possible.
- A note was made on the questionnaire right away.
- A blanket was used for wrapping the infant for re-warm.

**3.6.3. Standardize the weighing scale (followed by UNICEF, 2022)**

Scales should be standardized daily or anytime they are moved:

- The scale was set to zero.
- Then the three known-weight objects were weighed (e.g., 5, 10, and 15 kg) and results was also observed. (If the Weight is known, a container filled with stones and sealed can be utilized.)
- Second step has been repeated for three times.
- The scale was checked and adjusted.

**3.6.4. Length and Height measurement procedure (followed by UNICEF,2022)**

❖ **The procedure of height measurements**

- Placed the measuring board on a level, solid surface.
- Took off the baby shoes and any headgear.
- Placed the baby in the middle of the measuring board.
- While the head was touched by cursor, and the child's head, shoulders, buttocks, knees, and heels were in the contact with the board.
- Read the measurement to the closest 0.1 cm on the measuring table.
- Data was written down on questionnaire as soon as possible

### ❖ Procedure for length measurement

Children under two years age or with less than 85 cm height were selected for length measurement. Birth date of the child was checked on official papers supplied by the caregiver (e.g., health care, vaccination card, birth certificate) before length measurement.

- Set the measuring board horizontally on a level, smooth surface.
- Took off the kids' shoes and any headgear.
- Place the child on the center of the board, lying down and facing up.
- Held the child's head's sides and placed to touch the headboard.
- Hand was placed on the youngster head and pressed down. On the other hand, an assistant firmly holds the child's legs together. The toes were point up at straight angles, and the soles of the feet were flat on the foot piece.
- The length was observed and recorded immediately.

If the kid is taller than 85 cm and unable to stand, we must measure their lengths while laying down and subtract 0.5 cm from the total. Do not take these measures if the kid has a bone abnormality.

### 3.7. Statistical Analysis

Statistical Package for Social Science (SPSS) version 25 IBM was used to analyze the data. Descriptive analyses were conducted to ascertain the socio-demographic factors by knowledge and practices of EBF and CF were assessed by  $\chi^2$  test through significance for all analysis was set at  $p < 0.05$ . The study was designed was completely adjusted models to analyze each binary outcome variable. This research entered all the variables instantaneously into the binary logistics regression model. The adjusted odds ratio (AOR.) was observed to assess the strength of the associations at 95% CI for the significance test.

The knowledge index was created through the sum of binary input variables, where the highest and lowest value were selected for each underlying pointer. The enactment of individual information was articulated using a unit-free index between 0 and 1, following the structure technique of the Human Development Index. (UNDP. Human Development Report,2005). The Score was created and then categorized as the groups labelled as poor and good knowledge and practices (UNDP, 2005; Ling et.al.,2011). The knowledge score is poor = 0-3 and good =4-7 which is same as practice level.

## Chapter-4: Result

### 4.1 Socio-demographic information of the parents

Table 4.1 represents the socio-demographic characteristics of the respondents. A total of 350 mother-child have been involved in this study. From the total sample population, 36.9% of mothers are  $\leq 20$  years old and 63.1% are  $>20$  years old. In the case of educational status, 6.9% respondents or mothers are illiterate whereas 36.3% mothers are primary education, and the remaining 56.9% mothers have secondary and higher-level education. Among 199 respondents, only 9 respondents have higher education, and other respondents have achieved secondary education. The study found that maximum mothers are homemakers, whereas only 5.4% of mothers are involved in service in the observed area. Early marriage is a common problem in rural area. From Table 4.1, about 49.1% mothers have faced their first delivery between the age of 14-17 years old due to early marriage.

The educational qualifications of fathers are inferior. From the sample population, 24% fathers are illiterate, 53.7% fathers have achieved primary education, 12.3% fathers have obtained secondary education, and only 10% fathers are achieved higher secondary education in the observed area. A significant portion of the respondent's (60.9%) monthly income is below or equal to 9999 BDT. Out of total 350 mother-child pairs, only 12.9% husbands live their life by farming. And 83.7% of the respondent's husband are involves in small-scale business, day labor and other random work. From Table 4.2, it is cleared that 44.9% of the respondents live in a joint family, and others 55.1% of respondents live in single-family.

**Table 4.1. Socio-demographic characteristics of the respondents (Total participants, 350)**

Variables	Frequency	Percentage (%)
<b>Age of mother:</b>		
$\leq 20$	129	36.9
$>20$	221	63.1
<b>Education qualification of mother:</b>		
<b>Illiterate</b>	24	6.9
<b>Primary</b>	127	36.3
<b>Secondary and Higher</b>	199	56.9

<b>Variables</b>	<b>Frequency</b>	<b>Percentage (%)</b>
<b>Occupation of Mother:</b>		
<b>Housewife</b>	331	94.6
<b>Any form of formal work</b>	19	5.4
<b>Age during first delivery:</b>		
<b>14-17</b>	172	49.1
<b>18-21</b>	165	47.1
<b>22-25</b>	13	3.7
<b>Education qualification of father:</b>		
<b>Higher Secondary</b>	35	10.0
<b>Secondary</b>	43	12.3
<b>Primary</b>	188	53.7
<b>No formal education</b>	84	24.0
<b>Occupation of father:</b>		
<b>Business and others</b>	293	83.7
<b>Farmer</b>	45	12.9
<b>Govt. worker</b>	4	1.1
<b>Immigrant</b>	3	.9
<b>NGO</b>	5	1.4
<b>Father's income (in BDT):</b>		
<b>≤9999</b>	213	60.9
<b>≥10,000</b>	137	39.1
<b>Religion:</b>		
<b>Buddhist</b>	5	1.4
<b>Hindu</b>	36	10.3
<b>Islam</b>	309	88.3
<b>Types of family:</b>		
<b>Joint</b>	157	44.9
<b>Single</b>	193	55.1
<b>No. of children:</b>		
<b>≤2</b>	237	67.7
<b>&gt;2</b>	113	32.3

#### 4.2. Mother's Knowledge of EBF

As shown in table 4.2, 60% of mothers know about colostrum, and 40% of mothers have no idea about colostrum. It is alarming that only 26.9% mothers know about the importance of colostrum. The importance of colostrum is less known in the village area due to the lack of education and awareness. Very few mothers have ideas about the nutritional value of breastmilk. Young mother has less idea about EBF. But it is good to know that 73.4% mothers have knowledge on early initiation of breastfeeding which starts within one hour after the delivery. Although respondents have less idea about the importance of colostrum, a maximum number of mothers have practiced EIBF traditionally (with the help of seniors). According to IYCF Guidelines (A recommendation for Infants Young Child Feeding by WHO & UNICEF), it is important to know the "Attachment" and "Position" for every mother for proper breastfeeding practice. But only 35% of mothers know the procedure of "Attachment" and "Position" properly. On the other side, it is found that 81.5% mothers have idea about EBF, whereas 16.5% mothers have not. The mother who has no idea on EBF gave liquid food and water to their child before first six months. Out of 350 mother-child pairs, 80.4% mothers know the actual duration of EBF. And 62% of mother's know the importance of exclusive breastfeeding.

**Table 4.2. Mother's knowledge of Exclusive breastfeeding (total respondents were 350)**

Knowledge		Frequency	Percentage (%)
<b>Does the mother know about colostrum?</b>	Yes	210	60
	No	140	20
<b>Does the mother know the importance of colostrum?</b>	Yes	96	26.9
	No	254	71.1
<b>Does the mother have any knowledge about attachment &amp; position?</b>	Yes	125	35.0
	No	225	63.0
<b>Does the mother know that breastmilk should be given within 1 hour after delivery?</b>	Yes	262	73.4
	No	88	24.6
<b>Does the mother know about EBF?</b>	Yes	291	81.5
	No	59	16.5

<b>Does the mother know the appropriate duration of EBF?</b>	Yes	287	80.4
	No	63	17.6
<b>Does the mother know the importance of EBF?</b>	Yes	245	62.0
	No	105	38.0

### 4.3. EBF practices of mothers

Table 4.3 represents that around 75.1% mothers breastfeed their child within one hour after delivery in experimental area. However, 24.9% of mothers have not initiated breastfeeding due to physical illness or other causes. The study found that 82.3% of mothers don't have any pre-lacteal food for their babies. The finding also reveals that only 17.7% mothers introduce pre-lacteal food to children. In this study around 61.4% mothers breastfeed their children every 2-hours. The result has showed that 37.4% mothers breastfeed their child eight -twelve times in a day which is recommended by IYCF (2021) and 39.1% of mothers do not force their child during breastfeeding. Finally, only 38% mothers breastfeed their baby for more than ten minutes. Child should breastfeed for 20-25 minutes (IYCF, 2021) properly.

**Table 4.3. EBF practices of mothers (Total respondents were 350)**

<b>EBF practices</b>		<b>Frequency</b>	<b>Percentage (%)</b>
<b>Did the mother breastfeed her child within 1 hour after delivery?</b>	Yes	263	75.1
	No	87	24.9
<b>Did the mother give pre-lacteal food to the baby?</b>	Yes	62	17.7
	No	288	82.3
<b>Did the mother practice bottle feed?</b>	Yes	7	2.0
	No	343	98.0
<b>Did the mother breastfeed her child every 2hour intervals?</b>	Yes	215	61.4
	No	135	38.6
<b>Does the mother breastfeed her child 8th-12th times a day?</b>	Yes	131	37.4
	No	219	62.6
<b>Does the mother force their children during breastfeeding?</b>	Yes	137	39.1
	No	213	60.9
	Yes	133	38.0

<b>Does the mother breastfeed her child for more than 10 min?</b>	No	217	62.0
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#### 4.4. Mother's knowledge of CF

Table 4.4 presents the response of the mother's knowledge about CF. Here, 58.3% mothers know about CF, whereas 41.7% of the mother have less idea or no idea about CF. Out of 350 respondents, only 68.3% mothers know the actual age of the child (6 months) to start CF. The outcome also reveals that only 25.7% mothers aware of the advantage of CF. The study found that 35.1% mothers have knowledge on food diversity and 33.1% mothers have knowledge on food groups. Finally, 68% mothers consider packaged food as a complementary food.

**Table 4.4. Mother's Knowledge of CF (Total respondents were 350)**

<b>Knowledge</b>		<b>Frequency</b>	<b>Percentage (%)</b>
<b>Does the mother know what CF is?</b>	Yes	204	58.3
	No	146	41.7
<b>Does the mother know the right age to start CF?</b>	Yes	239	68.3
	No	111	31.7
<b>Does the mother know the benefits of CF?</b>	Yes	90	25.7
	No	260	74.3
<b>Does the mother know that child should feed (heavy meal) according to age?</b>	Yes	238	68
	No	112	32
<b>Does the mother know about food diversity?</b>	Yes	123	35.1
	No	217	64.9
<b>Does the mother know about the food group?</b>	Yes	116	33.1
	No	234	66.9
<b>Does the mother think that packaged food is also included in CF?</b>	Yes	238	68.0
	No	112	32.0

#### 4.5. Mother's practices on CF

Table 4.5 represents the information about practices on CF of mothers. This study shows that 66.9% of mothers started CF at the right time. There are only 45.5% mothers give snacks to their children, and around 38% mothers cook food separately for their children.



On the other side 32.3% mothers have no idea about absolute consistency for baby food. It is good that 75% mothers don't force their children to feed. It is also observed that 63.7% mothers give complementary foods 2-3 times/day to their children, and only 39.1% mothers-maintained food variety in daily meal.

**Table 4.5. CF practices of mothers (Total respondents 350).**

<b>Did the mother start CF at the Right Age?</b>	Yes	247	66.9
	No	103	33.1
<b>Does the mother give healthy snacks to the child?</b>	Yes	35	45.5
	No	315	54.5
<b>Does the mother cook separately for her child?</b>	Yes	77	38.0
	No	273	62.0
<b>Does the mother maintain absolute consistency for baby food?</b>	Yes	237	67.7
	No	113	32.3
<b>Does the mother force her child to feed?</b>	Yes	60	25.0
	No	290	75.0
<b>Does the mother feed meal to her child 2-3times/ day?</b>	Yes	223	63.7
	No	127	36.3
<b>Does the mother maintain food variety?</b>	Yes	137	39.1
	No	141	61.0

#### **4.6. EBF knowledge according to Socio-demographic characteristics**

From the total sample population, most of the mothers have shown good knowledge on EBF. Out of the eight selected predictor variables, only three variables were statistically significant: these were educational qualification, occupation, and place of delivery. The P-values of these characteristics are <0.001, <0.001 and 0.003, respectively, which less than 0.05.

**Table 4.6. EBF knowledge according to Socio-demographic characteristics**

Characteristics	Knowledge about EBF.			
	Total	Good	Poor	P-value
		223(63.7%)	127(36.3%)	
<b>Age in years</b>				.382
<b>≤20</b>	129(36.9%)	86(66.67%)	43(33.33%)	
<b>&gt;20</b>	221(63.1%)	137(62%)	84(38%)	
<b>Education qualification</b>				<0.001
<b>Illiterate</b>	24(6.9%)	2(8.3%)	22(91.7%)	
<b>Primary</b>	127(36.3%)	87(68.5%)	40(31.5%)	
<b>Secondary and Higher</b>	199(56.9%)	134(67.3%)	65(32.7%)	
<b>Occupation</b>				<0.001
<b>Any form of formal work</b>	19(5.4%)	4(21.1%)	15(78.9%)	
<b>Housewife</b>	331(94.6%)	219(66.2%)	112(33.8%)	
<b>Family income</b>				.285
<b>≤9999 BDT</b>	213(60.9%)	131(61.5%)	82(38.5%)	
<b>≥10,000 BDT</b>	137(39.1%)	92(67.2%)	45(32.8%)	
<b>Religion</b>				.155
<b>Muslim</b>	309(88.3%)	201(65%)	108(35%)	
<b>Non-Muslim</b>	41(11.7%)	22(53.7%)	19(46.3%)	
<b>Types of family</b>				.508
<b>Joint</b>	157(44.9%)	103(65.6%)	54(34.4%)	
<b>Single</b>	193(55.1%)	120 (62.2%)	73(37.8%)	
<b>No. of children</b>				.235
<b>≤2</b>	237(67.7%)	156(65.8%)	81(34.2%)	
<b>&gt;2</b>	113(32.3%)	67(59.3%)	46(40.7%)	
<b>Place of delivery</b>				.003
<b>House</b>	285(81.4%)	192(67.4%)	93(32.6%)	
<b>Medical Institution</b>	65(18.6%)	51(78.5%)	14(21.5%)	

From Table 4.6, the binomial logistic regression model is statistically significant,  $\chi^2(4) = 67, p < 0.001$ . The model explains 23% (Nagelkerke R<sup>2</sup>) of the variance in knowledge of EBF and correctly classified 73.4% of cases. Sensitivity and specificity are found 94.6% and 36.2% respectively.

**Table 4.7 Effects of socio-demographic factors on Knowledge of EBF**

Characteristics	AOR.	95% C. I.		p-value
		Lower	Upper	
Education qualification of mothers				
No Formal education	-			<0.001
Primary	.033	.007	.145	<0.001
Secondary				
Occupation				
Any form of work				
Housewife	10.948	3.473	34.514	<0.001
Place of delivery				
House	3.170	1.772	5.670	<0.001
Medical institution				

Regression analysis is conducted with associated factors (educational qualification, occupation, and place of delivery) in this study. Housewife (adjusted odds ratio, (AOR)=10.948; 95% confidence interval CI:3.473 - 34.514) mothers are more likely to have good knowledge on EBF compared to their counterparts, and it is statistically significant ( $p < 0.05$ ).

#### **4.7 Practices of EBF according to Socio-demographic characteristics.**

From table 4.8, most of the mothers have good practice of EBF. From eight selected socio-demographic factors only four factors are statistically significant with EBF practice. These are age in years, educational qualification of mother, occupation of mothers, and no. of children. P-value of these factors are 0.005, <0.001, <0.001, and .007 respectively which is less than 0.05.

**Table 4.8. Practices of EBF according to Socio-demographic characteristics.**

Characteristics	Practice on EBF			
	Total	Good	Poor	P-value
		218(62.2%)	132(37.7%)	
<b>Age in years</b>				0.005
<b>≤20</b>	129(36.9%)	93(72.1%)	36(27.9%)	
<b>&gt;20</b>	221(63.1%)	125(56.6%)	96(43.4%)	
<b>Education qualification</b>				<0.001
<b>Illiterate</b>	24(6.9%)	7(29.2%)	17(70.8%)	
<b>Primary</b>	127(36.3%)	66(52%)	61(48%)	
<b>Secondary and Higher</b>	199(56.9%)	145(72.9%)	54(75.1%)	
<b>Occupation</b>				<0.001
<b>Any form of formal work</b>	19(5.4%)	0	19(100%)	
<b>Housewife</b>	331(94.6%)	218(65.9%)	113(34.1%)	
<b>Family income</b>				.329
<b>≤9999 BDT</b>	213(60.9%)	137(64.3%)	76(35.7%)	
<b>≥10,000 BDT</b>	137(39.1%)	81(59.1%)	56(40.9%)	
<b>Religion</b>				.236
<b>Muslim</b>	309(88.3%)	189(61.2%)	120(38.8%)	
<b>Non-Muslim</b>	41(11.7%)	29(70.7%)	12(29.3%)	
<b>Types of family</b>				.249
<b>Joint</b>	157(44.9%)	103(65.6%)	54(34.4%)	
<b>Single</b>	193(55.1%)	115(59.6%)	78(40.4%)	
<b>No. of children</b>				.007
<b>≤2</b>	237(67.7%)	159(67.1%)	78(32.9%)	
<b>&gt;2</b>	113(32.3%)	59(52.2%)	54(47.8%)	
<b>Place of delivery</b>				.119
<b>House</b>	285(81.4%)	172(60.4%)	113(39.6%)	
<b>Medical Institution</b>	65(18.6%)	46(70.9%)	19(29.2%)	

The binomial logistic regression model is statistically significant,  $\chi^2(5) = 70$ ,  $p < .001$ . The model explains 25% (Nagelkerke R<sup>2</sup>) of the variance in the practice of EBF and correctly classified 70.3% of cases. In the study, sensitivity and specificity is found 26.5% and 96.8% respectively.

**Table 4.9 Effects on socio-demographic factors for the practice of EBF**

	p-value	AOR	95% C.I.	
			Lower	Upper
Age of mother				
$\leq 20$	.485	.814	.457	1.451
$> 20$				
Educational qualification of mothers				
Primary	<0.001	6.966	2.660	18.240
Secondary and higher	<0.001	2.632	1.596	4.341
Occupation				
Any form of work				
Housewife	.998	.000	.000	-
No. of Children				
$\leq 2$	.511	.822	.458	1.475
$> 2$				

Regression analysis is conducted with the factors (age of mother, educational qualification, occupation and no. of children) that are associated with practice of EBF in rural area. Mothers who have obtained primary level (adjusted odds ratio, (AOR)=6.966; 95% confidence interval CI:2.660-18.240) are more likely to have good practice of EBF compared to other factors.

#### **4.8 Knowledge of CF according to Socio-demographic characteristics**

The majority percentage of mothers have good knowledge on CF is shown in table 4.10. In the study, out of eight selected factors only six factors are statistically significant with CF knowledge. These are age in years, educational qualification of mother's, occupation of mothers, family income, religion, and no. of children. P-value of these factors are found 0.006, <0.001, 0.002, <0.001, <0.001 and .024 respectively.

**Table4.10. Knowledge of CF according to Socio-demographic characteristics**

Characteristics	Knowledge of CF.			
	Total	Good	Poor	P-value
		239(68.3%)	111(31.7%)	
<b>Age in years</b>				.006
<b>≤20</b>	129(36.9%)	99(77.3%)	29(22.7%)	
<b>&gt;20</b>	221(63.1%)	140(63.1%)	82(36.9%)	
<b>Educational qualification</b>				<0.001
<b>Illiterate</b>	24(6.9%)	20(83.3%)	4(16.7%)	
<b>Primary</b>	127(36.3%)	20(15.7%)	107(84.3%)	
<b>Secondary and Higher</b>	199(56.9%)	199(100%)	0	
<b>Occupation</b>				0.002
<b>Any form of formal work</b>	19(5.4%)	19(100%)	0(0%)	
<b>Housewife</b>	331(94.6%)	220(66.5%)	111(33.5%)	
<b>Family income</b>				<0.001
<b>≤9999 BDT</b>	213(60.9%)	125(58.7%)	88(41.3%)	
<b>≥10,000 BDT</b>	137(39.1%)	114(83.2%)	23(16.8%)	
<b>Religion</b>				<0.001
<b>Muslim</b>	309(88.3%)	200(64.7%)	109(35.3%)	
<b>Non-Muslim</b>	41(11.7%)	39(95.1%)	2(4.9%)	
<b>Types of family</b>				.182
<b>Joint</b>	157(44.9%)	113(72%)	44(28%)	
<b>Single</b>	193(55.1%)	126(65.3%)	67(34.7%)	
<b>No. of children</b>				.024
<b>≤2</b>	237(67.7%)	171(72.2%)	56(27.8%)	
<b>&gt;2</b>	113(32.3%)	68(60.2%)	45(39.8%)	
<b>Place of delivery</b>				.051
<b>House</b>	285(81.4%)	188(66%)	97(34%)	
<b>Medical Institution</b>	65(18.6%)	51(78.5%)	14(21.5%)	

The binomial logistic regression model is statistically significant,  $\chi^2 (7) = 423.934$ ,  $p < 0.001$ . The model explains 98% (Nagelkerke R<sup>2</sup>) of the variance in Knowledge of CF and correctly classified 99.1% of cases. In the study, Sensitivity and specificity are found 98.2% and 99.6% respectively.

#### 4.9 Practice of CF according to Socio-demographic characteristics

The majority percentage of mothers have shown poor practices on CF. In the study, only three factors are statistically significant with complementary feeding practices among eight factors. Those were the educational qualification of mothers, family income and place of delivery. The P-values of these characteristics are  $<0.001$ , 0.006, and  $<0.001$ , respectively.

**Table 4.11. Practice of CF according to Socio-demographic characteristics**

Characteristics	Practice on CF.			
	Total	Good	Poor	P-value
		157(46.9%)	193(53.1%)	
<b>Age in years</b>				.679
<b>≤20</b>	129(36.9%)	56(43.4%)	73(56.6%)	
<b>&gt;20</b>	221(63.1%)	101(45.7%)	120(54.3%)	
<b>Educational qualification</b>				<0.001
<b>Illiterate</b>	24(6.9%)	10(41.7%)	14(58.3%)	
<b>Primary</b>	127(36.3%)	99(78%)	28(22%)	
<b>Secondary and Higher</b>	199(56.9%)	155(77.9%)	44(22.1%)	
<b>Occupation</b>				.485
<b>Any form of formal work</b>	19(5.4%)	9(47.4%)	10(52.6%)	
<b>Housewife</b>	331(94.6%)	181(47.4%)	184(55.5%)	
<b>Family income</b>				.006
<b>≤9999 BDT</b>	213(60.9%)	108(50.7%)	105(49.3%)	
<b>≥10,000 BDT</b>	137(39.1%)	88(64.2%)	49(35.8%)	
<b>Religion</b>				.426
<b>Muslim</b>	309(88.3%)	168(54.4%)	141(45.6%)	

<b>Non-Muslim</b>	41(11.7%)	25(61.0%)	16(39.0%)	
<b>Types of family</b>				.242
<b>Joint</b>	157(44.9%)	92(58.6%)	65(41.4%)	
<b>Single</b>	193(55.1%)	101(52.3%)	92(47.7%)	
<b>No. of children</b>				.596
<b>≤2</b>	237(67.7%)	133(56.1%)	104(43.9%)	
<b>&gt;2</b>	113(32.3%)	60(53.1%)	53(46.9%)	
<b>Place of deliver</b>				<0.001
<b>House</b>	285(81.4%)	140(49.1%)	145(50.9%)	
<b>Medical Institution</b>	65(18.6%)	53(81.5%)	12(18.5%)	

The logistic regression model is statistically significant,  $\chi^2(4) = 132.817$ ,  $p < 0.001$ . The model explains 42.3% (Nagelkerke R<sup>2</sup>) of the variance in the practice of CF and correctly classified 76.9% of cases. In the study, Sensitivity and specificity is found 66.5% and 85.1% respectively.

**Table 4.12 Effects of socio-demographic factors for Practices of CF.**

	p-value	AOR	95% C.I.	
			Lower	Upper
Education qualification of mother's				
No Formal education				
Primary	0.001	4.897	1.937	12.383
Secondary and higher	<0.001	13.649	7.566	24.624
Father's income				
≤9999	.797	1.077	.614	1.887
>9999				
Place of delivery				
Any medical Institution				
House	<0.001	6.386	2.803	14.551

Regression analysis is conducted between associated factors (educational qualification, father's income and place of delivery) and practices of complementary feeding among



mothers. Mothers who have shown secondary & higher-level educational qualification (adjusted odds ratio, (AOR)=13.649; 95% confidence interval CI:1.937-12.383), and mothers who have chosen house as delivery place (adjusted odds ratio (AOR)=6.803; 95% confidence interval CI: 2.803- 14.551) are more likely to have good practice of CF compared to their counterparts.

#### 4.10. Newborn care practice

According to World Health Organization, essential newborn care practices are important interventions to save life of neo-nates which includes umbilical cord dressing, early initiation of breastfeeding, delay bathing, care for low birth weight, management of newborn. Ante natal care and post-natal care are the most important phase for new care practice. During this golden phase mothers start taking care of baby and learn about the importance of newborn care practice. Some others newborn care practices are place of delivery, type of delivery, ingredients used for umbilical cord dressing and instruments used for umbilical cord dressing (Madhu et.al., 2009) are observed in this study.

##### 4.10.1. ANC visit history of mothers during last pregnancy

In this study, it is observed that about 54.9% mothers have completed four ANC visits during their previous pregnancy period while only 22.6% mothers have completed three ANC visits. Another 14% mothers have completed two ANC visits in the observed area. Finally, 2.3% mothers never attend any ANC visit during their previous pregnancy period.

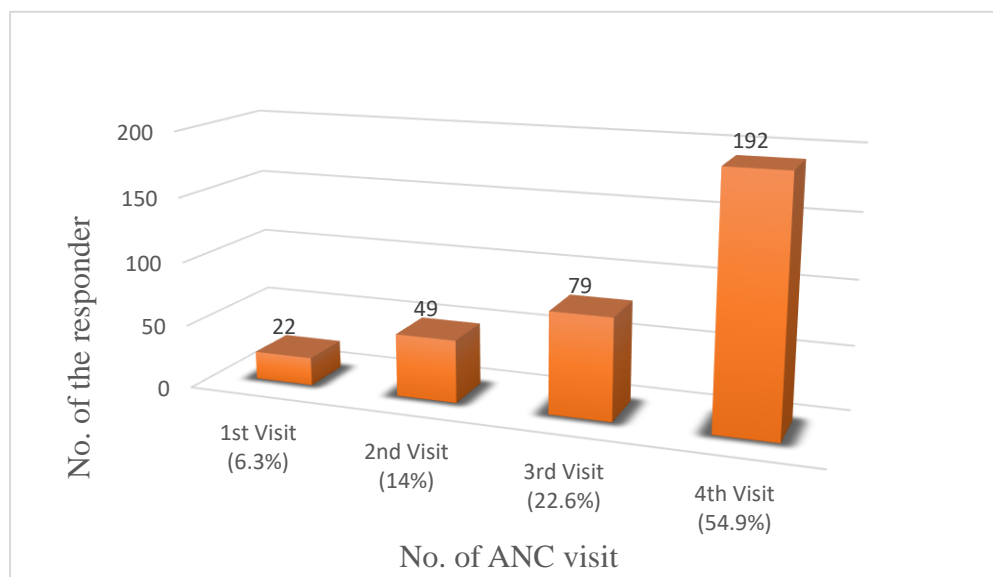


Figure 4.1: ANC visit history of mothers.

#### 4.10.2. PNC visit history of mothers after previous delivery

The study has revealed that only 1.1% mothers have completed four PNC visits while 11.7% mothers have completed two PNC visit, and 22.3% mothers only met one PNC visit after delivery. This study indicates that majority percentage of mothers do not attend any PNC visit after their delivery.

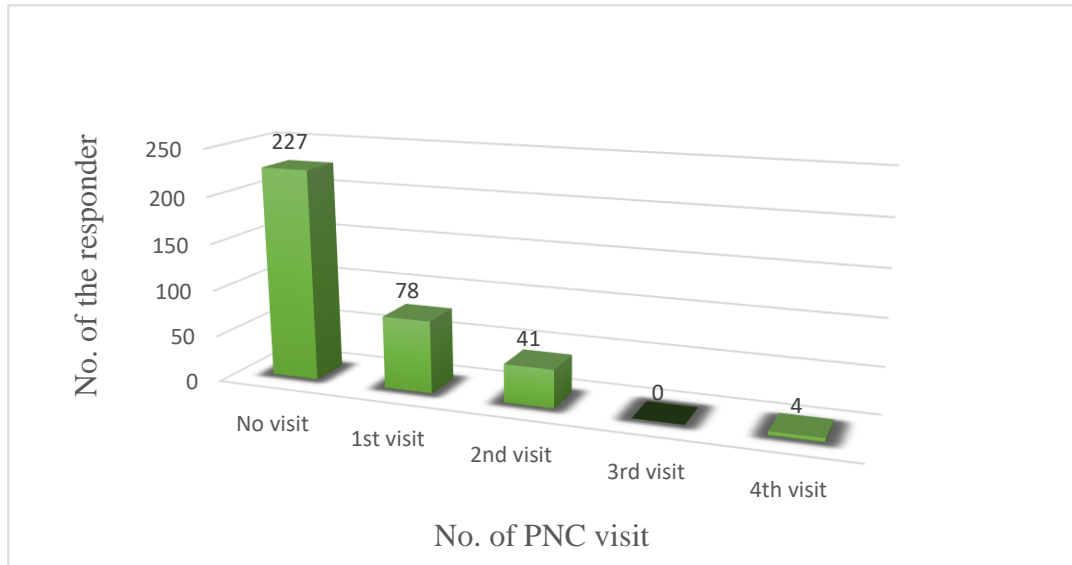


Figure 4.2: PNC visit history of mothers.

#### 4.10.3. Place of delivery in last pregnancy

A graphical representation represents the data about the "place of delivery" of the mothers. Around 81.4% (285 respondents) mothers have chosen house as delivery place over medical institution. On the other hand, about 18.6% (65 respondents) mothers have selected medical institution like a private hospital, govt hospital, Upazila health complex etc. for delivery place.

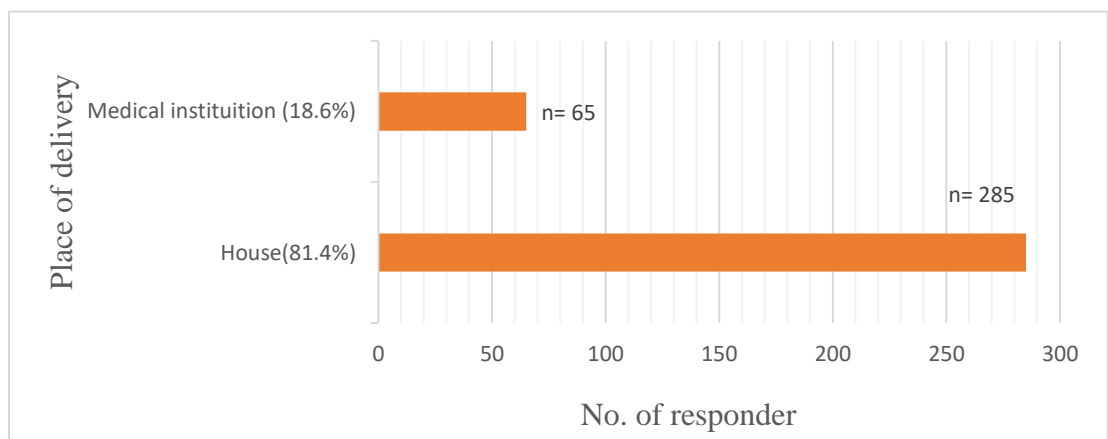


Figure 4.3: Place of delivery choose by mothers.

#### 4.10.4. Type of delivery

A graphical representation represents the data about "type of delivery" of the mothers from study area. About 89.1% (312 respondents) mothers have gone through normal delivery, and the other 10.9% (38 respondents) has chosen C-section.

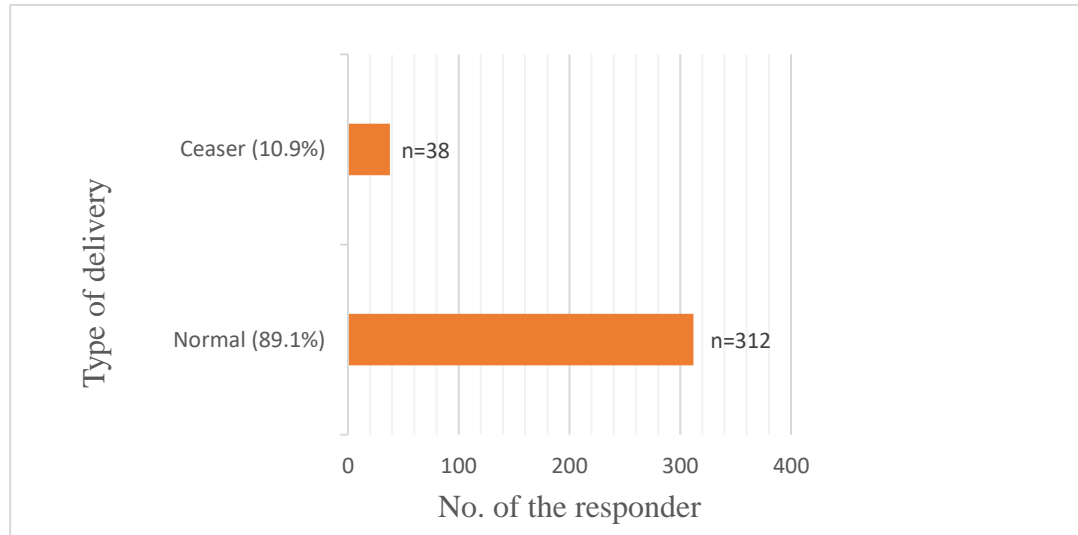


Figure 4.4: Type of delivery choose by mothers.

#### 4.10.5. Instruments used during delivery to cut the umbilical cord

"Blade" is used in 80% delivery to cut umbilical cord instead of medical equipment by local midwives is observed in this study. This practice could be harmful and unhygienic for mother and newborn health. Rural people are not aware of hygiene.

#### 4.10.6. Ingredients used for Umbilical Cord dressing

In this study, it is observed that only 24.6% mothers use chlorhexidine (7.1%) for umbilical cord dressing. The finding has suggested that 23.5% mothers have used mustard oil in umbilical cord and 16.3% mothers have used commercial powder for umbilical cord dressing. Using mustard oil or any kind of commercial powder instead of chlorhexidine could be harmful for infant health.

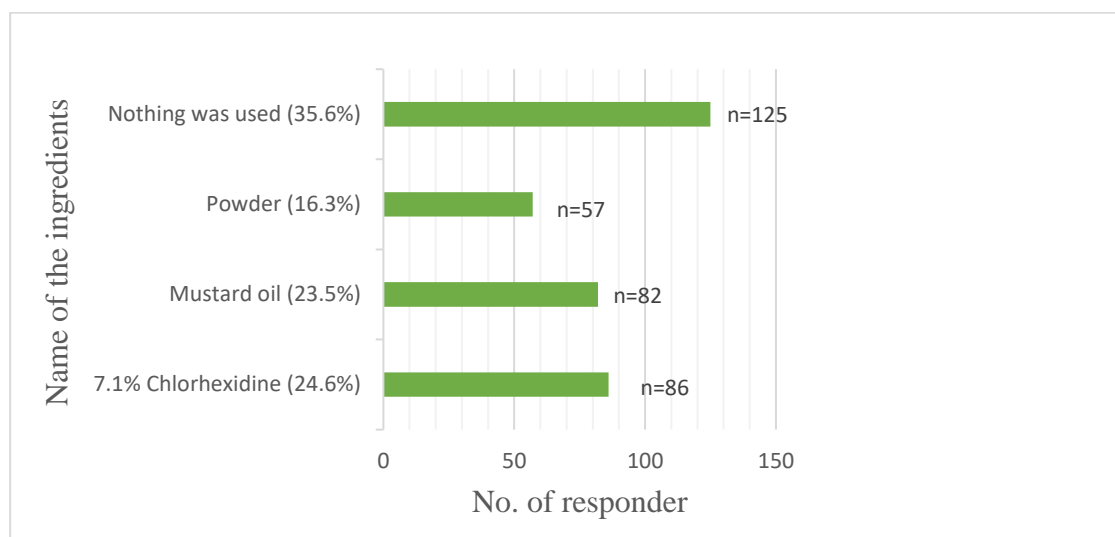


Figure 4.5: Ingredients used for umbilical cord-dressing.

#### 4.11 Nutritional status by using Anthropometry measurements

Nutritional status is determined by using MUAC tape, weight machine and height/length measurement board in the observed area. The number of children between 6-8 months age group is found 79. The median weight of male and female child is found 7 kg and 7.2 kg while the median height of male and female child is found 64.5 cm and 65.65 cm respectively.

The number of children between 9-11 months age group is found 90. The median weight of male and female child is found 7.2 kg and 7.3 kg while the median height of male and female is found 64.9 cm and 66.5 cm respectively.

The number of children between 12-23 months age group is found 181. The median weight of male and female child is found 9kg and 8.5 kg while the median height of male and female child is found 74.1 cm and 71.4 cm respectively from the observed area.

#### 4.13 No. of Malnourished is found by using MUAC tape

	Green	Yellow	Red
No. of Children	320	22	8

Out of 350 children only eight children MUAC are found in red mark, 22 children are found in yellow mark and remaining children are found in green mark in the MUAC tape. The percentage of malnutrition among children (6-23 months) is found 8.6% from the observed area.

#### 4.12. History of food intake in last 24 hours

Although 68.3% mothers have shown good knowledge of CF, but 53.1% mothers have shown poor practice of CF in the observed area. The finding of the study has suggested that mother's educational qualification and family income is highly associated with poor practice of CF. Due to poor practice of CF mothers do not feed proper food items to their children in the observed area. History of food intake in last 24 hours will help us to know that which food are chosen by mothers in last 24 hours. The number of food items fed in last 24 hours is given below in percentage. From 4.6 (a), about 3.4%, 81.1%, 25.1%, 14%, 7.7%, and 37.4% of mothers feed khichuri, shuji/roti/rice, fish, meat, egg, and dal to their children respectively.

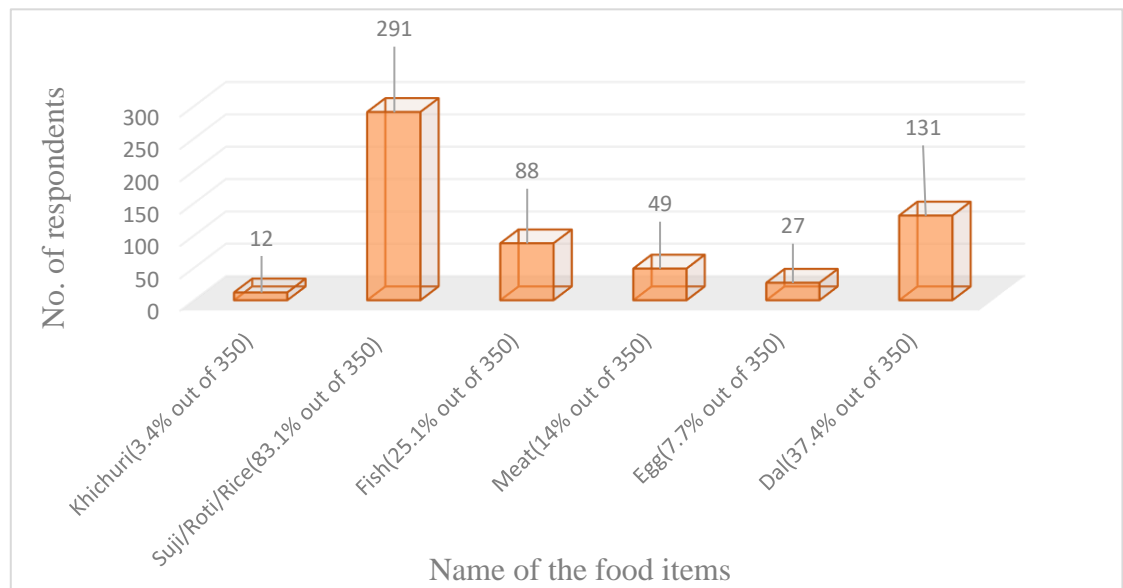


Figure 4.6(a): Different kinds of food intake in last 24 hour.

From figure 4.6(b), about 4.6%, 24.6%, 68.6%, 15%, and 12 % of mothers feed fruits, vegetables, packaged food, formula milk and formula food (cerelac etc.) to their children respectively. About 8.6% mothers provide packaged food to their child which is bad for health.

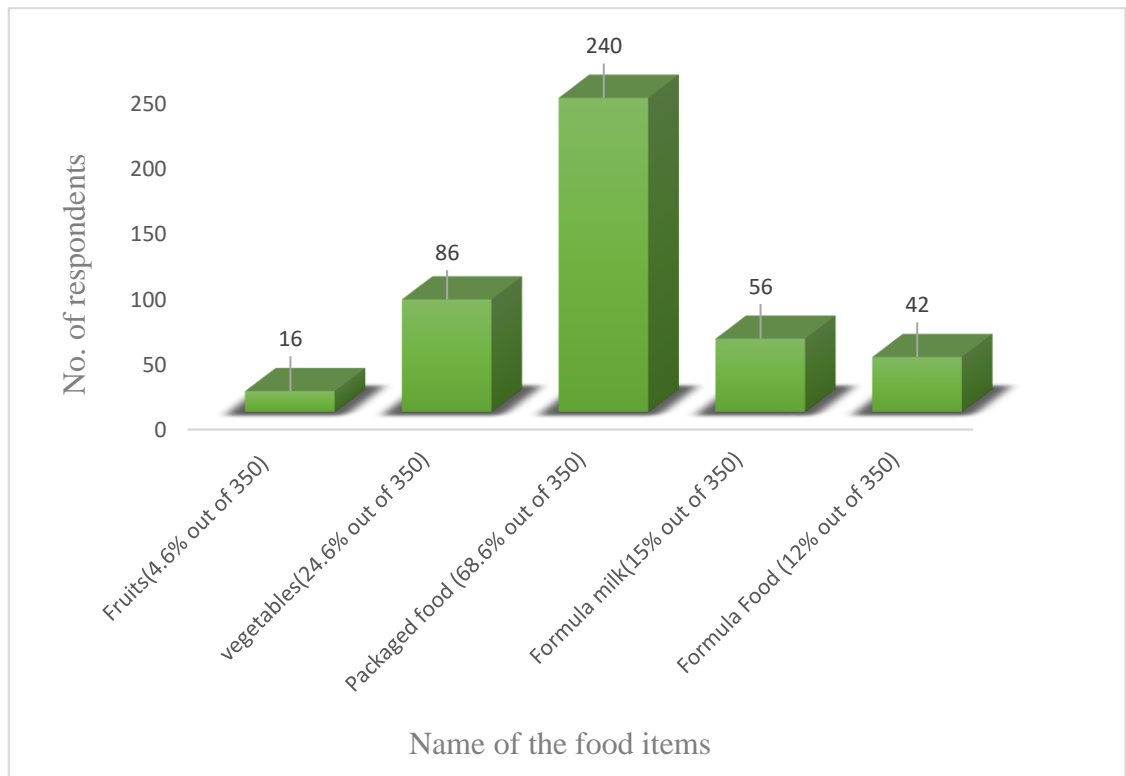


Figure 4.6(b): Different kinds of food intake last 24 hour.

### 4.13. History of feeding according to age

According to IYCF (UNICEF and WHO, 2018), children should feed the right amount of food for their development. Three hundred and fifty mother and child pairs have participated in this study. Children are divided into three categories depending on their age. These are 6-8 months, 9-11 months, and 12-23 months child. Each category of children needs different amount of food to fulfil their calorie requirements for growth and development.

#### 4.13.1. History of feeding according to age (6-8 months)

Figure 4.7 reveals that only 39 children have eaten the correct amount of food (which contains 2 meals in a day) while 22 children have eaten only 1 meal during last 24 hours. It is found that 18 children do not get any kind of complementary feeding. They only fed breastmilk in last 24 hours. For 6-8 months child, only two meals and one healthy snack are enough for a day. Each meal contains  $\frac{1}{2}$  250 mL of food. Complimentary food should be balanced diet for proper development of children.

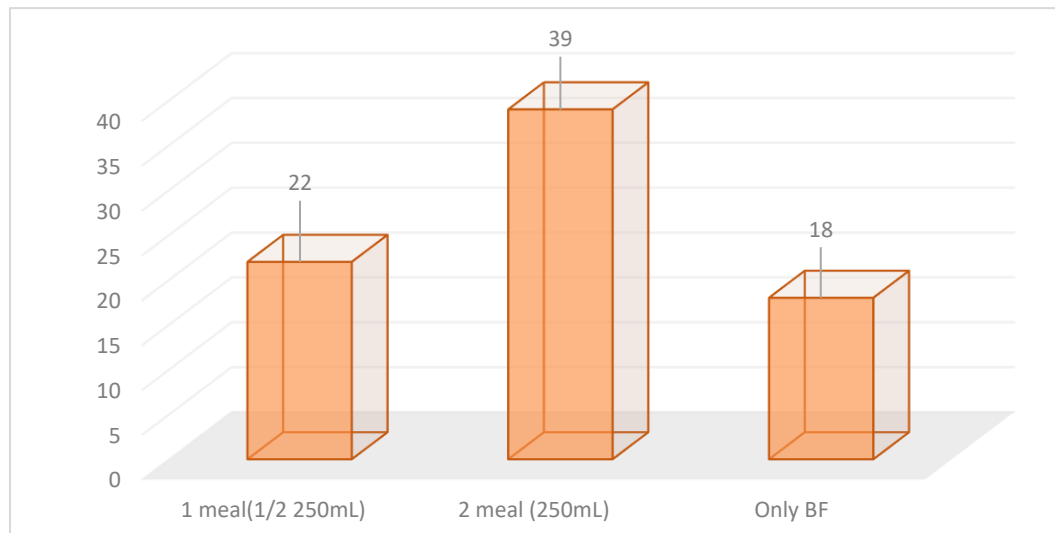


Figure 4.7: The amount of food intake by children (6-8 months) according to their age in last 24 hours.

#### 4.13.2. History of feeding according to age (9-11 months)

From figure 4.8, it is observed that only 9 children have eaten the correct amount of food (which contains 3 meals in a day) while 36 children have eaten 2 meals in last 24 hours. It is also found that 40 children have eaten 1 meal, and 5 children do not get any kind of foods in last 24 hour. They only fed breastmilk. For 9-11 months child, only three meals and two homemade healthy snacks are enough for a day. Each meal contains  $\frac{1}{2}$  250mL of food.

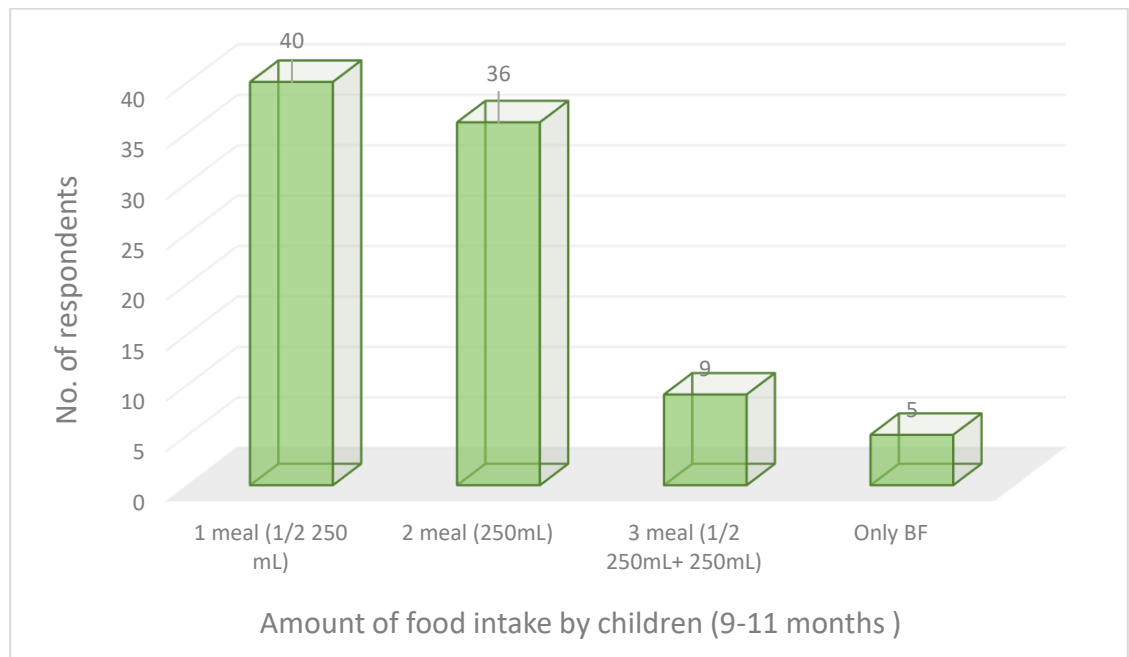


Figure 4.8: The amount of food intake by children (9-11 months) according to their age in last 24 hours.

#### 4.13.3. History of feeding according to age (12-23 months)

About 24 children have eaten the correct amount of food (which contains 3 meals in a day), while 90 children have eaten 2 meals in last 24 hours which shown in figure 4.9. It is also found that 67 children have eaten 1 meal in last 24 hour. They fed breastmilk. For 9-11 months child, only three meals and two homemade snacks are enough for a day. Each meal contains 250 mL of food.



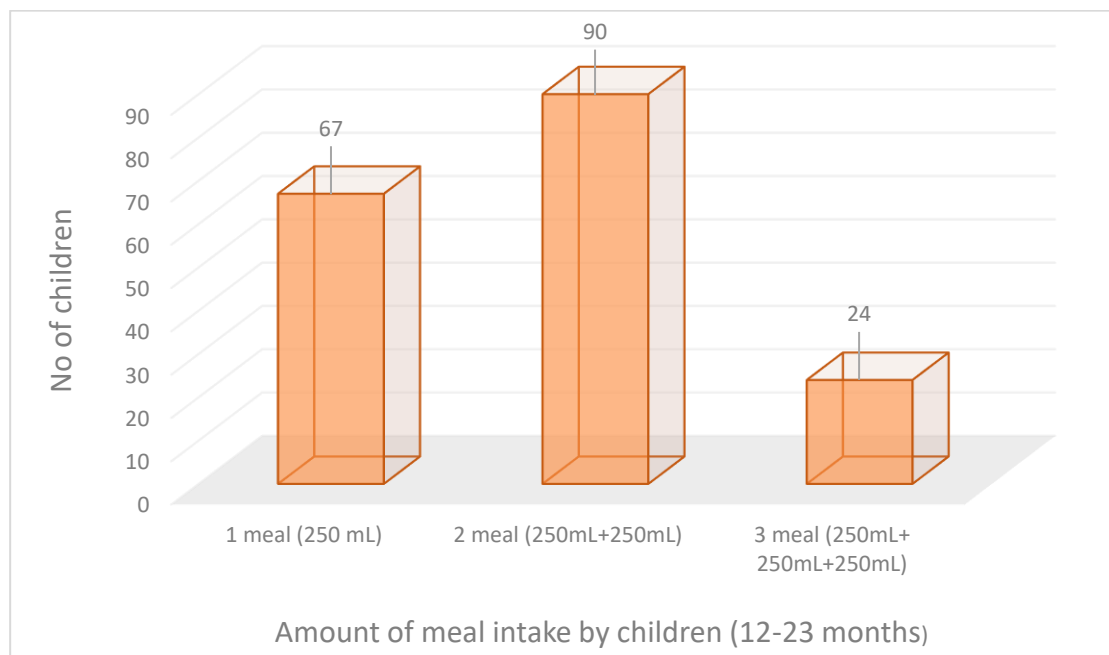


Figure 4.9: The amount of food intake by children (12-23 months) according to their age.

## Chapter-5: Discussion

From this study, we have observed that about 63.7% and 68.3% of mothers have good knowledge of exclusive breastfeeding and complementary feeding respectively. In addition, 60% of mothers have knowledge about colostrum. Approximately 80.4% mothers have knowledge on EBF in the observed area, which is comparable to the previous study which found that 68.4% of mothers have good knowledge on EBF (Howlader *et.al.*, 2020). On the other hand, around 26.9% mothers have knowledge about the importance of colostrum, whereas in the previous study showed that around 63.7% mothers have knowledge of colostrum (Howlader *et.al.*,2020). Mothers have not received any message about the benefits of colostrum due to poor ANC visit in the observed area. In rural area, mothers are told the importance of colostrum from medical institution during ANC visit or after delivery. The present study demonstrates that 35% mothers have knowledge about "Attachment" and "Position", and 81.5% mothers know what EBF means. Around 80.4% mothers know the actual duration of EBF.

About 75.1% mothers breastfeed their child within 1 hour after delivery which indicates that mothers have practiced early initiation of breastfeeding in the study area. This finding is in line with a study conducted in Bangladesh, which showed that 51.4% mothers have practiced early initiation of breastfeeding (Islam *et.al.*, 2019). On the other hand, 17.7% mothers gave pre-lacteal food to their baby. This finding coincides with a study conducted in Hyderabad, India, which showed that 23.21% mothers gave pre-lacteal food to their children (Mammundi *et.al.*, 2017).

It has been found that maximum mothers prefer breastfeeding over bottle feeding in the observed area. According to IYCF (2021, June), mothers should breastfeed her children every two-hour interval. It has been found that 61.4% mothers breastfeed their child every two-hour interval in experimental area. According to IYCF (2021, June) mothers should breastfeed their child at least **8<sup>th</sup> - 12<sup>th</sup>** times a day. The presents study evaluates that only 62.6% mothers breastfeed their child's at least **8<sup>th</sup> -12<sup>th</sup>** times a day. On the other hand, 39.1% mothers do not force their child's during breastfeeding which is good sign of feeding practice. This study also reveals that only 35% mothers have knowledge about "Position" and "Attachment". These poor practices can be threat to the child's growth and development in near future. "Attachment" and "Position" is described in IYCF guidelines (June 2021). Correct "Attachment" and "Position' is helpful for mother

and child health (IYCF, June 2021). No study has been found to compare with this data in our country.

Knowledge of complementary feeding is associated with seven selected factors in the observed area. These are age of mothers, educational qualification of mothers, family income, occupation of mothers, religion, type of family and place of delivery. About 58.3% mothers in the observed area have good knowledge on Complementary feeding. In this study, it is observed that 68.3% mothers have knowledge about the right age to start complementary feeding whereas only 66.9% mothers have done so. Shrestha *et.al.*, (2020) has been conducted a study in Nepal which indicates that about 64.4% mothers have knowledge about the age for beginning complementary feeding whereas only 55.6% mothers have done so.

This study expresses some important issues which are not discussed previously in Bangladesh, for example, only 25.7% mothers have knowledge about the benefits of complementary feeding and 48% mothers know that the children should be given the right amount of food according to his/her age. It is found that 35.1% mothers have knowledge about food diversity and 33.1% mothers have knowledge about food groups. This study also demonstrates that only 39.1 % mothers maintain food diversity in children's diet. No study has been found to compare with this data in our country. Villagers are not aware of food groups and food varieties. As a result, different type of packaged food (chips, ice-cream sticks, candy, juice, cake etc.) are popular among villagers as well as children. About 68% mothers believe that packet foods are included in complementary feeding. Mothers have less idea about healthy snacks is observed. Only 45.55% mothers give healthy snacks to their children and rest of the mothers do not. This study indicates that around 38% mothers cook separate meals for their children. The actual consistency of complementary food depends on the age of the child. But this study shows that 67.7 % mothers have knowledge about the right consistency of complementary food. Children are feed liquid or semi-liquid food from the start and gradually progress from semi-solid to solid food over two years (IYCF recommended; 2019, June).

It is good sign that 75% mothers do not force their children to feed daily meals. There are around 63.7 % mothers give 2-3 meals to their children per day. According to IYCF (2021, June), children who 6-8 months old are needed 2 meals/ servings which equal to 250 mL, children who 9-11 months old are also needed 3 meals/servings which equal to

250 mL+1/2 of 250mL in a day. Finally, children who 12-23 months old are needed 3 meals/servings which equal to 250mL +250mL +250mL in a day.

Socio demographic factors related to EBF knowledge have been analyzed through regression analysis. The analysis reveals that housewife (adjusted odds ratio (AOR)=10.948; 95 % confidence interval (CI):3.473-.34.514) mothers have a good EBF knowledge than others. Socio-demographic factors related to EBF practice are also analyzed through regression analysis. Mothers who have primary and secondary educational qualification (adjusted odds ratio, (AOR)=6.966 and 2.632; 95% confidence interval, (CI):2.660-18.240 and 1.596-4.341) have shown good EBF practice than others.

Socio demographic factors related to practice of complementary feeding are analyzed through regression analysis. Mothers who have shown secondary & higher-level educational qualification (adjusted odds ratio, (AOR)=13.649; 95% confidence interval CI:1.937-12.383), and mothers who have chosen house as delivery place (adjusted odds ratio (AOR)=6.803; 95% confidence interval CI: 2.803- 14.551) are more likely to have good practice of CF compared to their counterparts.

New-born care practice have also been evaluated in the observed area. About 54.9% mothers have completed four ANC visits during their previous pregnancy, while 2.2% have not completed any ANC visits. On the other hand, about 64.9% of mothers do not attend any PNC visits after delivery due to lack of knowledge, education about PNC visits in the observed area. About 81.4% mothers prefer home as a delivery place while 8.6% mothers prefer medical institutions such as private hospitals, government hospitals, upazila health complexes, etc. During 80% delivery "blade" is used to cut umbilical cord is found in this study. Although health worker discourages mothers to use anything on umbilical cord, but 23.5% mothers use mustard oil on umbilical cord during newborn care practice is also found in this study. Using mustard oil or other ingredients over chlorhexidine (7.1%) is harmful for umbilical cord.

Around 68.6% mothers feed packaged food to their children in last 24-hours. Mothers are unaware of the adverse effect of packaged foods on children's health.

Nutritional status is determined by using anthropometry measurements. About 8.1% children with malnutrition are found by using MUAC tape. Both male and female children (N=79) belonging aged group 6-8 months showed less median weight (7kg and 7.2 kg) and height (64.5 cm and 65.7 cm) than the growth chart of world health

organization for Bangladesh (IPHN, 2022). Whatever, 90 children (male and female) in the aged group 9-11 months showed less median weight (7.2kg and 7.3 kg) and height (64.9 cm and 66.5 cm) than the growth chart of world health organization (IPHN, 2022). Moreover, 12-23 months age group (N=181) showed lower median weight (9 kg and 8.5 kg) and height (74.1 cm and 71.4 cm) than the growth chart of world health organization (IPHN, 2022).

This study reveals that only 39 children have eaten the right amount of food (which contains 2 meals in a day) from 6-8 months age category. Besides, 9 children have eaten right amount of food (which contains 3 meals in a day) from 9-11 months age category. Finally, only 24 children have eaten proper amount of food (which contains 3 meals in a day) from 12-23 months age category. These results also suggests that children are becoming malnourished due to the lack of food intake in the experimental area.

## **Chapter 6: Limitations & Recommendation**

### **❖ Limitation**

Other cultural factors that may have some impact on exclusive breastfeeding and complementary feeding and, newborn care practice have not been studied in this research. The results on this limited sample may impede its ability to generalize. The sample size must be significant to get more accurate result. In this study, the relationship between socio- demographic factors and newborn care practice can be analyzed. There are some people may purposefully or accidentally provide inaccurate information about knowledge, practices, and food intake in last 24 hours.

### **❖ Recommendation**

Mother's friendly health and nutrition facilities should be provided by the authority which can help in raising awareness of exclusive breastfeeding, complementary feeding and newborn care practices. Strategies to raise mothers' awareness of newborn care practices can achieve zero child mortality rate in Bangladesh. Future research is encouraged to cover a wider geographic range to enhance the accuracy of findings. A larger sample size for the study may yield more precise conclusions about the prevalence of exclusive breastfeeding, complementary feeding, and newborn care practice. To reduce health disparities, community health extension activities should be strengthened with nutritional and health educator.

## **Chapter 7: Conclusion**

In this study poor practice of complementary feeding has been observed among mothers in rural area. Overall feeding practices and knowledge are individually associated with socio-demographic factors. Such as education level of mothers, occupation of mothers, place of delivery, no. of children and fathers' income etc. These independent variables are positively associated with feeding practice and knowledge. In the observed, area poor newborn care practice is found among mothers. Around 8.1% malnourished children have been found in observed area due to low intake of complementary feeding, lack of education and family income. Poor complementary feeding practices are responsible for malnutrition among children aged 6-23 months. One to one or direct counselling and messaging regarding breastfeeding, complementary feeding and newborn care practice are needed for rural people. Health facilities for mothers and children must be improved in local area.

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## Appendix-I

### Questionnaire:

Name of the volunteer:	Date:
Consent of the participant: A. Yes B. No	Mobile No:
Name of the village:	Kauerkhope, Ramu

### Section 1:

#### A. Information about Mother:

Name of the mothers:	
Age:	
Educational Qualification:	A. No formal education B. Primary C. Secondary D. Higher
Occupation of mothers:	B.
Age during first delivery	A. 14-17 B. 18-21 C. 22-25

#### B. Information about Father:

Name of the father:	
Age:	
Education Qualification:	
Occupation	
Income:	

#### C. Others information:

Religion:	
Type of family:	
No. of children:	

#### D. Information of Child (6-24 months):

Name of the children:	
Sex	
Age	
Autism	A. YES B. NO



**Section 2:****A. Knowledge on EBF (Exclusive breastfeeding):**

Does the mother know what colostrum is?	A. YES	B. NO
Does the mother know the important of colostrum?	A. YES	B. NO
Does the mother have knowledge about attachment and position?	A. YES	B. NO
Does the mother know that breastmilk should be given within 1 hour after delivery?	A. YES	B. NO
Does the mother know what is EBF (Exclusive breastfeeding)?	A. YES	B. NO
Does the mother know the appropriate duration of EBF?	A. YES	B. NO
Does the mother know the importance of EBF?	A. YES	B. NO

**B. Practice of EBF:**

Did the mother breastfeed her child within 1 hour after delivery?	A. YES	B. NO
Did the mother give pre-lacteal food to the baby?	A. YES	B. NO
Did the mother practice bottle feed?	A. YES	B. NO
Did the mother breastfeed her child every 2-hour intervals?	A. YES	B. NO
Does the mother breastfeed her child 8 <sup>th</sup> -12 <sup>th</sup> times a day?	A. YES	B. NO
Does the mother force her child during breastfeeding?	A. YES	B. NO
Does the mother breastfeed her child for more than 10 min?	A. YES	B. NO

**Section 3:****A. Knowledge on CF:**

Does the mother know what CF is?	A. YES	B. NO
Does the mother know the right age to start CF?	A. YES	B. NO
Does the mother know the benefits of CF?	A. YES	B. NO
Does the mother know that child should feed (heavy meal) according to age?	A. YES	B. NO
Does the mother know about food diversity?	A. YES	B. NO

Does the mother know about the food group?	A. YES	B. NO
Does the mother think that packaged food is also included in CF?	A. YES	B. NO

**B. Practice of CF:**

Did the mother start CF at the Right Age?	A. YES	B. NO
Does the mother give healthy snacks to the child?	A. YES	B. NO
Does the mother cook separately for her child?	A. YES	B. NO
Does the mother maintain absolute consistency for baby food?	A. YES	B. NO
Does the mother force her child to feed?	A. YES	B. NO
Does the mother feed meal to her child 2-3times/day?	A. YES	B. NO
Does the mother maintain food variety?	A. YES	B. NO

**Section 4: Newborn care practice**

No. of ANC visit	A. 1 B. 3	B. 2 D. 4
No. of PNC visit	A. 1 B. 3	B. 2 D. 4
Place of delivery	A. Home	B. Medical
Type of delivery	A. Normal	B. C-section
	B.	
What equipment used during delivery to cut umbilical cord?	A. Blade	B. Scissors
What substance was used for umbilical cord dressing?	A. 7.1% chlorhexidine B. Powder C Mustard oil	

**Section 5: Anthropometric Assessment:**

Weight	
Height/Length	
MUAC measurement	A. SAM      B. MAM      C. Normal

**Section 6:**

**A. Frequency of Feed**

How many times mother feed her child in last 24 hour?	A. 1 time    B.2 times    C. 3 times
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**B. Consumption of Food (from various food group) by children from last 24 hour**

<b>Name of Food Item</b>	<b>YES</b>	<b>NO</b>
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Khichuri:		
Shuji/Roti/Rice:		
Meat:		
Fish:		
Dal:		
Egg		
Fruits:		
Vegetables		
Formula Milk		
Formula food		
Packaged food		

## Appendix-II



Interview with mother



Interview with mother



Interview with mother



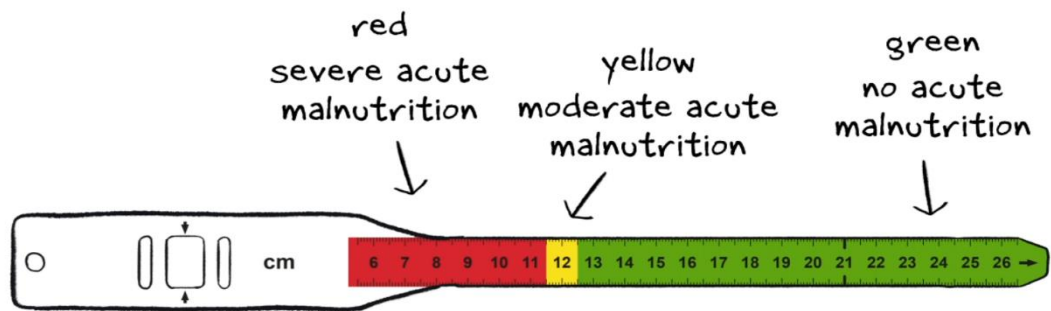
Weighing child (0-23 months old)



Interview with mother



MUAC measurement



MUAC tape

### **Brief Biography of the Student**

This is Aumi Chhetri daughter of Dev Bahadur Chhetri and Parul Chhetri. She has passed the Secondary School Certificate Examinations in 2011 from Millpara High School, Khustia and Higher Secondary Certificate Examination in 2013 from K.B college Mymensingh. She obtained her Food Science and Technology Degree in 2017 (held in 2018) from Chattogram Veterinary and Animal Sciences University (CVASU), Bangladesh. Now, she is a candidate for the degree of MS in Applied Human Nutrition and Dietetics under the Department of Applied Food Science and Nutrition, Faculty of Food Science and Technology, CVASU. She is career-oriented person and passionate for her dream. She wants to serve the country as scientist in the future.