A low cost, sustainable, locally delivered intervention to promote exclusive breastfeeding practices in rural Bangladeshi women

Sanjida Haque Rema

A thesis submitted in partial fulfilment of the requirements of

London Metropolitan University

For the degree of

Doctor of Philosophy

April 2019

Statement of originality

I, Sanjida Haque Rema, confirm that the work presented in this thesis is my own research, that it has been composed by myself under the guidance of my supervisor, Professor H. D. McCarthy. Where information has been derived from other sources, I confirm that this has been indicated in this thesis.

Following the project proposal, funding has been granted for my PhD from 'Bangabandhu fellowship' on Science and ICT project, Bangladesh.

Signature…….

Date…….

Abstract

Background

Breastfeeding is a well-accepted customary practice in Bangladesh. However, there are barriers to exclusive breastfeeding including the tradition of potentially harmful practices such as prelacteal feeding (PF) and early additional feeding (ADF). Most breastfeeding promotion programmes are unable to support mothers in rural areas who deliver at home, assisted by locally practiced dai or a traditional birth attendant (TBA). With adequate training and knowledge in optimum infant feeding, TBAs could establish a locally acceptable and sustainable custom of breastfeeding practices amongst mothers in rural areas.

Methods

A controlled trial was conducted in the Dohar Upazila of Dhaka district to evaluate the impact of a TBA-led education intervention on early and exclusive breastfeeding practices in the first six months post-natally. Two community clinics (CCs) were selected as the intervention and control centres respectively. TBAs were trained to deliver breastfeeding and infant feeding advice to mothers, both pre- and post-natally. Demographic characteristics were collected via questionnaires. Infant weight, length, BMI and age were recorded across four clinic visits between birth and 5-6 months and converted to z-scores using WHO growth references. Where possible, infant birth weight was recorded. Infant feeding histories were collected via questionnaires together with reported occurrences of infant illnesses.

Results

A total of 269 mothers were recruited during 2014-2015, of whom 265 mothers with a mean age of 23.6$\pm$5.0 years completed the final 5-6 months of follow-up. The majority of mothers (78.3%) either had received primary education or were uneducated. More than 96% stayed at home and 43.4% were pregnant for the first time. Significantly more mothers (86.8%) in the intervention group breastfed their infants within the first hour post-natally compared to 31.5% in the control group ($p<0.0001$). 8.3% of infants in the intervention group received PF in the first week compared to 82.3% in the control group ($p<0.0001$). Significantly more mothers (78.6%) in the intervention group exclusively breastfed between birth and 5-6 months post-natally compared to 29.2% in the control group ($p<0.0001$). The intervention tended to show better outcomes for the infants with respect to z-weight, z-length and z-BMI up to age 5-6 months, although statistical significance varied at time points and between anthropometric measurements. Infants in the intervention group tended to present with fewer illnesses across the study period compared to the control group.

Conclusion

The study successfully found that the TBA-led breastfeeding education intervention resulted in better outcomes for infant feeding, growth and illness. It is likely that the better infant growth and illness resulted from improved breastfeeding practice. These findings suggest that the training of local TBAs could lead to a low cost and sustainable way to promote exclusive breastfeeding practices in rural Bangladeshi women which feasibly could be extended across the country.

Publications arising from this thesis

Rema Haque S., R. Ash, McCarthy, H. D. (2014) ‘A low cost, sustainable, locally delivered intervention to improve exclusive breastfeeding practices in rural Bangladeshi women’, *Proceedings of the Nutrition Society*, University of Glasgow.

Rema Haque S., R. Ash, McCarthy, H. D. (2014) ‘An ‘An investigation into exclusive breastfeeding practices in rural Bangladeshi women’, *Proceedings of the Nutrition Society*, University of Nottingham.

Haque, S. R., Ash, R. and McCarthy, H. D. (2015) ‘An investigation into exclusive breastfeeding practices in rural Bangladeshi women’, *Proceedings of the Nutrition Society*, 74(OCE3). doi: 10.1017/S002966511500230X.

Rema Haque S., R. Ash, McCarthy, H. D. (2015) ‘An ‘An investigation into exclusive breastfeeding practices in rural Bangladeshi women’, *Proceedings of the Nutrition Society*, Robert Gordon University, Aberdeen.

Rema Haque S., R. Ash, McCarthy, H. D. (2015) ‘An ‘An investigation into exclusive breastfeeding practices in rural Bangladeshi women’, *Proceedings of the Nutrition Society*, Irish Section Meeting at University College Cork, Ireland on 17-19 June.

Rema Haque, S., Ash, R. and McCarthy, H. D. (2016) ‘An investigation into exclusive breastfeeding practices in rural Bangladeshi women’, Research Horizon Conference, London Metropolitan University.

Rema Haque S., McCarthy, H. D. and Bhakta D. (2017) ‘A low cost, sustainable, locally delivered intervention to improve exclusive breastfeeding practices in rural Bangladeshi women’, Research students conference, London Metropolitan University.p.20.

Rema Haque S., McCarthy, H. D. and Bhakta D. (2018) ‘A low cost, sustainable, locally delivered intervention to improve exclusive breastfeeding practices in rural Bangladeshi women’, Research Horizon, Human Science Research Conference, London Metropolitan University.

Acknowledgements

Firstly, I would like to acknowledge the tremendous help, encouragement and support provided by my supervisor, Professor H. David McCarthy, who had been with me throughout the journey and his continuous support given to me leap over my hurdles, large and small. After my first supervisor left, he took over the responsibility and this thesis would not have been possible without his dedicated supervision, continuous support and encouragement during this hard time.

I would also like to thank 'Bangabandhu fellowship' on Science and ICT project, Bangladesh for providing financial support for my PhD and to get acceptance to conduct the research in Dohar Upazila. Thanks to project director MD Saifullah for his support.

I would like to thank Dr Dee Bhakta for her supervision and support. Also, my grateful acknowledge to my previous supervisor Dr Ruth Ash for giving me the courage to pursue my degree, supporting me to select and design the project.

My sincere thanks to Civil Surgeon of Dhaka district, Dr. Md Abdul Malek Mridha, Deputy Civil Surgeon Dr. Jakir Hossain, Dhaka giving permission and providing all the supports needed for the data collection, travelling and allowing me to live in doctors' residence in Dohar UHC. I would like to thank UH&FPO Md Jasim Uddin and all the doctors, nurses and other staffs working in UHC for supporting and helping me in every step. Their co-operation helped me to be comfortable during staying in the residence and walking around the health complex every time.

I would like to specially thank to my sister, Dr. Khadija Haque Shima for her valuable advice and support during field visits. A special thanks to health assistants, community healthcare providers and traditional birth attendants who volunteered in the study, without their support it would have not been possible to complete the project. Also, thanks to all the mothers and the babies who gave their valuable time to participate in this study.

Most importantly, a special thank you all the members of my dear family. My mother and my father for always believing in me, sacrificing so much to get me in this stage. Thank you my sister Leema, my brother-in-law Nefaur, brother Ehsan and sister-in-law Saraf for their support, encouragement during my tough time. Thank you my beautiful niece Manha and nephew Manseeb for putting a smile on my face.

A final but most heartful thank you to my husband, Boby, for his support, understanding, sacrificing countless night of sleeping to look after our daughter so that I can compete my thesis. Throughout my journey, you were always there, during my good and tough time. I can't express in words, how indebted I am for your patience, dedication and love you have showered me with.

I thank Almighty for giving me ability to complete this study project.

Finally, I would like to dedicate this work to my daughter Raifa, who taught me the meaning of breastfeeding, giving me the opportunity to have the wonderful experience of becoming a mother.

Table of contents

List of Tables

List of figures

Abbreviations and Acronyms

AA	Arachidonic acid
ADF	Additional feeding
ANC	Antenatal care
ARI	Acute respiratory tract infections
BBF	Bangladesh Breastfeeding Foundation
BC	Before Christ
BCG	Bacille Calmette Guerin
BDHS	Bangladesh Demographic and Health Survey
BF	Breastfeeding
BFHI	Baby Friendly Hospital Initiative
BFS	Bangladesh Fertility Survey
BM	Breast milk
CC	Community clinic
CHCP	Community health care provider
CPPBF	Campaign for Protection and Promotion of Breastfeeding
C/S	Caesarean section
DGFP	Directorates General of Family Planning
DGHS	Directorates General of Health Services
DHA	Docosohexaanoic acid
DHS	Demographic and Health Survey
DNA	Deoxyribonucleic acid
DPT	Diphtheria, pertussis (whooping cough), and tetanus
EDD	Expected date of delivery
EIBF	Early initiation of breastfeeding
ENF	Early neonatal feeding
EBF	Exclusive breastfeeding
EPI	Expanded programme on immunization
FP	Family planning
FPFW	Family planning field worker
freq.	Frequency
FWA	Family welfare assistant

GDP	Gross domestic product
G	Gram
Govt.	Government
HA	Health assistant
HAZ	Height-for-age
Hep B	Hepatitis B
Hib	Haemophilus influenzae type b
HIV	Human immunodeficiency virus
HW	Health worker
IFS	Infant Feeding Survey
Ig	Immunoglobulin
IMCI	Integrated management of childhood illness
IMR	Infant Mortality Rate
IPHN	Institute of Public Health Nutrition
IPV	Inactivated polio vaccine
IYCF	Infant and Young Child Feeding
LCPUFA	Long chain poly unsaturated fatty acid
LMP	Last menstrual period
Mo	Month
MGRS	Multicentre Growth Reference Study
MICS	Multiple indicator cluster survey
ml	Millilitre
MN	Maternal nutrition
MNT	Maternal and neonatal tetanus
MOHFW	The Ministry of Health and Family Welfare
MR	Measles, Rubella
MUFA	Mono unsaturated fatty acid
NGOs	Non-government organizations
NIPORT	National Institute of Population Research and Training
NVD	Normal vaginal delivery
OPV	Oral polio vaccine
ORS	Oral rehydration salts
PCV	Pneumococcal conjugate vaccine

PF	Prelacteal feeding
PHC	Primary HealthCare Services
PNC	Postnatal care
(SAWS)	Sallallahu Alayhi Salaam
SD	Standard deviation
SFA	Saturated fatty acid
SGA	Small for gestational age
Sq km	Square kilometre
SVRS	Sample vital registration system
(SwT)	Subhanahu wa ta'ala
TBA	Traditional birth attendant
TEM	Technical error of measurement
UN	United nation
UNICEF	United nation's children emergency fund
UHC	Upazila Health Complex
UK	United Kingdom
US	United State
UTI	Urinary tract infection
WABA	The World Alliance for Breastfeeding Action
WAH	Weight-for-height
WAZ	weight-for-age
WBK	World Breastfeeding Week
WBTi	World Breastfeeding Trends Initiative
WHO	World Health Organization
YRS	Years
$	Dollar

Chapter One: Introduction

Chapter 1: Introduction

1.1 Problem statement

There has been very little published research into practice of exclusive breastfeeding for the first six months of age in rural Bangladeshi women; however anecdotal evidence suggests that a large number of these women are giving additional and complementary feeding to their infants before the six months period recommended by the World Health Organization (WHO). In association with the WHO recommendations of exclusive breastfeeding for the first six months of the infant's life and continuation of breastfeeding as long as two years and beyond, the American Academy of Paediatrics also recommends breastfeeding for at least 12 months (WHO, 2002a; Eidelman *et al.,* 2012). Recently, The Scientific Advisory Committee on Nutrition (SACN) has reaffirmed and updated their mission that exclusively breastfeed for around the first six months and to introduce complementary foods at around six months of age, alongside continued breastfeeding for at least the first year of life (SACN, 2018). If an infant is fed only breast milk for the first six months, they will be protected against major childhood illnesses. Optimal breastfeeding is the best option to fight against malnutrition, infection and newborn deaths. An infant who is not breastfed is 15 times more likely to die from pneumonia and 11 times more likely of die from diarrhoea compared to an infant exclusively breastfed for the first six months (Save the Children, 2013). It is estimated that 60 million children will die under the age of five between 2018 and 2030, half of them newborns (WHO, 2017) and an estimated of 6.9 million under five children died in 2011 (Save the Children, 2013). The majority of these deaths occured in Southern Asia and Sub-Saharan

Africa (WHO, 2017). Each year an estimated 1.5 million children's lives could be saved by improving breastfeeding practices around the world (UNICEF, 2018). UNICEF estimated that globally 77 million newborns are not breastfed within first hour which ultimately increases the risk of newborn deaths by up to 80%. An estimate of 800,000 lives could be saved if every baby were breastfed within the first hour of life and exclusively breastfed until they are six months old (UNICEF, 2016). By 2025, the WHO aims to significantly reduce maternal, neonatal, infant and childhood mortality by establishing a 50% universal exclusive breastfeeding rate (WHO, 2014; Victoria *et al*., 2016).

Despite available evidence that suggest early, and exclusive breastfeeding is the best way to nourish a newborn, many mothers, in developing countries practice prelacteal feeding (PF), early additional feeding (ADF) and inappropriate complementary feeding (CF). Bangladesh is one of these countries where many mothers give other liquids and foods before the initiation of breastfeeding. This is almost universal in Bangladesh; these practices are influenced by socioeconomic, cultural and religious factors by delayed initiation of breastfeeding, PF and ADF during breastfeeding before completing the first six months. In rural settings, the vast majority of Bangladeshi mothers continue to introduce supplemental foods before the WHO recommendation of weaning age, placing breastfeeding at risk and these improper practices ultimately responsible for high rates of infant morbidity and mortality in Bangladesh (Khan *et al.,* 2008; Ara *et al*., 2018).

As the birth of a child is an event of celebration for the family and the society, breastfeeding is strongly influenced by the religious and cultural practices (Laroia and Sharma, 2006). An occasion like 'Annaprashan' or 'mukhe bhaat' (grain

initiation) is celebrated on a child's six months completion and the first rice-eating ceremony is a part of Bengali culture amongst the Bengali Hindus (Lochfeld, 2002). Bangladesh is majorly a Muslim country where more than 90% are Muslims and Islamic teachings support breastfeeding for two years and beyond (Shaikh and Ahmed, 2006). The father must support the mother in breastfeeding by providing food and clothing (Hawwas, 1988). In the Al-Quran, Allāh (SwT) mentions in Surat al-Baqarah, Verse 233: "Mothers shall suckle their children for two full years, - that for such as desire to complete the suckling". And in Surat al-Aĥqāf, Verse 15, He states: "And his gestation and weaning take thirty months". It is narrated from the Prophet Muhammad (SAWS): "Allāh (SwT) has placed the sustenance (rizq) of the child in the two breasts of the mother, in one is his water, and in the other his food". The Prophet Muhammad (SAWS) also narrated that, "For a child, there is no milk better than the milk of the mother".

Breastfeeding is almost universal amongst Hindus and Hindu women tend to breastfeed their infants throughout infancy or longer. In the ancient Indian literature, the Vedas mentioned that milk and breast are symbols of longevity and nectarine sweetness (Laroia and Sharma, 2006). The Sushruta Samhita, a surgeon in the Gupta period (400BC) describes the power of breastmilk: ''May four oceans, full of milk, constantly abide in both your breasts, you blessed one, for the increase of the strength of the child! Drinking of the milk, whose sap is the sap of immortal life divine, may your baby gain long life, as do the gods by feeding on the beverage of immortality!'' (Bhishagratna, 1916). In Japan, Buddhist have the time-honoured custom of visiting a Buddhist template to pray for abundant breastmilk secretion and for the sound development of the baby (Segawa, 2008).

Available evidence from the Bangladesh Demographic and Health Survey (BDHS) suggests the prevalence of exclusive breastfeeding (<6 months) in Bangladesh is an average of 55% with a median duration of 2.8 months (National Institute of Population Research and Training (NIPORT) *et al.,* 2016). However, the prevalence was as low as 27.2% in a study conducted in a hospital in Dhaka (Sharmin *et al.,* 2016). An observational study conducted in Narayanganj General Hospital, 2012 confirmed that early weaning or ADF is often practiced among Bangladeshi rural mothers and is significantly associated with diarrhoea and malnutrition in the baby (Haque, Ash and McCarthy, 2015).

Identifying these issues, the research was conducted to overcome this barrier by giving mothers a repeated exclusive breastfeeding message, through traditional birth attendants (TBAs). To determine if there was any influence of the intervention on infants' growth, measurements of the study infants were taken regularly for a period of time. As there was not a recommended schedule of visits specifically for growth assessment, routine immunization visits considered the best way to record the measurements of the infants when a mother-infant pair visits a health care provider. The first chapter begins by describing the demographic characteristics of Bangladesh, an overview of the current healthcare system including Expanded Programme on Immunization (EPI) and Community Clinics (CCs), breastfeeding and it's health benefits, common breastfeeding practices in Bangladesh, breastfeeding around the world and in neighbouring countries, breastfeeding promotional programmes and recommendations from WHO.

1.2 Country profile

With an area of approximately 147,570 square kilometres, and a population of 161.75 million, Bangladesh is the eighth-most populous country and amongst the most densely populated countries in the world with more than 1,000 people live in every square kilometre (Ministry of Health and Family Welfare (MOHFW), 2016; Bangladesh Bureau of Statistics (BBS), 2017). It is located in South Asia, bordered by India on three sides and in south-west side shares border with Myanmar and to the south by the Bay of Bengal (MOHFW, 2016). Bangladesh achieved it's independence on 16th December, 1971 after a nine-month liberation war against Pakistan with the loss of approximately 3 million lives and another ten million refugeed into India (Iqbal, 2008). The majority of the population (89%) are Muslims and the remaining are Hindus (9.6%), Buddhists (0.6%) and Christians (0.3%) (MOHFW, 2016). Although Bangladesh has made remarkable progress in different sectors, with an increasing economic growth and a reduction in the rates of poverty by 9% in between 2005-2010, almost a quarter of Bangladeshis (24.3%) live in poverty with 12.9% of the population live in extreme poverty (The World Bank, 2017b).

It is predominantly a rural country with around 65% of it`s total population living in rural areas (The World Bank, 2016a). Rural people depend mainly on land for their livelihoods, but their livelihoods are precarious. Due to the seasonal nature of farm income and natural disasters such as heavy rainfall, flooding and drought, their crops and animals are significantly damaged. In addition, with urbanisation, the number of farmlands are shrinking and most rural households have very little, if any cultivatable land. A UN study stated that, the majority of citizens of Bangladesh will be urban-dwellers by 2039 (United Nations, 2018). Due to

poverty and unfavourable agriculture environment, it is challenging for the people to rebuild their lives, which takes them deeper into more poverty.

In Many parts of Bangladesh, a lack of fresh water and improved sanitation facilities have led to major health problems in rural and urban slums of Bangladesh. Due to arsenic contamination of tube wells, less than 80 percent of the population have access to improved drinking water sources and 39 percent do not have access to sanitary toilets (The World Bank, 2016b). Although, this amount of progress over the time is remarkable, the quality of the sanitary toilets and drinking water is still questionable. About 40 percent of the toilets failed to reach the quality standard and half of the drinking water quality failed to meet the water safety standard. This inadequacy in water supply, sanitation and hygiene have a direct impact on the rapid outbreak of waterborne diseases such as diarrhoea, cholera, typhoid and other communicable diseases such as skin and eye conditions. Waterborne diseases especially diarrhoea is a significant burden for children aged under-five who are more susceptible to dehydration and nutritional loses through diarrhoea in Bangladesh (NIPORT *et al.,* 2016). The high environmental temperature along with rainfall is significantly associated with diarrhoea in Bangladesh (Checkley *et al*., 2000; Singh *et al.,* 2001; Hashizume *et al*., 2007). Moreover, unsanitary toilets, non-concrete household and lower educational attainment act as precipitating factors for the incidence of diarrhoea (Watson *et al.,* 1997). Table 1.1 shows demographic characteristics of Bangladesh.

Table 1.1: Demographic characteristics of Bangladesh

Total population in million (1st January, 2017)	161.75
Population density (people per sq. km)	1,090
Percentage of people aged between 15-49 years	53.6
Percentage of rural population	65
Life expectancy at birth in years	71.6
GDP per capita US$	1,517
Under-5 mortality rate (per 1,000 live births)	36
Infant mortality rate (per 1,000 live births)	29
Neonatal mortality rate (per 1,000 live births)	20
Maternal mortality ratio (per 100,000 live births)	176
Total adult literacy rate of population 15+years	64.6
Total expenditure allocated to health as % of GDP (2014)	2.8
Health expenditure per capita US$ (2014)	88
Births attended by skill health personnel (%)	41.1
Home delivery rate (%)	62.2%

Source: (BBS, 2015; BBS, 2017; MOHFW, 2016; NIPORT *et al.* 2016; The World Bank, 2016a; The World Bank 2017a; WH0, 2018a).

1.3 Overview of healthcare system in Bangladesh

Since independence, Bangladesh has actively pursued a policy for providing essential basic healthcare for the improvement of the quality of life for all. The Ministry of Health and Family Welfare (MOHFW) is responsible the formulation and implementation of the national health and population policies and controls the overall administration, co-ordination and management of healthcare and family planning services down to the community level (Ruhul *et al.,* 1999; Islam and Biswas, 2014; MOHFW, 2016). Apart from the public health departments of the government, the private sector run by local entrepreneurs, non-government organizations (NGOs) and international organizations serve a large proportion of people. The MOHFW, through the two Directorates General of Health Services (DGHS) and Family Planning (DGFP), manages a dual system of general health

and family planning services through district hospitals, Upazila Health Complexes (UHC) and sub-district level, Union Health and Family Welfare Centres at union level and community clinics (CCs) at ward level (WHO, 2015). However, despite the efforts of the public health facilities, the quality of services at these facilities remained quite low and overall utilisation rate of public health services was as low as 30% (Ricardo *et al.,* 2004). A number of factors such as insufficient allocation of resources, institutional limitations and negligence of service providers, long travel and waiting time are the major hindrances to the utilisation of the public health sectors (Andaleeb, Siddiqui and Khandakar, 2007; Mahmood, 2012; Ahmed *et al.,* 2015).

1.3.1 Community Clinic (CC)

In 1998, the government planned to extend the Primary Healthcare Services (PHC) at ward level to reach the entire rural population. These are grass roots one-stop primary health care service facilities. In order to reach the expectation of the local people and to ensure long-term sustainable healthcare services, the government took the initiative to build partnership between public-sector facilities and community (Normand, Iftekar and Rahman, 2002). The motive was to deliver healthcare facilities to the door step in the rural settings and to improve the overall health situation by reducing infant and under-five mortality, maternal mortality and morbidity through ensuring comprehensive primary healthcare services free of cost (Normand, Iftekar and Rahman, 2002; Millat *et al.,* 2011). The MOHFW constructed each community clinic (CC) to provide service for around 6,000 people with a location is accessible to 80% of the local population within less than 30 minutes walking distance. Each clinic has members of two staff, one health

assistant (HA) and one family welfare assistant (FWA) or a community health care provider (CHCP). Services of CCs include: maternal & neonatal health care services (antenatal care / postnatal care); integrated management of childhood illness (IMCI); reproductive health and family planning (FP) services; expanded programme on immunization (EPI); nutritional education and micronutrient supplements; health education & counselling; screening of chronic non-communicable diseases; treatment of minor ailment; common diseases, first aid and establishing referral linkage with higher facilities (Normand, Iftekar and Rahman, 2002).

1.3.2 Expanded Program on Immunization (EPI) Schedule in Bangladesh

The EPI was first initiated by the WHO in May 1974 aiming to protect all children around the world against six vaccine preventable diseases including tuberculosis, polio, diphtheria, whooping cough, tetanus and measles by the year 2000. In Bangladesh, the EPI was introduced in 1979 as a pilot project and over the following decades, it became one of the most successful projects throughout the country by significantly reducing child mortality and morbidity from vaccine preventable diseases (Sarkar *et al.,* 2015). Initially, the service was limited to selected number of UHC, major hospitals and some NGOs. Between 1985-1990, with the support of WHO and UNICEF, the government took a number of measures to gradually expand the EPI throughout 460 Upazilas, 84 municipalities and 4 city corporations. EPI is now available through clinic-based and outreach activities. Almost all EPI outreach sites are within15-20 minutes walking distance. In rural areas, health workers (HW) and family planning field workers (FPFW)

who work under MOHFW at village level are responsible for admission of the vaccines at health centres. Along with vaccination, motivation for vaccination, social mobilization activities and education are also provided during household visits by HWs and FPFWs (Jamil *et al.,* 1999; Uddin *et al.,* 2010).

The EPI in Bangladesh has made tremendous progress over the period and became the most successful public health intervention in Bangladesh by reducing mortality and morbidity against vaccine preventable diseases (UNICEF Bangladesh, 2018). The latest demographic survey shows that full immunization among children 12-23 months old was 78% fully vaccinated by 12 months of age (NIPORT *et al.,* 2016). According to WHO and UNICEF survey, the coverage of BCG was 99% and the percentage of immunized against DPT was 97% in 2016 (WHO, 2017). Now, Bangladesh is maintaining polio free status and the last reported case was in August 2000 (WHO, 2017). The country also achieved maternal and neonatal tetanus (MNT) elimination status in 2008 through immunization of pregnant women and other women of reproductive age and promotion of more hygienic deliveries and umbilical cord care practices (WHO Bangladesh, 2018b). Therefore, the existing EPI network provides an ideal low-cost method of transmitting health messages to Bangladeshi mothers. Table 1.2 shows current the immunization schedule in Bangladesh.

Table 1.2: Vaccination schedule for children aged 0-15 months in 2016

Disease	Vaccine	Number of doses	Interval between doses	Starting time of vaccination
Tuberculosis	BCG	1	-	After birth
Diphtheria, Pertussis, Tetanus, Hepatitis-B, Haemophilus influenzae type B	DPT-Hib-HepB	3	4 weeks	6 weeks
Poliomyelitis	OPV	4 *	4 weeks	6 weeks
Pneumococcus	PCV	3	4 weeks	6 weeks
Inactivated polio virus	IPV			14 weeks
Measles Rubella	MR	1	-	38 weeks and 15 months
	Vitamin A			6-59 months (not given through EPI)

* Three doses of OPV is to give with DPT three doses and the fourth dose of OPV is to give with Measles (WHO, 2017).

1.4 Introduction to breastfeeding

Human breastmilk is uniquely composed for human infants in a perfect manner where it's nutrients, minerals, vitamins and water composition are derived from maternal diet, maternal stores or synthesised directly within the mammary gland. It is a highly complex product with many unique qualities which provides the infant with all the energy, nutrients and water and other components required for optimal growth and development. In addition, the immune supportive compounds contained within the first yellowish milk colostrum known as 'liquid gold' provides

the newborn with the majority of it's initial immune defence needs (Hakansson, 2015).

The WHO and UNICEF recommendations on breastfeeding are as follows:1) initiation of breastfeeding within the first hour after birth; 2) exclusive breastfeeding for the first six months and 3) continued breastfeeding for two years or beyond together with 4) safe, nutritionally adequate and age appropriate complementary feeding starting after completion of sixth month (WHO and UNICEF, 2003). The WHO defines exclusive breastfeeding as receiving only breastmilk but includes the infant to receive oral rehydration salts (ORS), drops and syrups (vitamins, minerals, medicines) and nothing else (WHO, 2007). The government in Bangladesh has adopted this recommendation, but barriers such as delayed initiation, the practice of early neonatal feeding (ENF) and PF, early and inappropriate ADF and CF have resulted in enormous challenges to establish ideal breastfeeding practices around the country.

A number of studies have examined the composition of breastmilk and it's changes in response to many factors such as time of the day, season, stage of lactation, feeding pattern, maternal parity, duration of pregnancy, maternal disease and maternal diet. Therefore, it is believed that the composition of breast milk is specifically produced by each mother to meet the demand of her infant according to it's age and other characteristics. The breast milk is classified into colostrum, transitional milk and mature milk with gradual alteration in the composition of milk throughout lactation period (Jenness, 1979; Innis, 2014; Mosca and Giannì, 2017). Studies have found that breastmilk composition changes constantly throughout the entire lactation period as a response to a number of factors including milk removal during breastfeeding (Lönnerdal, 2003;

Khan, 2012; Hassiotou *et al.,* 2013). It is likely that milk composition can be influenced by either maternal, infant or both factors (Khan, 2012; Bravi *et al.,* 2016). Recent studies have also shown that the lipid content of the breastmilk is changeable according to feeds and fluctuates throughout the day. The lipid content of the breastmilk is higher when the breast is emptier than before the feed when breast is fuller and appears to be related to the emptying of the breast during the feed with larger feeds or expressing after the end of feed having a higher lipid content (Mitoulas *et al.,* 2002; Kent *et al.,* 2006; Hassiotou *et al.,* 2013).

Maternal diet can also influence the nutritional quality of breast milk (Lauritzen *et al.,* 2002; Leotsinidis, Alexopoulos and Kostopoulou-Farri, 2005; Daud *et al.,* 2013; Bravi *et al.,* 2016). For example, a crossover study found a higher breast-milk total energy content for a diet significantly lower in carbohydrate and higher in fat than with a diet high in carbohydrate and low in fat (Mohammad, Sunehag and Haymond, 2009). Studies on the protein content of breastmilk have been carried out in different parts of the world and many findings shows no direct relation between maternal protein intake and breast-milk total protein content (Boniglia *et al.,* 2003; Mohammad, Sunehag and Haymond, 2009; Ogechi and Irene, 2013). Breastmilk also produces large amount of nonprotein nitrogenous compounds including free amino acid (FAAs) which changes over the first four months of lactation (Lei *et al.,* 2012). Women having a high proportion of protein containing diet had a higher level of non-protein nitrogen in their breastmilk, part of which due to a higher level of Urea (Lönnerdal, 1994). The concentration of most FAAs with taurine, glutamic acid, glutamine and alanine is higher in mature milk than in colostrum or transitional milk (Baldeón *et al.*, 2014).

Maternal diet high in fat and low in carbohydrate were associated with higher a proportion of breast-milk total fat compared to a maternal diet high in carbohydrate and low in fat were found in a US study (Mohammad, Sunehag and Haymond, 2009). Studies also have shown that the consumption of oily fish or fish oil supplementation increased the long chain poly unsaturated fatty acid (LCPUFA) Docosohexaanoic acid (DHA) content of breastmilk which is essential for brain and retina development (Fidler and Koletzko, 2000; Hornstra, 2000; Koletzko *et al.,* 2001; Kelishadi *et al.,* 2012). However, the breast-milk content of another LCPUFA named Arachidonic acid (AA) was found to be independent of maternal dietary intakes as it is synthesised within mammary tissue (Fidler and Koletzko, 2000; Koletzko *et al.,* 2001). Many studies have reported inconsistent results on the correlation between breast-milk content of total saturated fatty acid (SFAs) and maternal dietary intake of fat, total energy, total SFAs, total mono unsaturated fatty acid (MUFA), carbohydrate or protein intake (Scopesi *et al.,* 2001; Lauritzen *et al.,* 2002; Rist *et al.,* 2007; Nasser *et al.,* 2010; Mäkelä *et al.*, 2013; Antonakou *et al.,* 2013; Innis, 2014). Breastmilk content of two essential fatty acids, namely linolenic which converts to arachidonic acid (AA) and alpha-linoleic acid which converts into eicosapentaenoic acid (EPA), the latter further converts to docosahexaenoic acid (DHA). They are essential for regulating growth, inflammatory responses, immune function, vision, cognitive development and motor systems in a newborn ((Martin, Ling and Blackburn, 2016).

The first milk or colostrum is produced after birth and lasts for 2-4 days after breastfeeding has started. The composition of colostrum significantly differs from the mature milk where colostrum is rich in lactalbumin, lactoprotein and antibodies such as IgA, IgM and IgG (Godhia and Patel, 2013; Hassiotou *et al.,*

2013). These antibodies play an important role in the infant's immune system and confer passive immunity to the newborn, also known as ''foremilk''. In addition, antimicrobial peptides such as lactoferrin and lactiperoxidase, bioactive properties and growth factors have key role for nutrition, growth and development of the newborn (Dvorak, 2010). The nutrient content, chemical composition and major functions of breastmilk can be seen in Appendix A.

During breastmilk production and the act of breastfeeding, a mother's body requires more dietary energy. Generally, mother's milk production adapts to the needs of her baby in terms of quality and quantity. Even among moderately malnourished mothers, the quantity and quality of milk appears to be unaffected. A study found that in communities where malnutrition is prevalent, the average growth of the infant is satisfactory up to the age of about 3 months on exclusive breastfeeding (Thomson and Black, 1975). If a mother eats less food in a day, the demand of the baby is fulfilled by drawing from the maternal body stores. However, many health professionals and mothers believe that maternal nutritional status affects lactation (Greiner, 1994). One study has reported that for some micronutrients, mainly the water-soluble vitamins deficiencies in the maternal diet may affect breastmilk composition and the nutritional status of the breastfed infant (Allen, 1994). A more recent study conducted in Ethiopia found that poor maternal vitamin-A status was associated with wasting in infants (Tariku *et al.,* 2017). Children with vitamin A deficiency are more prone to infectious diseases such as diarrhoea and respiratory tract infections which are ultimately common predictors for wasting (Fekadu *et al.,* 2015; Asfaw *et al.,* 2015). Breast milk also lacks adequate amounts of vitamins D and K (Martin, Ling and Blackburn, 2016). The optimum level of vitamin D stores present at birth are

reduced within 8 weeks after birth. Exclusive breastfed infants receive below the minimum recommended intake of vitamin D, putting the infant at the risk for vitamin D deficiency, inadequate bone mineralization and increase risk of rickets. However, risk of vitamin D deficiency amongst breastfed infants also depends on sun exposure. Vitamin K, an essential component for blood coagulation, is transferred from the placenta to foetus in a very limited amount. Therefore, a newborn often has an extremely low concentration of vitamin K and is at risk of developing haemorrhagic disease. However, even in difficult circumstances, breastfeeding remains the most beneficial choice for the child and the mother, even if the maternal diet is not optimal.

1.5 Health benefits of breastfeeding

For the vast majority of infants and young children throughout the world, breastfeeding saves lives, prevents morbidity, promotes optimal physical and cognitive development and reduces the risks of some chronic diseases. A number of studies have indicated the short-term and long-term health benefits of breastfeeding for the infant at all stages of life. There is growing evidence to indicate that breastfeeding benefits the mother as well such as reducing the risk of postpartum blood loss, acts as a method of contraception and reduce the risks of breast and ovarian cancer (Labbok, 1999; Haider *et al.,* 2000; León-Cava *et al.,* 2002). Breastfeeding also develops bonding between mother and her child as well as an improved confidence of successful mothering (Labbok, 1999; Martin, Ling and Blackburn, 2016).

1.5.1 Benefits for the child

1.5.1.1 Infectious diseases

Increasing evidence shows the protective benefits of exclusive breastfeeding against infectious diseases such as acute respiratory tract infections (ARI), gastrointestinal infection, acute otitis media (AOM) during early neonatal period and in later life (Arifeen *et al.,* 2001; Morris and Bryce, 2003; Mihrshahi *et al.*, 2007; Black, Khan & Islam 2017; Kørvel-Hanquist, Djurhuus and Homøe, 2017). The magnitude of the effects can be large. For example, a meta-analysis of data conducted in 6 developing countries indicated breastfeeding provided a greater degree of protection against diarrhoea associated deaths than against deaths attributable to ARI in the first 6 months of life, whereas the level of protection was similar for infants who were 6 to 11 months of age (WHO Collaborative Study Team, 2000). A similar picture is seen in industrialized countries. A systematic review was performed based on twenty-one studies to assess the effect of breastfeeding and exclusiveness and duration of breastfeeding on infections. These studies strongly suggest that breastfeeding protects infants against gastrointestinal, respiratory tract and overall infections in industrialized countries (Duijts, Ramadhani and Moll, 2009). A recent study also indicated that breastfeeding for six months or longer was associated with a reduced risk of lower respiratory tract infection up to four years of age (Tromp *et al.,* 2017). This Dutch population-based prospective cohort study found that compared to children who were never breastfed, breastfeeding for 6 months or longer was significantly associated with decreased risk of lower respiratory tract infections up to pre-school age (Tromp *et al.,* 2017). In Bangladesh, where infectious diseases such as diarrhoea and ARI are responsible for more than two-thirds of all deaths in

children aged less than one year, a study had shown the protective effect of exclusive breastfeeding against ARI and diarrhoea associated morbidity (Mihrshahi *et al.*, 2007). Studies have also demonstrated the protective effects of exclusive breastfeeding and breastfeeding for longer duration against urinary tract infection (UTI) (Pisacane *et al.*, 1992; Mansour and Mansour, 1993; Mårild *et al.*, 2007).

1.5.1.2 Asthma

The protective role of breastfeeding against the development of asthma and allergic diseases among children has remained controversial for more than eight decades (Bener *et al.,* 2007; Yamakawa *et al.,* 2015; Oddy, 2017). Although breastfeeding is protective against lower respiratory tract infection during infancy, such protection has not been fully demonstrated for asthma in all studies. Factors such as differences and limitations in the methodology and confounding factors have greatly complicated the interpretation and comparison of studies. Moreover, the immunological complexity of breast milk, and possibly genetic differences among individuals may affect whether the action of breastmilk protective or triggers an allergy (Friedman & Zeiger, 2005). However, a secondary analysis performed in Japan between 2001 and 2004 showed that breastfeeding reduced the risk of hospital admission for asthma in children aged between 6 and 42 months (Yamakawa *et al.,* 2015). A more recent study conducted in Canada found that direct breastfeeding is highly protective compared with formula feeding against childhood asthma (Klopp *et al.,* 2017). A review of a landmark study of around 250,000 babies between 1983 and 2012 found a link between

breastfeeding and decreased childhood asthma rates by 37 percent in infants under three (Dogaru *et al.*, 2014).

1.5.1.3 Neurodevelopment

Many studies have examined the link between breastfeeding and neurodevelopment and found benefits in children (Morley *et al.,* 2004; McCrory and Murray, 2013). A number of studies have shown a positive relationship between breastfeeding and cognitive development in children, although it is possible that the breastfeeding effect may be confounded by other unobserved factors such as maternal education, age, income (Kramer *et al.,* 2008; McCrory and Layte, 2011; McCrory & Murray, 2013). A study conducted to establish the impact of exclusive breastfeeding on cognitive development in small for gestational age infants (SGA) found a significant impact on cognitive development in exclusively breastfed infants without compromising growth (Rao *et al.,* 2007). Docosahexaenoic acid (DHA), an omega-3 essential fatty acid (C22H3202), plays a fundamental role for the formation and function of the nervous system, and helps in growth and development of the brain and retina (Echeverría *et al.*, 2017). Studies also suggested the influence of DHA through breastfeeding over a longer period influence the observed effect on childhood adiposity (Pedersen *et al.,* 2012; Patro-Gołąb *et al.*, 2016; Foster *et al.,* 2017). Foster *et al.* targeted a high-risk group of obese mothers in a long-term follow-up of a randomized trial where mothers received DHA supplementation from their second trimester of gestation. At two- and four-years follow-up time points, offspring adiposity was measured. While no significant differences by measures of adiposity were noted at birth, two or four years by randomization group, a significant association was found in the exploratory analysis taking into account

breastfeeding and measured DHA level suggesting that DHA supplementation during pregnancy in obese mothers may have long-lasting effects on offspring measures of adiposity (Foster *et al.,* 2017). A general association between breastfeeding and later reduced adiposity has been observed across a wide range of studies, though unmeasured confounding has often been attributed as an explanation.

1.5.1.4 Risk of chronic diseases

A number of studies have investigated the potential links between infant feeding and a number of chronic or non-communicable diseases and found a protective effect of breastfeeding. These includes obesity, type 2 diabetes and hypertension (Owen *et al.,* 2006; Horta, Mola and Victora, 2015; Pongiglione and Fitzsimons, 2017; Wallby, Lagerberg and Magnusson, 2017). Breastfed babies have a slower growth during infancy than formula-fed babies and is expected to reduce the risk of being overweight or obese in later life. Scientific evidence on the role of breastfeeding in the development of obesity remains equivocal. Some studies show a protective effect of breastfeeding against obesity (Oddy *et al.,* 2006; Araújo *et al.*, 2006; Weyermann, Rothenbacher and Brenner, 2006; Toschke *et al.*, 2007; Eny *et al.,* 2018; Bell *et al.,* 2018). Ideal breastfeeding practices from birth to 1 year slows the ponderal index and weight gain among the infants whose mothers were diagnosed with gestational diabetes mellitus (GDM) compared to formula-fed infants (Gunderson *et al.,* 2018). Early initiation in first hour and longer duration of breastfeeding have significantly reduced the risk of overweight and obesity (Al-Jawaldeh and Abul-Fadl, 2018).

1.5.2 Benefits for the mother

Breastfeeding has substantial known positive outcomes not only for the baby but also for the mother. The interaction between mother and baby through breastfeeding extends far beyond nutrition. It builds an emotional bond between the mother and her baby. The two endocrine hormones oxytocin and prolactin help in relieving stress (Carter and Altemus, 1997; Mezzacappa, Kelsey and Katkin, 2005). Oxytocin has a key role in contraction of the uterus during labour and after labour helps in controlling postpartum bleeding. Beyond that, oxytocin acts as 'the love hormone' which helps the mother and the baby feel calm and closely attached to each other (Afshariani, 2014). Breastfeeding also helps the mother to expend around 200-500 kcal for the production of breastmilk. This is one way that a mother can lose the extra fat that was accumulated during pregnancy (Dewey, Heinig and Nommsen, 1993). It also reduces the risk of type 2 diabetes and cardio-vascular disease in the future (Jäger *et al.*, 2014). During milk production, bone demineralisation occurs as a result of extracting calcium from mother's body. After the baby is weaned, remineralisation occurs, and more calcium is deposited in the mother's body and this cycle helps to prevent osteoporosis (Turck *et al.,* 2013). Research has also shown that breastfeeding acts as a natural contraceptive by inhibiting ovulation (Haider *et al.,* 2000). In addition, the lower level of oestrogen and inhibition of ovulation during lactation have an impact on reducing the future risk of breast, uterine and ovarian cancer in the premenopausal period (Turck *et al.,* 2013; Afshariani, 2014).

1.6 Understanding breastfeeding trends in Bangladesh

In Bangladesh, practice of breastfeeding is universal (Greiner, 1997; Mihrshahi *et al.,* 2010; NIPORT *et al.,* 2016) and mothers are encouraged to breastfeed both by cultural and religious views (Piechulek, Aldana and Hasan, 1999; NIPORT *et al.,* 1997; NIPORT *et al.,* 2016). Although the incidence is declining in many parts of the world (Australian Institute of Health and Welfare, 2011; Ma, Liu and Smith, 2014; Ericson *et al.*, 2016), Bangladesh is one of the few countries taking the opposite position to breastfeeding until two years and beyond (Ahmed, Parveen and Islam, 1999; Hanif, 2013; Joshi *et al.,* 2014). Evidence from studies in the 1970s and 80s including the Bangladesh Fertility Survey (BFS) documented the longer duration of breastfeeding in Bangladesh (Khan, 1980; Huffman *et al.,* 1980; Ahamed, 1986; Briend, Wojtyniak and Rowland, 1988; Piechulek, Aldana and Hasan, 1999). Even today, the trend has not changed and babies are breastfed for an extended period (Akter and Rahman, 2010). The recent Bangladesh Demographic and Health Survey 2014 described universal breastfeeding among women with a median duration of 31 months (NIPORT *et al.,* 2016). Mothers from rural areas were breastfed longer than in urban areas (Giashuddin and Kabir, 2004). Many studies have shown more than 99 percent of mothers practiced breastfeeding in the first month (Saha *et al.,* 2009) with as high as 96.4% still breastfeeding between 12-15 months from secondary data of BDHS, 2004 (Mihrshahi *et al.,* 2010).

However, problems can arise with the breastfeeding including delays in initiation of breastfeeding, discarding colostrum, practice of PF and improper introduction of complementary food.

1.6.1. Early initiation of breastfeeding (EIBF)

Early initiation of breastfeeding (EIBF) is defined by putting the baby on to the breast within one hour of birth and is recommended by the WHO (WHO, 2018a). Despite the high prevalence rate of breastfeeding in Bangladesh, the rate of early initiation rate is not satisfactory (Sundaram *et al.,* 2016). According to The National Neonatal Health strategy and Guidelines for Bangladesh, EIBF within one hour was one of the priories of the set of essential newborn care practices (MOHFW, 2014; NIPORT *et al.,* 2016; Sakib, 2017). Regrettably, only 6% of children received all essential newborn care after birth (NIPORT *et al.,* 2016). The most recent BDHS in 2014 shows that 51% of newborns did not receive breastfeeding within first hour of birth and the improvement was not noticeable since the last survey was conducted in 2011 (50.2%). There are a number of reasons for the importance of starting breastfeeding at first hour. The mother and the child both benefit from early initiation. Breastfeeding should not be stopped even if breastmilk has not been established yet. Early suckling stimulates the release of prolactin and oxytocin hormone; hence the hormone prolactin helps to produce the milk in the alveoli of breasts and oxytocin activates the contraction of the uterus and helps in reducing postpartum haemorrhage (Martin-Du Pan, 2012). There have been several beneficial effects of early initiation of breastfeeding reported including reducing infant mortality and morbidity (Mullany *et al.,* 2008; Tawiah-Agyemang *et al.*, 2008; Khan *et al.,* 2014; Sharma and Byrne, 2016). Nationally, initiation of breastfeeding in first hour after birth, feeding colostrum and exclusive breastfeeding for the first six months have been promoted through the Baby-Friendly Hospital Initiative (BFHI) implemented and supported by BBF and UNICEF respectively. Since, the majority of the deliveries

(62%) in Bangladesh are conducted at home, the BFHI can have a limited impact on the breastfeeding practices.

To understand the reasons for delaying the introduction of breastfeeding in Bangladesh, existing research was analysed for identifying the influencing factors in rural and urban areas. There have been few studies which conducted solely focusing on EIBF in Bangladesh. Adding non-breastmilk food as PF in the first three days is a major barrier to early initiation (Sundaram *et al.,* 2013; Sundaram *et al.,* 2016). Traditional practices such as prelacteal feeds of honey, sweetened water or mustard oil being given as the first food immediately after birth act as a hindrance to ideal breastfeeding practices (Das, Talukder and Sella, 1992). Infants, who struggle initially with suckling, are more prone to receive a food other than breastmilk (Sundaram *et al.,* 2016). Low birth weight and premature newborns are also less likely to be breastfed earlier compared to normal weight and full-term newborns (Esteves *et al.*, 2014; Haider and Saha, 2016; Sharma and Bryne, 2016). Skin to skin contact is not widely practiced in Bangladesh (26%), a process which may help to put newborns on to the breast in the first hour (Moore *et al.,* 2012; Singh *et al.,* 2017). Moreover, health facilities act as barrier to practicing early breastfeeding compared to a non-facility birth environment. The procedures of the health facilities require immediate separation of the mother and newborn which ultimately prevents early initiation (Sobel *et al.,* 2011; Crenshaw, 2014). Studies also revealed that breastfeeding initiation was delayed when the infant was delivered by Caesarean section (CS) or the mother had a complicated delivery (Rowe-Murray and Fisher, 2002; Haider and Saha, 2016; Hobbs *et al.,* 2016; Singh *et al.,* 2017). Early initiation also varies with place and mode of delivery. Results from a study indicated that early breastfeeding in

the poorest settings, in Rangpur and Sylhet divisions compared to Barishal (Singh *et al.,* 2017). Surprisingly, children from wealthy households and from urban settings were at higher risk of late initiation of breastfeeding (NIPORT *et al.,* 2009; Mihrshahi *et al.,* 2010; NIPORT *et al.,* 2013; NIPORT *et al.,* 2016). Factors such as household wealth, presence of a birth attendant (Mihrshahi *et al.,* 2010; Haider and Saha, 2016; Sharma and Byrne, 2016), bathing after delivery, the knowledge and beliefs of family members' especially women who deliver at home also have an impact on the early initiation of breastfeeding (Bhandari *et al.,* 2004; Barnett *et al.*, 2006; Esteves *et al.,* 2014). Children born in a health institute or delivered by a health professional, with educated mother were less likely to breastfed immediately (NIPORT *et al.,* 2013; NIPORT *et al.,* 2016).

1.6.2 Discarding colsotrum

Avoidance of colostrum was widespread in Bangladesh in an earlier period (Das and Ahmed 1995; Ahmed, Parveen and Islam, 1999). There were some traditional misconceptions about this first milk and in most cases, colostrum was discarded before putting the child on to the breast. Children often waited for first two-to-three days to avoid the ''harmful'' milk until receiving the mature milk (Goodburn, 1994; Tarannum and Hyder, 1998; Bandyopadhyay, 2009). Mothers' knowledge regarding colostrum was found to be very low (Ahmed, Parveen and Islam, 1999). In a survey of 60 Bangladeshi immigrant mothers in London, only two mothers knew the beneficial effects of colostrum and mothers hand expressed the colostrum for disposal (Littler, 1997). A study conducted in 1996 in two different rural settings of Bangladesh indicated that only 12 percent of

mothers regarded colostrum as the first food for newborns and only 10 percent of mothers allowed their newborns to receive colostrum (Ahmed, Parveen and Islam, 1999). A similar picture was seen in another study where 26 percent mothers believed that colostrum was indigestible and 22 percent identified colostrum as not being fresh as it was in the breast throughout pregnancy and hence harmful for the infants (Mehriban and Sayed, 2015). Instead, many children in Bangladesh received other milk or fluid which could be harmful and inappropriate for the newborns and therefore exposed to neonatal infection, diarrhoea and respiratory infections. Grandmothers and TBAs were the source of this knowledge and influence decision making (Tarannum and Hyder, 1998; Bandyopadhyay, 2009). Similar practice was seen in neighbouring and African countries (Raina, Mengi and Singh, 2012; Legesse *et al.,* 2015). In a study of 496 infants in rural area of Bogra district found that 88% mothers recognized the importance of colostrum, but it was initiated to only in 18 percent infants (Piechulek, Aldana and Hasan, 1999). Although the majority of mothers (83.5%) in a study of 242 mothers in 7 villages of Narayanganj district identified colostrum as good, less than 8% mothers gave it as the first food to their infants (Das and Ahmed, 1995).

Opposite results of universal practice of colostrum feeding (BBF, 2006; Joshi *et al.,* 2014) are also seen and there may be a misconception regarding colostrum rejection in Bangladesh. It is possible that mothers' understanding about the colostrum is not clear which causes inconsistency in results in different studies. Methodological differences in studies might also explain the differences in results. One study examining the history of colostrum feeding revealed that no infant was completely deprived of colostrum, either partially or fully (Rizvi, 1993). A study

with 510 participating mothers showed that 95.1 percent infants received colostrum (Islam *et al.,* 2015). Another study conducted among 143 mothers in a rural setting of Matlab thana indicated that 90% infants received colostrum (Holman and Grimes, 2001). The latest BDHS did not collect information about colostrum feeding. However, the 2007 BDHS data showed a high rate (92%) of colostrum recipients among children (NIPORT *et al.,* 2009). It is suggested that initiatives such as breastfeeding promotion programmes, baby friendly hospital initiatives and essential newborn care practices might have a positive impact on colostrum feeding (MOHFW, 2012).

1.6.3 Prelacteal feeding (PF)

Introducing PF before the establishment of breastfeeding is widely practiced in rural as well as urban areas of Bangladesh and is a major barrier to achieving the recommendations of the Global Strategy for Infant and Young Child Feeding (IYCF) on exclusive breastfeeding practices (Mihrshahi *et al.,* 2007; Sharma and Byrne, 2016). Evidence suggests that giving prelacteal feeds has negative consequences such as delaying breastfeeding establishment, interfering with suckling and exclusive breastfeeding as well as exposing the baby to neonatal infections by introducing inappropriate and contaminated feeds (Khanal *et al.,* 2011; Moore *et al.,* 2012; Legesse *et al.*, 2014). In Bangladesh, universal prelacteal feeds are typically honey, water or sweetened water (sucrose) and mustard oil (Greiner, 1997; Tarannum and Hyder, 1998). These feeds are usually given on the tip of a finger or by spoon and these can be a direct cause of gastrointestinal infections by directly exposing infants to unhealthy contaminated feeds, spoons, hands or water (Ahmed, Rahman and Alam, 1996). Mihrshahi *et*

al. analysed the data from a multiple indicator cluster survey (MICS) and found that 66.6% infants received prelacteal feeds (Mihrshahi *et al.,* 2007). The results of an earlier study in 1996 amongst 2105 mothers in two rural areas of Bangladesh showed that the prevalence of PF was 85% and only 10% of mothers fed the colostrum (Ahmed, Parveen and Islam, 1999). The main reasons for giving prelacteal feeds were the discarding of colostrum, breast refusal, not enough breastmilk secretion immediately after birth and traditional beliefs (Tarannum and Hyder, 1998; Sundaram *et al.,* 2016). There is also the perception that colostrum is not sufficient volume for the infant and adding prelacteal feeds will stop the baby from crying (Tarannum and Hyder, 1998; Mishrshahi *et al.,* 2007). The feeding of honey or sweetened water is traditionally practiced and it is believed that these will build a pleasant personality in the future, strengthen the baby as well as clear the gut (Haider *et al.,* 1997; Sundaram *et al.,* 2016). Grandmothers and local TBAs play a key role in the decision making of PF in rural areas of Bangladesh (Hossain *et al.,* 1992, Ahmed, Rahman and Alam, 1996; Haider *et al.,* 2010; Belachew, Kahsay and Abebe, 2016, NEOVITA, 2016).

1.6.4 Exclusive breastfeeding (EBF)

Although the universality status of breastfeeding in Bangladesh is reported in many studies, the rate of exclusive breastfeeding during the first six months is not satisfactory. In the last demographic survey, nearly all the infants (96%) were breastfed during first year, but only 55% of infants under the age of six months were breastfed exclusively. This rate was further reduced to 32% for older infants aged between four to five months (NIPORT *et al.,* 2016). Since the 1993-94 DHS, an improvement in the exclusive breastfeeding remained largely unremarkable

increasing from 45% to 55% in 2014 (NIPORT *et al.,* 1994; NIPORT *et al.,* 2016). Globally, 40% of infants under the age of six months are exclusively breastfed (UNICEF, 2017). A study conducted in a rural area of Bangladesh showed lower rate of exclusive breastfeeding (36%) compared to the recent national rate (Joshi *et al.,* 2014; NIPORT *et al.,* 2016). Begum *et al.* found in the study conducted in Dhaka amongst 250 infants aged more than six months and less than a year showed a lower rate (24%) of exclusive breastfeeding up to the six months period. Of these infants, one-third had already received complementary feeds before six months (Begum *et al.,* 2013).

Like the rest of world, complementary foods are introduced at an early age in Bangladesh (Black *et al.,* 2013; Begum *et al.,* 2013). The introduction of breastmilk substitutes such as infant formula, water, juices, animal milk are far too common. In addition, poorly-timed introduction of semisolid, solid or soft foods, often of poor quality, inadequate in nutritional value are also common in Bangladesh (Kabir *et al.,* 2012; Manikam *et al.,* 2017). These inappropriate complementary feeding practices in rural as well as urban areas directly or indirectly signifies the high rate of child malnutrition, morbidity or mortality (Begum *et al.,* 2013). Evidence from previous studies shows that mothers have limited knowledge on the ideal CF time and the ideal food (Roy *et al.,* 2002; Bhandari *et al.,* 2004; Khatun and Siddiqua, 2010). Although CF is started earlier than the recommended time, foods given to the infants are often low in energy and contain only minimal amounts of nutrients, over diluted, not provided in a sufficient amount and not as frequently as should it be given. Infants are susceptible to malnutrition based on breastmilk as their prime source of nutrition during the most vulnerable periods between 6 months and 18 months, when breastmilk is

no longer sufficient to meet the rapidly growing child's demand (Bhandari *et al.,* 2004; Niger *et al.,* 2010). Mothers from low socioeconomic backgrounds had poor knowledge regarding infant feeding practices (Khatun and Siddiqua, 2010). In addition, an increased incidence of diarrhoea resulting from use of contaminated water and improper storage of food and water has also been reported during this period (Henry *et al.,* 1990; Ghuliani and Kaul, 1995; Rahman *et al.,* 2016). During the rainy season, when flooding occurs, there is more chances of contamination of food and water compared to the dry season (Goudet *et al.*, 2011). A study found that major wet foods such as cow's milk, powdered milk and boiled rice were all susceptible to contamination in the rainy season (Henry *et al.,* 1990).

The main reasons for introducing any kind of CF any time before six months were, a perception of insufficient breast milk, refusal of babies to suckle, being influenced by neighbouring mothers, relatives, lack of nutritious foods to the mother causing inadequate secretion of breastmilk and illness of the mother (Dyson, McCormick and Renfrew, 2005; Joshi *et al.,* 2014; Hackett *et al.*, 2015). A hospital-based study conducted in Dhaka with 400 mother-baby pairs shows that only 1% mothers had a sound knowledge about CF and 25 percent of the mothers' source of knowledge about feeding practices were their relatives (Paul *et al.,* 2014).

1.7 Breastfeeding world-wide

In a world of poverty, inequality and natural and human-made crises, breastfeeding still believed to be the pillar of long-term benefits for both babies and mothers. The slogan of World Breastfeeding Week (WBK) in 2018 reflected it, 'Breastfeeding: Foundation of Life' (World Alliance for Breastfeeding Action,

2018). The recommended infant feeding practices varies widely across the world, between different countries and between rural and urban affluent and underprivileged populations within the same country. Moreover, regular statistics for individual countries are seldom published routinely, thus comparisons are difficult to make.

According to UNICEF data 2017, globally 40% infants aged between 0 to 6 months were exclusively breastfed. In spite of initiatives and the importance of exclusive breastfeeding, the rates have increased slowly with a rise of just 7 percent in the last 15 years and the rate was 45% for breastfeeding initiation in the first hour (UNICEF, 2018). Noticeable improvements, in exclusive breastfeeding by 10% have been seen only in two regions, Eastern and Southern Africa and West and Central Africa. The infants that are breastfed in the first hour after birth ranges from around 40% in West and Central Africa and South Asia to about 63% in Eastern and Southern Africa (UNICEF, 2018). According to UNICEF, out of 140 million newborns born in 2015 globally, only 45% children were put to the breast in the first hour of life (UNICEF, 2016). A study conducted among five western countries found that breastfeeding initiation in some western countries remained below 80% (Bernard, Cohen and Kramer, 2016). In Europe, the position of the UK was the lowest in breastfeeding (World Breastfeeding Trends Initiative (WBTi), 2016). According to a 2010 Infant Feeding Survey (IFS), 81% of infants were breastfed in first hour (WBTi, 2016). However, a rapid fall-off was seen from birth with 55% breastfed at 6 weeks, 34% at 6 months and less than 1% of mothers exclusively breastfeeding at 6 months and this rate is even lower among White British, mothers who are younger and lived in the least deprived areas (McAndrew *et al.,* 2012). A study conducted in Norway in 2016

among infants / parents showed that 81% infants were breastfed at 5 months of age but only 16.4% were exclusively breastfed. Highly educated, multiparous mothers were unlikely to exclusively breastfeed or breastfed at 5 months (Bjørset *et al.*, 2018). Although Australia's infant feeding guidelines recommend exclusive breastfeeding up to around six months and continued until the age of 12 months, it's National Infant Feeding Survey statistics of 2010 showed that the rate of exclusiveness declined from 90% at birth to less than a quarter (15.4%) at the age of less than 6 months (Australian Institute of Health and Welfare, 2011). Likewise, the Canadian Maternity Experiences Survey found that 90% of Canadian mothers started breastfeeding, the rate of exclusive breastfeeding sharply decreased from the first week and reached 14.4% at the age of 6 months. Evidence from the survey also showed that the Baby-Friendly Hospital Initiative recommended (BFHI) in-hospital breastfeeding supportive practices were rarely implemented (Public Health Agency of Canada, 2009). Aggressive advertisements for formula feeds, a lack of appropriate instructions to health workers, lack of monitoring of breastfeeding in hospital, free promotional formula supply and inadequate support to the mothers were all contributing factors to the failing of breastfeeding (Chalmers, 2013).

Studies have found that exclusive breastfeeding practice is extremely low in South Africa (Between 8 to 12%, UNICEF South Africa, 2012; Siziba *et al.,* 2015). Between 1990 and 2008, under-five years mortality rate rose from 56 to 67 per 1000 live births (Chopra *et al.,* 2009). A lack of knowledge of the critical benefits of breastfeeding in association with fears of HIV transmission, among other factors were found to be the strongest predictor to early breastfeeding cessation (Doherty *et al.,* 2012). A meta-analysis of nationally representative Demographic

and Health Surveys (DHS) between 2010 and 2015 was conducted on 29 countries in Sub-Saharan Africa divided into four sub-regions, namely West Africa, East Africa, Central Africa and Southern Africa. The prevalence of early initiation of breastfeeding in first hour was more than 50% in the majority of the countries, which fulfils the WHO target by the year 2025; however, overall exclusive breastfeeding rate was less than 50% (WHO, 2014; Issaka, Agho and Renzaho, 2017). In Nigeria, colostrum is regarded as 'dirty milk' and harmful for infants. Several ritual practices such as cleaning up of mother before the onset of breastfeeding and prayers before breastfeeding commenced were also practiced (Davies-Adetugbo, 1997). Giving water and other concoctions to infants with the belief of quenching their thirst or welcoming them into the world was seen in a Ghanaian study ((Otoo, Lartey and Pérez-Escamilla, 2009). In many African countries, traditional beliefs, practices and rites encourage giving prelacteal feeds like water, herbs and 'teas' to breastfeeding babies (Semega-Janneh *et al.*, 2001; Shirima, Gebre-Medhin and Greiner, 2001; Nwankwo and Brieger, 2002). Exclusive breastfeeding is considered dangerous to the infant who is thought to require water to satisfy thirst and promote normal development among rural Yoruba communities (Davies-Adetugbo, 1997) in West Africa.

1.8 Breastfeeding in neighbouring countries

In the South Asian countries of Bangladesh, India, Nepal, Pakistan and Sri Lanka, the pattern of breastfeeding practices appears to be at a steady rate. However, due to the widening changes in lifestyles in urban and rural population groups over time, it is suggested that in urban areas, breastfeeding rates are declining rapidly (Laroia and Sharma, 2006). These changes have taken various forms,

from a steady decline in breastfeeding duration, to a revival in colostrum, avoidance of PF and exclusive breastfeeding. These countries have now adopted the international breastfeeding recommendations and programmes to educate people about ideal infant feeding practices. Because of the comparable socioeconomic condition and cultural practices, countries of South Asia have a similar breastfeeding picture.

In India, the picture of breastfeeding practices is similar to Bangladesh in that it is influenced by traditions and beliefs (Latha *et al.,* 2016). Mothers' knowledge regarding colostrum varies within this country. According to a study conducted in a hospital in south India, 56% mothers knew the beneficial effects of colosrum (Ekambaram, Bhat and Ahamed, 2010), and other studies shows that between 75-87% of mothers recognised the importance of colostrum (Tiwari and Singh, 2007; Goyal *et al.*, 2015). There were however some myths regarding colostrum. Some mothers believe that colostrum is indigestible and deleterious to the infant (Goyal *et al.,* 2015). Similar to Bangladesh and Pakistan, advice regarding discarding colostrum was received from relatives and friends (Tarannum and Hyder, 1998; Gul *et al.,* 2014; Goyal *et al.,* 2015). In Pakistan, discarding colostrum was more common in home deliveries conducted by a TBA (Fikree *et al.,* 2005; Fatmi, Gulzar and Kazi, 2005; Khadduri *et al.,* 2008; Gul *et al.,* 2014). Early initiation was not satisfactory, PF is prevalent and rate of exclusive breastfeeding varies in different parts of India (Kishore, Kumar and Aggarwal, 2009). The causes for delaying initiation were: mother-in-law's advice, perception of not enough milk came in first 1 to 2 days and colostrum is harmful (Gul *et al.,* 2014). The rate of PF varies from highest (92%) to very low (5.9%) (Kesterton and Cleland, 2009; Vijayalakshmi S, Patil and Datta, 2014). A study conducted in

a tertiary care hospital in India found timely initiation and PF rates were 36.4% and 16.9% respectively (Patel, Banerjee and Kaletwad, 2013). Results from other studies from other parts of India also reported the practice of giving prelacteal feeds (Das *et al.,* 2008; Kumar *et al.,* 2012; Joseph *et al.,* 2013). Studies from Nepal and Pakistan reported that the percentages of newborns that were introduced to prelacteal feeds were 80.4% and 75.2% (Karas *et al.,* 2012; Turab *et al.,* 2014). A Pakistani study conducted in Karachi shows 48% of infants breastfed in the first 2 hours of birth, 43% discarded the colostrum and exclusive breastfeeding rate was only 26%, even though almost all infants (97%) were breastfed. Common prelacteal feeds were honey, ark-e-gulab (rose water), herbs, green tea, saunf (aniseed), water, sweetened water, gripe water and formula (Gul *et al.,* 2014). Home deliveries by TBAs are common in South Asia including Bangladesh, India, Pakistan and Nepal.

According to the 2011 Nepal Demographic and Health Survey, the rate of early initiation was 66.4% (Adhikari *et al.,* 2014), but this percentage varies according to the area such as rural part of Nepal; 3.4% in first hour that increased to 56.6% in 24 hours (Karas *et al.,* 2012). Common prelacteal feeds in Nepal were honey, water, ghee (clarified butter), sugar, powdered milk, turmeric and ginger. In Nepal, giving a bath immediately after birth to a baby and a body massage with mustard oil is almost universal and resembles practices in Bangladesh, India and Pakistan (Darmstadt and Saha, 2002; Fatmi, Gulzar and Kazi, 2005; Khadduri *et al.,* 2008; Moran *et al.,* 2009; Gupta *et al.,* 2010; Karas *et al.,* 2012; Gul *et al.,* 2014). While the WHO recommends a delaying of at least 4-6 hours, preferably 24 hours to bath a newborn, this practice is not followed and is considered a barrier to EIBF in these countries (Parlato, Darmstadt and Tinker, 2004; Fikree *et*

al., 2005; Sreeramareddy *et al.*, 2006; Barnett *et al.,* 2006). Because of the widely practiced PF, a suboptimal rate of breastfeeding is seen in the majority of Pakistani mothers (Khadduri *et al.,* 2008; Hazir *et al.,* 2013; Gul *et al.,* 2014). A different picture of breastfeeding practice is seen in Sri Lanka. Almost all infants in Sri Lanka (99.4%) are breastfed and unlike other South Asian countries, early initiation was as high as 90.3% and just 1.9% mothers discarded their colostrum (Department of Census and Statistics, 2016). According to the World Breastfeeding Trends Initiative assessment, Sri Lanka is the number one country for optimal breastfeeding practices (WHO Sri Lanka, 2016). However, the growth of the formula feed industry has made the status challenging. A clinic-based study conducted in Sri Lanka among mothers with infants aged between 4 to 12 months in 2006 found that 62% of infants received feeds via a bottle and 23% of infants received formula and the rate of exclusive breastfeeding declined from 61.6% at 4 months to 15.5% at 6 months (Agampodi *et al.,* 2007).

1.9 Breastfeeding promotion programmes in Bangladesh

Breastfeeding initiation and the continuation for longer duration was traditionally practiced in Bangladesh. However, late initiation, discarding colostrum, a practice of traditional feeds such as prelacteal feeds, early or late weaning have acted as barriers to receive the maximum benefits from breastfeeding which led to infant mortality rate (IMR) as high as 140 per 1000 live birth in 1980 (BBF, 2006). In April 1989, the government of Bangladesh in association with international organizations including UN agencies launched a Campaign for Protection and Promotion of Breastfeeding (CPPBF) for the first time and initiated steps to work against the delayed initiation of breastfeeding, introduction of prelacteal feeds,

early complementary feeding and the low rates of exclusive breastfeeding (BBF, 2006). UNICEF financially supported this initiative from 1989 to 1995 through the Institute of Public Health Nutrition (IPHN) (BBF, 2016). This campaign coexisted with the WHO/UNICEF launched BFHI that provided training for health professionals in breastfeeding management skills (UNICEF and WHO, 2009) and ten steps for successful breastfeeding practices was endorsed in hospitals in the 1990s (Mangasaryan *et al.*, 2012). Later in 1991, at the 1st National conference on breastfeeding, the government announced the campaign as a national authority by signing the Dhaka Declaration for protection, promotion and support of breastfeeding and optimal IYCF and maternal nutrition (MN). Later, the CPPBF became known as the Bangladesh Breastfeeding Foundation (BBF) (BBF, 2006). Since then the BBF has continued to work to improve the breastfeeding practices and it's outcomes in Bangladesh. Colostrum feeding has improved from almost it being universally discarded to it universally initiated (BBF, 2006; BDHS, 2014). Noticeable improvements were seen in IMR and under five mortality rate, 87 and 133 per 1000 livebirths respectively in 1993 to 38 and 46 per 1000 livebirths respectively in 2014 (MOHFW *et al.,* 2015). Apart from monitoring infant feeding practices, infant, child and maternal nutrition status, a few more initiatives such as the regulation of marketing for breastmilk substitutes, extension of paid maternity leave from 3 months to 4 months were established by BBF (BBF, 2006). BBF also adopted the shifted WHO recommendation of exclusive breastfeeding from 4 months to 6 months as an international norm in 2002 (WHO and UNICEF, 2003).

1.10 International initiatives on breastfeeding

Before the nineteenth century, infants who were not fed breastmilk were not likely to survive. Artificial feeding was considered being a poor substitute to breastfeeding (Crowther *et al.,* 2009). The picture started to change by the middle of the twentieth century. Bottle-feeding increasingly became popular in many industrialized countries. Although, in the first half of the twentieth century researchers and clinicians became concerned over the high rates of infant mortality and morbidity and they started to agree as 'breast is best', they also insisted that with modern medicine, modern technology, clean water and a careful mother, bottle-feeding was satisfactory for most infants (Holt, 1957). Breastmilk substitute such as Liebig's food and Nestlé's Milk Food entered the market in the second half of the nineteenth century by overwhelming advertising and by the 1920's bottle-feeding had become widely accepted as a mode of infant feeding. Changes in modern society brought more women to outdoor activities and they welcomed the convenient, safe and healthy alternative to mother's milk (Crowther *et al.,* 2009). Breastfeeding initiation and duration decreased in the first decades of 1900s, initiation rate nearly 70% in 1911-1915 to nearly 50% in the 1926-1930 which further declined to only 25% in 1946-1950 cohort (Hirschman and Butler, 1981). In the 1970s, considerable international effort was taken to limit the marketing of widespread infant formula and in 1981, the International Code of Marketing of breastmilk Substitutes was established (Wright and Schanler, 2001). In 1989, a U.S. surgeon tried to re-establish breastfeeding culture and urged all the experts to encouraged women to breastfeed (Obermeyer and Castle, 1996).

In 1990, UNICEF and WHO announced the 'Innocenti Declaration' on the Protection, Promotion and Support of Breastfeeding by defining optimal infant

feeding as exclusive breastfeeding from birth through 4-6 months with continued breastfeeding into the second year with appropriate and adequate complementary foods at 6 months (UNICEF, 1990). In the following 10 years a great deal had been accomplished in improvement in pattern of breastfeeding and the 'Innocenti Declaration' set the stage for breastfeeding programming approaches that were used in 1990s. In addition, the Global Strategy for IYCF was endorsed in 2002 by the World Health Assembly and the UNICEF and the BFHI was established. The goals of BFHI were to: i) Improve breastfeeding practices within maternity wards in the health system; ii) Educate all health workers who were trained in these facilities concerning the importance and basic skills of breastfeeding support; and iii) Enforce within facilities the principles of the International Code of Marketing of breast-milk Substitutes. All countries were called to establish the 'Ten Steps to Successful Breastfeeding' to improve breastfeeding by providing full support to the mothers (UNICEF, 2005) (Ten steps of successful breastfeeding can be seen in Appendix B).

The BFHI was highly successful in increasing exclusive breastfeeding in many regions and continued to be effective even in the advertising of commercial infant formula and HIV prevalent areas (WABA, 2000; UNICEF and WHO, 2009). Based on evidence, one of the major policies changed was the shift to a recommendation of exclusive breastfeeding for first six months for optimal outcomes. While the 'Innocenti Declaration' referred to six months of exclusive breastfeeding in the preamble, the text of the Declaration itself referred to four to six months (UNICEF, 1990). After reviewing all the findings by an expert panel in 2001, it was concluded that there was no evidence of any benefit in giving others food besides breastmilk prior to 6 months (WHO, 2002b). As a result, the WHO

shifted the recommendation of four to six months, to six months of exclusive breastfeeding. The ‘Innocent Declaration’ also promoted appropriate and adequate complementary feeding beginning at 6 months with continued breastfeeding for up to two years and beyond. The global strategy recommended that to sustain the gains made by practicing exclusive breastfeeding for the first six months of life, interventions need to extend into the second half of infancy and beyond by giving safe and adequate complementary foods with locally available foods while maintaining frequent breastfeeding.

Chapter Two:

Aims, objective, hypothesis and rationale of the study

Chapter 2: Aims, objective, hypothesis and rationale of the study

2.1 Aims

This study was designed, implemented and analysed with respect to a breastfeeding advice intervention delivered by TBAs who lived within the target area. Thus the main aims were:

1. To assess the impact of a TBA-led intervention on the prevalence of women practicing exclusive breastfeeding for the first six months.

2. To evaluate the impact of a TBA-led intervention on the prevalence of early neonatal feeding (ENF) and prelacteal feeding (PF).

3. To assess the impact of a TBA-led intervention on the prevalence of additional feeding (ADF) before first six months after birth.

4. To evaluate the impact of a TBA-led intervention on the prevalence of diarrhoeal diseases, malnutrition and infant mortality in the rural sample.

2.2 Objective

To train a group of TBAs to deliver an education intervention to increase awareness of optimal breastfeeding practices among mothers in rural Bangladesh and to quatify the impact of the education programme.

2.3 Hypothesis

Null hypothesis= Intervention has no impact on maternal breastfeeding practice, the infant's growth and infection.

2.4 Rationale of the study

The study was designed to test whether TBAs can have an impact on early initiation of breastfeeding, avoidance of early neonatal and prelacteal feeding and the practice of exclusive breastfeeding for the first six months after birth amongst mothers in a rural community. Mothers were provided advice and support during the antenatal and postnatal periods through home visits by the TBAs. Breastfeeding is a behaviour predominantly associated in the developing world with comparatively less educated mothers who are from limited advantageous backgrounds. It is possible that women from rural areas, lack support networks that may be already functioning in other areas due to limited healthcare facilities.

Previous research shows that an intervention providing postnatal breastfeeding support and advice for mothers improves their interest and confidence which then enables them to more likely to be successful. The study was conducted in the villages of Dohar Upazila where home delivery was common. Like the rest of Bangladesh, breastfeeding was common in Dohar. However, the common practice of early neonatal and prelacteal feeding can act as a key barrier to exclusive breastfeeding practice. Mothers from a rural community lack the concept of exclusive breastfeeding. They tend to believe that prelacteal feeds do not cause any harm to the newborn and instead these feeds are necessary for the wellbeing of the infant (Sundaram *et al.,* 2016; Swigart *et al.*, 2017). Feeding

water does not harm the exclusive status of breastfeeding to the infant and satisfies thirst. Research shows that vulnerable group such as rural adolescent mothers who are uneducated or less educated struggle to breastfeed their first-born (Hakett, 2015b; Muelbert and Giugliani, 2018). Moreover, hospital-based breastfeeding promotion programmes are unlikely to reach the rural mothers who have a home birth. Rural mothers mostly depend on their elder relatives and TBAs to obtain knowledge regarding infant feeding and child rearing (Madhu, Chowdary and Masthi, 2009). Thus, it seemed essential to provide information on breastfeeding through a sustainable way to reach the rural mothers at their home. For this reason, the intervention was conceived as a means of providing information in a locally acceptable manner. It was assumed that information provided by local women who helped with home deliveries known as TBAs could have a strong positive effect. It was also assumed that this local resource-based intervention might have a tenable effect in the community, whereby the effects of TBAs' improved breastfeeding knowledge which would escalate beyond the intervention period. As TBAs are local and have been assisting home deliveries for a long time, it was believed that these TBAs might raise awareness about ideal infant feeding practices during assisting home deliveries in the future. This intervention aimed to deliver advice to all women in the intervention group who had either TBA assisted delivery or a different means of delivery.

Chapter Three: The pilot study

Chapter 3: The pilot study

3.1 Aims of the pilot study

1. To engage and consult with health professionals in Dohar.

2. To identify the level of knowledge and capabilities of the HAs and CHCPs to conduct the interviews in the main study.

3. To obtain an estimated number of pregnant women per week attending the clinic.

4. To gather background information on the local community relating to demography and infant feeding practices.

5. To pilot the questionnaires briefly to determine what the questionnaires were asking and to identify any ambiguous questions in the antenatal and postnatal questionnaires; to determine the frequent answers of the open-ended questions which would enable the formulation of closed questions in order to make the questionnaire easier to complete and enable the data to process for statistical analysis.

The antenatal and postnatal questionnaires were piloted on two occasions between 26th October to 10th November 2013 and 30 March to 7 April 2014 at four sites in Dohar: antenatal outdoor patient department (OPD) and immunization section of Dohar UHC, CCs and home visits.

3.2 Study design

The pilot study involved pregnant mothers who gave consent for interview during a home visit or antenatal visit as well as mothers with babies attending the EPI schedule. This was to observe their experiences of breastfeeding and to monitor the support and advice mothers received during their breastfeeding journey until their babies were six months old. The focus of this trial was to identify common breastfeeding practices and factors that predicted early cessation of exclusive breastfeeding. Antenatal and postnatal questionnaires were used in this study. This pilot study helped to understand behaviour in order to develop breastfeeding messages for the main study.

3.3 Discussion with health professionals

Before conducting the pilot study, a meeting with the Upazila health complex`s UH&FPO, nurses, doctors and health workers was arranged to discuss the project. This meeting provided apprehension about the health and social and other situation of these areas and health workers' experiences working in these areas. They also provided ideas about the approximate number of potential pregnant women for the data collection. A nurse who worked in the UHC supplied information about pregnancy and antenatal check-up of previous years from the computer records. Health services providers acted as the key informants of current health issues of areas where they work.

3.4 Study methodology

The researcher together with a health assistant conducted this pilot study. The antenatal and postnatal questionnaires were completed at four sites, antenatal OPD of Dohar UHC and home visit, the immunization section of UHC and a community clinic. The antenatal interviews were conducted at the OPD where women visited for their routine antenatal check-up in Dohar UHC as well as during home visits. The postnatal interviews were conducted in the immunization section of the UHC, Dohar and in the community clinic.

3.5 Sample size

For the antenatal interview, 14 pregnant women with a gestational age of 28 weeks and beyond were interviewed from 5th November to 10th November 2013. 10 women came from the ANC OPD in UHC and 4 came via home visits for the interview. For the postnatal interview, infant feeding histories from 55 mother-infant pairs were collected. Infants were aged between birth and 12 months. The postnatal pilot study was conducted from 30th March to 7th April 2014 in the EPI immunization section in Dohar UHC and in one CC. Those who gave informed consent were selected for the antenatal and postnatal pilot study. All mothers agreed to participate in the study and complete the questionnaires.

3.6 Inclusion criteria:

For the antenatal questionnaire, expectant mothers with gestational age 28 weeks and beyond who were willing to participate were interviewed. For the

postnatal questionnaire, mothers with infants aged between 0 to 12 months who gave their consent were interviewed.

3.7 Exclusion criteria:

Mothers not giving consent were excluded from the interview session. However, no mother refused to give consent.

3.8 Training of the health assistant (HA)

The researcher trained and supervised the HA who interviewed the mothers at home and in the EPI centre or OPD of the UHC for the pilot study. The HA was informed about the research project and her expected role and the data collection proceeded in an ethical and reliable manner. The researcher interviewed participants with the HA shadowing the researcher. The researcher also observed the HA during interviewing the mothers. The HA was also trained to weigh the infants.

3.9 Designing and piloting the questionnaires

3.9.1 Antenatal questionnaire

The antenatal questionnaire (PQ1) was designed to obtain necessary information on feeding intention, influences and previous feeding behaviour. Demographic details including age, literacy, occupation, parity, age of marriage and first pregnancy, previous breastfeeding history, breastfeeding support and other demographic characteristics (i.e. family structure, husband's occupation, monthly expenditure, drinking water facilities etc) were recorded. The antenatal

questionnaire was predominantly of a closed one, where the mothers answered the question in the way of which answer is correct for them and the interviewer circled the answers. At first the questionnaire was produced in English, and then translated to Bengali to make it easily understandable for HA who helped to collect the data. Copies of sample antenatal questionnaire were assessed by the health professionals of UHC.

3.9.2 Postnatal Questionnaire

The pilot postnatal questionnaire (PQ2) was designed similarly to the antenatal questionnaire where both closed and open type of questions with possible multiple choices answers were added. To assess the suitability of the content of the questionnaire, copies of a sample postnatal questionnaire were circulated amongst doctors and other health professionals. The pilot questionnaire was circulated in both English and Bengali languages according to appropriateness. This also enabled the project to be discussed and suggestions for improvement to be incorporated. Everyone's feedback was assessed, and changes were made where needed. In the questionnaire, closed-ended questions were used with a list of possible responses.

The completion time of each questionnaire was between 5-7 minutes. General observations were also recorded on the completion of the questionnaire. Reliability of each question and the answer options were observed.

3.10 Results

3.10.1 Antenatal

Participants' general characteristics are presented in Table 3.1. Mean (±SD) age of the mothers in the pilot study was 24.5±4.9 years and mean age of marriage was 16.3±1.9 years. Mean age of first pregnancy among the participating mothers was 18.1±2.7 years. The majority of the mothers were identified as literate who were able to sign their name. All mothers stayed at home and contributed to household works.

Table 3.1: General characteristics of 14 pregnant women in pilot study

Characteristics	**(n=14)**
	Mean±SD
Age (years)	24.5±4.9
Age of marriage (years)	16.3±1.9
Age of 1st pregnancy (years)	18.1±2.7
Education	freq. (%)
Literate	11 (78.6%)
Illiterate	3 (21.4%)
Occupation	
Household works	14 (100%)
In field or others	0

Table 3.2 shows the husband's and other demographic characteristics. Half of the husbands lived in foreign countries for work. Women who lived with their in-laws and their children counted as a joint family (family members >5). 57.1% women in the study came from a joint family and the remaining belonged to a nuclear family (family members<5). The majority of the families in the study had access to a tube well for drinking water while the remaining families collected drinking water from a tap placed at home or from the river, pond or surface water.

More than half of the families' monthly expenditure was between 5,000 to 10,000 Taka per month.

Table 3.2: Husband's occupation and other demographic characteristics in pilot study

Demographic characteristics	**(n=14)** freq. (%)
Husband`s occupation	
Expatriate worker	7 (50%)
Rickshaw puller	2 (14.3%)
Small business	2 (14.3%)
Driver	1 (7.1%)
Others	2 (14.3%)
Family structure	
Joint family	8 (57.1%)
Nuclear family	6 (42.9%)
Source of drinking water	
Tap water placed at house	4 (28.6%)
Tube well	8 (57.1%)
River or pond water	2 (14.3%)
Monthly family expenses (Taka)	
<5,000	4 (28.6%)
5,000 to 10,000	4 (28.6%)
>10,000	6 (42.9%)

The mothers' obstetric histories are presented in Table 3.3. The majority of the mothers were multigravida and planned for a home delivery. Although the majority of the pregnant women had at least one antenatal check-up, few women completed 4 or more visits.

Table 3.4 shows that the most common piece of breastfeeding advice reported by mothers was their baby needed to be breastfed (35.7%) from birth to two years and the most common source of advice was either their mother or mother-in-law (64.3%).

Table 3.3: Obstetric histories reported during the antenatal interview in pilot study

Characteristics	**(n=14)**
	freq. (%)
Pregnancy type	
Primigravida	4 (28.6%)
Multigravida	10 (71.4%)
Preferred choice of delivery	
Home delivery	12 (85.7%)
Delivery at health institute	2 (14.3%)
Antenatal check-up	
Attended at least once	**(n=10)**
Once	1 (10%)
Twice	6 (60%)
Three times	0
Four times or more	3 (30%)
Never attended	4 (28.6%)

Table 3.4: Breastfeeding advice and feeding intention in pilot study

Breastfeeding advice	**(n=14)**
	freq. (%)
Baby needs to be fed colostrum and breastfed until 6 months	1 (7.1%)
Start breastfeeding from first day of birth and only breast milk till 6 months	1 (7.1%)
Feed your baby breast milk as long as possible	2 (14.3%)
Colostrum is good and protects against diseases	1 (7.1%)
No substitute of breastmilk	4 (28.6%)
Baby needs to be breastfed after birth upto 2 years	5 (35.7%)
Source of breastfeeding advice	
Health care professional	2 (14.3%)
Mother / mother-in-law	9 (64.3%)
Elder relatives / TBA	5 (35.7%)
TV / Radio	2 (14.35)
Others	0

Total number of responses is more than the total number of participants because of multiple responses

TBA= Traditional birth attendant

Table 3.5 shows the histories of previous babies' feeding practices. Colostrum feeding and breastfeeding were universal and the duration of breastfeeding was 18 months and beyond. Reasons for feeding colostrum were also identified. Introducing PF was also common among mothers. The mothers reported that their baby was thirsty and couldn't receive any breast milk in the earliest period. The majority of mothers added fluid, semisolid or solid earlier and they thought that feeding only breast milk was not sufficient and her baby needed more.

Table 3.5: Feeding history of previous youngest child of 10 multipara mothers in pilot study

Feeding history of youngest child	**(n=10)**
	freq. (%)
Colostrum	**10 (100%)**
Reason for feeding colostrum	
Not aware of its's benefits, advised by elder relatives	5 (50%)
Colostrum is good for baby	4 (40%)
Colostrum is nutritious	1 (10%)
Prelacteal feeding	**8 (80%)**
Introduction of ADF (fluid, semisolid, solid)	**8 (80%)**
At 2 months	7 (87.5%)
At 3 months	1 (12.5%)
Reasons for introducing fluid, semisolid or solid	
Breastmilk is not enough	7 (87.5%)
Baby needed more	1 (12.5%)

ADF=Additional feeding

3.10.2 Postnatal

Infants' characteristics are presented in the Table 3.6. Infants were aged between 0 to 12 months and approximately half of them were below age six months and the proportion of male infants was slightly higher than female. 32.7% of deliveries were conducted at home. Birth weight ranged between 2.0 kg to 4.0 kg with a mean weight of 2.84±0.5 kg. The percentage of low birth weight (LBW) (<2.5 kg) in the pilot study was 20.6%. Infants' weight during the interview session was also measured and infants weighed between 3.0 kg to 12.0 kg with a mean of 6.7±1.7 kg.

Table 3.6: Characteristics of the infants in the postnatal interview in pilot study

Age group	**(n=55)**
	freq. (%)
<6 months	28 (50.9%)
6 months and older	27 (49.1%)
Mean age 5.9±3.4 months	
Gender	
Male	29 (52.7%)
Female	26 (47.3%)
Place of birth	
Home delivery	18 (32.7%)
At hospital or clinic	37 (67.3%)
Birth weight	**(n=34)**
<2.5	7 (20.6%)
2.5 and over	27 (79.4%)
Mean weight 2.84±0.47 kg	
Weight during the interview	**(n=55)**
mean weight 6.7±1.73 kg	

Breastfeeding initiation and practices collected during postnatal interview are presented in the Table 3.7. Breastfeeding was universal and the majority of the infants (89.1%) received colostrum. Early initiation of breastfeeding in the 1st hour after birth was reported by 32.7% of mothers with the remaining mothers starting breastfeeding within 6 hours or later.

In Table 3.8, a high prevalence of PF in the infants is shown and common prelacteal feeds were infant formula (53.2%), honey (48.9%) and sweetened water (38.3%). The main reasons for adding PF were baby could not suckle, to stop baby crying and to satisfy hunger. Health care professionals, mothers or mothers-in-law and TBAs were the prime decision makers for adding PF.

Table 3.7: Breastfeeding history of 55 infants in pilot study

Colostrum feeding	**(n=55)**
	freq. (%)
Received colostrum	49 (89.1%)
Time when breastfeeding established	
In first hour	18 (32.7%)
Within 6 hours	11 (20%)
Within 24 hours	5 (9.1%)
In 2nd day & after	21 (38.2%)

Table 3.8: Prelacteal feeding history in the 1st week postnatally in pilot study

Prelateal feeding history	**(n=47)**
Types of PF	freq. (%)
Infant formula	25 (53.2%)
Honey	23 (48.9%)
Plain water	7 (14.9%)
Honey & Mustard oil	0
Water sweetened with sugar or crystalline sugar	18 (38.3%)
Diluted cow`s, goat's milk or powdered milk	9 (19.1%)
Others	4 (8.5%)
Reasons for introducing PF	
Baby couldn`t suckle	27 (57.4%)
To satisfy hunger	17 (36.2%)
To make sweet voice	11 (23.4%)
Colostrum insufficient	0
To stop baby crying	18 (38.3%)
Mother ill	0
To prevent cold and cough	8 (17%)
Traditional beliefs	5 (10.6%)
Others	5 (%)
PF advised by	
Health care professional	21 (44.7%)
TBA	17 (37.2%)
Mother / mother-in-law	32 (68.1%)
Others	12 (25.5%)

Total number of responses is more than the total number of participants because of multiple responses

PF= Prelacteal feeding; TBA= Traditional birth attendant

Table 3.9 shows that the majority of mothers added water or fluid as feeds after feeding breastmilk. The reasons to add water or fluids were breastmilk was not enough (68.4%), to satisfy hunger and thirst (68.4%), to stop baby crying (31.6%) and baby couldn't suckle. The most common semisolid feed was Shuji (Semolina) and mostly due to the mother's perception of insufficient breastmilk and increased need of the infant.

In Table 3.10, 40 mothers reported that they did feed something additional other than breast milk in the previous 24 hours from a 24-hour recall.

Table 3.11 shows the illnesses of the infants since birth reported by the mothers. Among the 55 mothers, 5 reported that their babies did not suffer from any illness since birth.

Table 3.9: ADF (fluid, semisolid or solid) reported by 38 mothers in pilot study

Time when water or fluid introduced	**(n=38)**
	freq. (%)
In 1st 7 days	25 (65.8%)
1 month and later	13 (34.2%)
Types of fluid	
Infant formula	27 (71.1%)
Plain Water	17 (44.7%)
Water sweetened with sugar or crystalline sugar	9 (23.7%)
Diluted cow's or goat's milk or powdered milk	12 (31.6%)
Others	0
Reasons for starting fluid	
Breastmilk is not enough	26 (68.4%)
To satisfy hunger/thirst	26 (68.4%)
To stop baby crying	12 (31.6%)
Baby could not suckle the breast	11 (28.9%)
Ill health of mother	2 (5.3%)
Family decision	1 (2.6%)
Others	1 (2.6%)
Time when semisolid or solid introduced	(n=30)
1-2 months	5 (16.7%)
3-4 months	5 (16.7%)
5-6 months	17 (56.7%)
7 months and beyond	3 (10%)
Types of food (semisolid or solid)	
Shuji (semolina)	27 (90%)
Khichuri	7 (23.3%)
Family food	4 (13.3%)
Others	18 (60%)
Reasons for adding semisolid or solid	
Family decision	5 (16.7%)
Breastmilk is not enough	27 (90%)
Increased need	13 (43.3%)
Others	5 (16.7%)

ADF= Additional feeding

Table 3.10: A 24-hour recall of feeding other than breastfeeding in pilot study

Types of food in 24-hour recall	(n=40)
	freq. (%)
Plain Water	11 (20%)
Fruits / fruits juices	4 (10%)
Infant formula	8 (14.5%)
Diluted cow's or goat's milk, powdered milk	7 (12.7%)
Shuji (Semolina)	17 (30.9%)
Khichuri	2 (3.6%)
Others	7 (12.7%)

Total number of responses is more than the total number of participants because of multiple responses

Table 3.11: Illnesses of infants since birth reported in pilot study

Types of illnesses	(n=50)
	freq. (%)
Common cold	45 (90%)
Fever	21 (42%)
Diarrhoea	19 (38%)
Pneumonia	10 (20%)
Others	11 (22%)

Total number of responses is more than the total number of participants because of multiple responses

3.11 Interpretation of the findings

Overall, the aims of the pilot study were achieved. This pilot study was mainly conducted in the Dohar UHC, which allowed to engage and consult with the health professionals working in the antenatal and paediatric OPD of the health complex. The pilot study gave the opportunity to engage with one HA who was placed in the UHC and helped in every step of conducting the pilot study. The HA in the EPI section also helped to weigh the infants. Working with her also gave an idea about the knowledge and working pattern of the HAs in the rural settings. In addition, confidence was gained with respect to the ability of the HA to conduct the interviews, collect measurements and contribute overall to the data collection process. In this small study, interesting observations were obtained, giving an insight to the typical feeding practices of rural mothers in Bangladesh. There was a chance to consult with the doctors specifically in the antenatal, paediatric and family planning doctors who travel to rural settings. Moreover, the UH&FPO of the UHC gave permission to set up the entire pilot study and allowed to locate in the OPD in the antenatal and EPI section next to the doctors and to interviewing the mothers. The nurse helped to get access to the data in the computer storage. Looking at the data of attending antenatal women helped to obtain an estimated number of pregnant women in a week attending UHC and in community clinics. The sample size of fourteen antenatal mothers and fifty-five postnatal mother-infant pairs in the pilot study also provided an indication of the time required to collect the data and the time needed when the study was to be scaled up to the final sample size. Confidence was gained to ensure that the main study was feasible within the time limits of the study. Most importantly, confidence was

gained from the use of the questionnaires such that valid data in the main study could be obtained.

Overall, this pilot study generated very useful information about demography, infant feeding practices and reasons underlying the mothers' decision in her feeding. Based on the outcomes of the pilot study, a better understanding of the demographics in Dohar Upazila and feeding practices of infants in Dohar was gained. According to employment practices, the majority of male members worked in foreign countries for earnings, which was quite different from other parts of Bangladesh. Based on outcomes of the pilot questionnaires it was clear that some parts of the questions needed to be modified for the intervention study. In the intervention, the questionnaires were more organized, understandable and accurate. The pilot study provided a better understanding of approaching the women and to win the trust and to get them involving in the study. Thus, it was agreed to proceed with the main study based on these outcomes of the pilot study.

Chapter Four: Methodology

Chapter 4: Methodology

4.1 Intervention

The intervention was designed to encourage EIBF, avoidance of ENF and PF especially the traditionally practiced and potentially harmful PF such as the use of honey and sweetened water. In addition, the aim was to encourage the practice of exclusive breastfeeding for the first 6 months after birth and to discourage non-exclusive breastfeeding by delivering breastfeeding messages developed for the intervention. Breastfeeding promotional programmes are mainly health institute based which may not have the impact of changing the infant feeding picture in rural areas of Bangladesh. The reason for this is that the majority of mothers do not go to hospital for delivery but instead prefer home deliveries. For the home deliveries, TBAs are more likely to have a great influence on breastfeeding and infant feeding practices in rural areas of Bangladesh. This study trained TBAs to deliver breastfeeding messages through home visits in a rural setting.

4.1.1 Traditional birth attendants (TBAs)

In rural parts of Bangladesh, home deliveries are performed by TBAs either government trained or untrained. In this study, ten TBAs were recruited who assisted home deliveries in villages around the Modhur Chor area of Dohar Upazila. These TBAs were trained to encourage mothers in the intervention group for EIBF, to stop practicing ENF and PF, especially the traditionally practiced honey and sweetened water feeding and to practice exclusive breastfeeding for the first 6 months. They routinely visited their allocated mother-infant pairs at home both pre and postnatally.

4.1.2 Health Assistants (HAs) and Community Healthcare Providers (CHCPs)

A HA routinely visits homes twice a week in her allocated areas which is her usual duty and she is based on the CC in her area where she would work with a CHCP. A CHCP works in a CC and is trained to see patients, give prescribed medicines, immunize infants and children and refer the patient to UHC when appropriate. Two HAs and two CHCPs who worked in and under Modhur Chor (Intervention centre) and West Moura (Control centre) CCs participated in the study to collect data and to measure the weight and length of the infants during the routine EPI immunization sessions.

4.2 Study area

The study was carried out in Dohar Upazila in the Dhaka district which is 60 km from Dhaka city. Dohar is linked to Dhaka by road and river. With an area of 121.41 km^2, around 226,493 people live in Dohar Upazila (Ministry of Housing and Public Works (MOHPW), 2015). Upazila is situated in the southern-most part of Dhaka district and divided into 8 unions and 1 porosova, 93 mauzas/mahallas and 139 villages (Ministry of Women and Children Affairs (MOWCA), 2007). Dohar has one UHC with 50 beds and 13 CCs (MOHFW, 2016). The literacy rate in Dohar is 65% (MOHPW, 2015) compared with the national average of 72.76% in 2016 (Unesco Institute of Statistics, 2016). The majority of the people in Dohar are farmers (47.23%) and 94.78% are Muslims (MOWCA, 2007).

In Dohar Upazila, while there were thirteen CCs in 2016 (MOHFW, 2016) when data were collected for this study there were, however eleven CCs. The pilot

study and the intervention study were conducted in Dohar UHC and in the three CCs in Dohar. Modhur Chor and West Moura CCs located to the north-west and east to Dohar Upazila were selected as the places for recruiting and interviewing mother-infant pairs while they visited for their infants' routine immunization. Each CC serves the people from villages around the CC where people can get free primary healthcare facilities within walking distance. Dohar Upazila was chosen because of the different social classes people live in the villages around Dohar. People from different social classes to landless who had been living in government residential project in Dohar lived in the villages around Modhur Chor and West Moura CCs. The areas shared similar demographic and social characteristics. There was no guarantee, however, the two communities were identical with respect to all relevant factors or that they would remain unchanged during the project.

One of the objectives of this research was to collect data through the EPI immunization schedule, to record weight and length of the infants on a regular interval so a CC or a health complex where mothers with their infants would visit at a regular interval was desirable. Dohar Upazila is one of the successful Upazilas where EPI success was reported as 100% in 2013 (MOHFW, 2014). Evidence showed that mothers still prefer home deliveries (naturally) assisted by TBAs and which keep them away from pre and postnatal facilities provided in the hospitals and clinics (MOHFW, 2014). TBAs played a key role in the intervention. Many mothers who had home deliveries missed all the institute-based facilities, but a regular vaccination visits is the only medium to get access to these mothers with their infants on a regular basis. The selection of villages within this Upazila was also dependent on whether the people were locally settled or not. The

maximum population in Dohar lived in their own permanent home or in the government established residential projects.

Figure 1: Location of Dohar in Bangladesh

Source : https://en.wikipedia.org/wiki/Dohar_Upazila

Figure 2: Map of Dohar

Source: https://www.thebangladesh.net/upazilas-of-dhaka/dohar-upazila.html

4.3 Sample size

Approximately 400 participants with 200 mother-infant pairs in each CC were expected to be recruited to the study. According to the Dohar UHC health bulletin 2014, from January to December 2013, the number of registered pregnant women who visited to the UHC or any of the community clinics at least once were 14,165 and these were 12 government health centres including UHC and CCs in Dohar Upazila. Those pregnant women who had private clinic services were not included in the counting. However, the number of women who did not visit any of the CCs or UHC before or after delivery (MOHFW, 2014) were also not counted. Finally, it was expected that a minimum of 280 pregnant mothers in their third trimester would be found in one month in those who visited the UHC or any of the CCs at least once in their whole pregnancy period (detail can be seen in Appendix Q). A minimum of 400 mothers were expected to be recruited from Modhur Chor and West Moura clinics. The recruitment process of the pregnant women continued from December 2014 until September 2015. A total of 258 prenant women in their last trimester were recruited and divided into 122 women in the control group based on Moura CC and 136 women in the intervention group based on Modhur Chor CC during the antenatal period. An additional eleven pairs were recruited from the first postnatal visit (Q2) and finally a total number of 265 mother-infant pairs completed to the end of the study. During the recruiting period, 56 pregnant women from both groups were willing to participate in the study but were not included. The reasons for exclusion are given in Table 4.1.

Table 4.1: Reasons for not recruiting 56 women who were interested to participate in the study

Reason	Control (n=29)	Intervention (n=27)
Not planned to stay in the same place of residence for the study period	12	9
Refused share their infant feeding history	9	7
Refused to measure infant's weight and length	8	11

Flow chart shows the recruitment and progression of the study process.

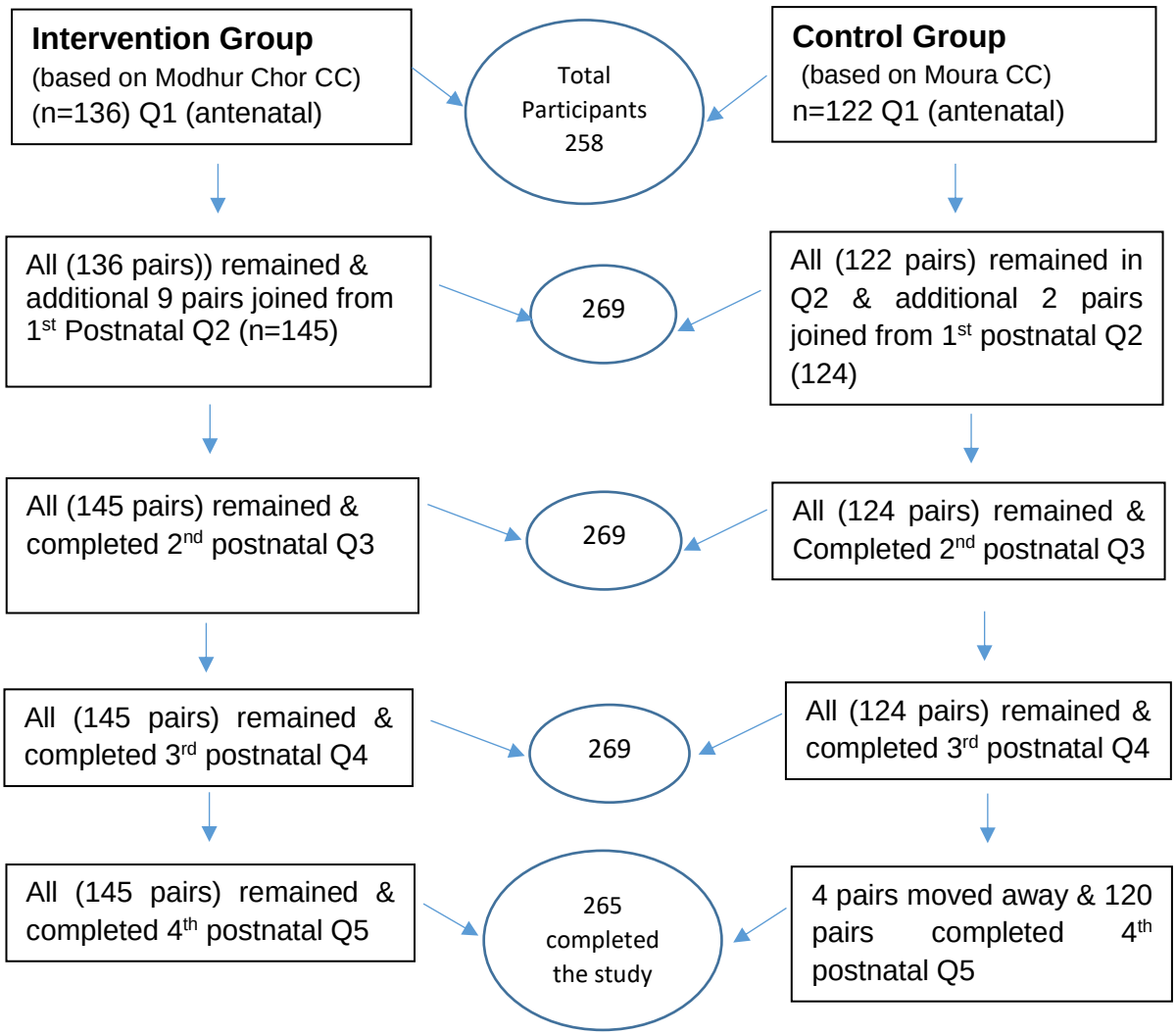


Figure 3: Flow chart of study participants from recruitment to final interview between 5-6 months

4.4 Inclusion criteria

Pregnant women in their third trimester who were willing to participate in the study and have given informed consent were selected. An additional criterion was pregnant women in their third trimester who intended to deliver and planned to live in the area for at least first six months after delivery. A requirement for the measurement procedures was that mothers agreed to have their infants weighed and measured during the EPI visits.

4.5 Ethical approval and consent

The civil surgeon of Dhaka district issued an ethical approval letter from the office of civil surgeon, Dhaka on 4th December 2014 (Appendix K). Additional ethical approval was issued from London Metropolitan University 'Research Ethics Review Panel of the School of Human Sciences' (Appendix L). Signed informed consent was provided by all the study participants. The HA informed the participants about the study purpose at the beginning of each interview by reading a participant's information sheet (Appendix H) leading to consent. Mothers' consent was also obtained for anthropometric measurement of their infants. The respondents were informed that their participation was entirely voluntary, and they could withdraw at any point during the study without reason or prior notice. They were also informed that the information obtained during each interview would be entirely anonymous and the purpose of this research was to propose policies and programs to improve infant feeding practices which were expected to improve child health, growth and development in the future.

4.6 Data handling and statistical analysis

The data collected from each clinic was uploaded onto Excel spreadsheets (Microsoft ® Office Excel 2016) and SPSS version 25 by one person (SHR). From the total of 269 mother-infant pairs with completed data were collected and 265 infants were measured to date, approximately 4300 data points were uploaded. The whole data set was rechecked manually. The variables in each spreadsheet were entered either manually or calculated using a formula. Variables including ID, gender, age, date of birth, date of measurement, weight to the nearest 0.1kg, length to the nearest 0.1cm were directly entered. Some variables were calculated using an equation is shown in Table 4.2.

Table 4.2: Variables calculated in Microsoft Excel using an equation

Variable	Equation
Decimal age	(Date of measurement-Date of birth) / 365.25
BMI (kg/m²)	Weight (kg) / Height² (m)
z-weight	LMS Growth software
z-length	,,
z-BMI	,,

Data were statistically analysed using SPSS version 25. The analyses compared EIBF, ENF, PF, ADF and exclusive breastfeeding in infants aged between 0 and 5-6 months using Pearson's Chi square test to calculate 95% confidence intervals for the difference between two groups. For the outcome, the results of two-sided 5% tests are reported. Strength of association between variables was also measured using a Pearson's correlation coefficient and a significant association was identified using a p value ≤0.05. z-scores for weight, length, BMI were

calculated using the WHO Growth reference data. Mean z-scores were compared between the two groups using an unpaired t-test. Comparisons between the two groups were extended to examine absolute weight, length and BMI. The prevalence of illnesses was compared between the two groups. It was important to confirm that mothers in the two groups were similar for a range of characteristics so that when the effect of the intervention was evaluated, any differences could not be accounted for by differences in the social, demographic or economic characteristics. Thus, continuous variables were analysed for normality using Kolmogorov-Smirnov and Shapiro-Wilk test. A $p < 0.05$ was taken as a data being not normally distributed. Therefore, a Nonparametric test (Mann-Whitney U) was used to compare maternal age between groups and a Chi-squared test was used to compare categorical variables between groups. For normally distributed variables of continuous data, an unpaired t-test was performed.

4.7 Development of antenatal and postnatal questionnaires

The following steps were taken in the process of designing the questionnaires and in planning the approach to data collection.

4.7.1 Discussion with the UHC's doctors and HAs

Following the pilot study, the antenatal and postnatal questionnaires prepared for the intervention were tested in Dohar UHC and in a CC. An informal visit was paid to Dohar UHC and one CC to assess the procedure of data collection. Five women attending the EPI immunization section in UHC, two HA working in EPI of UHC, one medical officer from the obstetrics and gynaecology department

were invited to an informal discussion with the researcher to assess their thoughts on breastfeeding and the proposed intervention. All agreed to participate. Comments made at this time were recorded and this information was then used as a key factor during the next stage of the development of the questionnaires. In Dohar UHC, the questionnaires were pretested by the researcher and HAs. One of the HAs had already participated in the pilot study (see chapter three). She joined the other HA to help. During these interviews, the researcher monitored the HAs and gathered experience and assessed the possibilities of conducting the data collection with the HAs.

4.7.2 Structure of the antenatal questionnaire (Q1)

The antenatal questionnaire (Q1) was designed to obtain necessary information on feeding intention, influences and previous feeding behaviour. To compare between the intervention and control groups, demographic details thought to have influence on infant feeding were also recorded. These were age, literacy, occupation, parity, age of marriage and first pregnancy, previous breastfeeding history, breastfeeding support and demographic characteristics (i.e. family structure, husband's occupation, monthly expenditure, drinking water facilities etc). The contents of the questionnaire were based on the existing literature on infant feeding practices in Bangladesh, India and Pakistan. It was not possible to cover all potential responses, therefore questions with multiple possible responses had an 'other' option with a space for an individual response if required. A sample questionnaire can be seen in Appendix I.

Prior to the main study, the antenatal questionnaire was piloted on 14 pregnant mothers who were pregnant for 28 weeks and beyond and attended the antenatal

visit at the outdoor patient department in Dohar UHC. Each woman was interviewed after the purpose of study was explained to her. There were no difficulties encountered with the questionnaire but the pilot helped to modify a few questions for the main study (see chapter three).

4.7.3 Structure of the postnatal questionnaires (Q2, Q3, Q4, Q5)

The structure of four postnatal questionnaires (Q2, Q3, Q4, Q5) was similar to the antenatal questionnaire with a combination of both closed and open type of questions plus multiple choices answers. Postnatal questionnaires were used in the four EPI visits to collect feeding histories except for the first postnatal questionnaire where some additional questions were added. The postnatal questionnaire was piloted in a sample of mother-infant pairs who attended the EPI vaccination session in the Dohar UHC. As well as evaluating the content of the questionnaire and the clarity of the instructions, common answers to open ended questions were sought in order to provide a choice of possible responses. In addition, sample questionnaires were also circulated amongst doctors and other health professionals so that everyone was able to voice their opinion and to ensure that the questions were clear and the instructions were unambiguous. This also enabled the project to be discussed and suggestions for improvement to be incorporated. Mothers who visited the paediatric OPD or child admitted to the paediatric ward were not approached or interviewed as their children were ill, and it could have been very distressing for a mother in this situation to be interviewed. The interviewer in contact with the participants at this stage were generally the researcher (SHR) or the HA. In the final version of the questionnaire, closed-ended questions were used with a list of possible

responses. The responses were based on those obtained during the pilot study and the results of other similar published studies. To enable comparison between the two groups, the first postnatal questionnaire designed to collect information about birth history and immediate postnatal feeding which may have had an effect on infant feeding (e.g. mode and place of delivery, birth weight, TBA assisted delivery, immediate post-delivery feeding). The postnatal questionnaires were aimed to be completed between birth to 1½ months period, 2 months and onwards, between 3 and 4 months and onwards and 5 months and onwards to the EPI visits in CCs. The Q3, Q4 and Q5 questionnaires aimed to assess the continuation and duration of breastfeeding until five to six months period and were based on the first postnatal questionnaire (Q2).

4.8 Reliability of the questionnaires between the groups

It was anticipated that the reliability of the questionnaires in the intervention and control groups would not differ. Repeated test measures were taken to ensure that the questionnaires provided reliable data. However, there were some differences which highlighted some mothers' intention expressed in the antenatal interview to differ from what they practiced as reported in the postnatal questionnaires. Even in the same postnatal questionnaires, some mothers who practiced exclusive breastfeeding gave a different history when asked about a 24-hour feeding history. Comparing questions between the antenatal questionnaire (Q1) with responses given in first postnatal questionnaire (Q2) showed some differences as shown below:

Question (16) in Q1 (antenatal questionnaire) what kind of delivery would you prefer?

Question (21) in Q1 (antenatal questionnaire) Have you planned to feed anything other than breastmilk in the first week of birth?

Differences here may again reflect changes in personal circumstances occurring over time as well as the interaction with the intervention.

4.9 Meeting and allocation

4.9.1 Meeting the project director

Initially a meeting was arranged with the funding body's project director at BCSIR Complex, Dhanmondi on 26th November 2014. The organization and expected outcomes of the research project were discussed. The project director supplied a letter (Appendix M) to the civil surgeon of Dhaka district requesting organization for the project.

4.9.2 Meeting with civil surgeon and deputy civil surgeon

Two consecutive meetings were arranged with the civil surgeon and deputy civil surgeon of Dhaka district. These meetings took place in the office of the civil surgeon, Government of Peoples` Republic of Bangladesh, Janoshangha Bhabon, Azimpur, Dhaka in 27th and 29th November 2014. The researcher briefly informed them about the research planning and requirements for conducting the research. Dohar Upazila in Dhaka district was chosen for the study. The civil surgeon issued an order letter to the UH&FPO of Dohar UHC to take necessary steps and to support the researcher to conduct the research.

4.9.3 Meeting with doctors and health professionals in Dohar UHC

A meeting was held with the participation of doctors working in Dohar UHC. This meeting was moderated by the UH&FPO and the researcher (SHR) on 30th November 2014. Doctors from paediatrics, obstetrics and gynaecology, the residential medical officer and the family planning officer also attended the meeting and shared their experiences while working in Dohar UHC and CCs. Attendees shared their thoughts and experiences on breastfeeding practices in the meeting. Other health professionals like nurses of UHC also joined and shared their experiences about the common breastfeeding practices in the villages of Dohar Upazila. All the health professionals including doctors in Dohar UHC were very cooperative and also interested about the outcome of the research project. The UH&FPO and committee leader of all the CHCPs of Dohar helped to plan for the visiting clinics to set up CCs for data collection.

4.9.4 CCs visit and allocation for data collection

All the CCs in Dohar were initially visited by a team of the researcher (SHR) and two health professionals from Dohar UHC. This took place for five consecutive days starting from 30th November to 4th December 2014. Four, out of eleven clinics were selected primarily. These selections were based on availability of transport, distance from the UHC and maximum distance from two CCs. Finally, Madhur Chor and West Moura CCs were chosen for the data collection. The areas shared similar demographic and social characteristics. There was no guarantee, however, the two communities were identical with respect to all relevant factors or that they would remain unchanged during the project. The team talked with the HAs, CHCPs and founding members of these two clinics.

They were explained details on the purposes and process of data collection. An information sheet and consent form for participants and their guardians were also provided. Repeated meetings and discussions were held separately with HAs, CHCPs and clinics' funding members about the project in further details, in order to answer queries and to obtain an overall decision on participation. HAs and CHCPs who worked in these two CCs willingly agreed to volunteer for data collection.

4.9.5 Meeting with Community Support Groups (CSGs), influential people and residents around CCs

A meeting was held with the community support groups (CSGs) of respective CC and local people in Modhur Chor and West Moura CCs in 5th and 6th December 2014 respectively. The researcher explained the project plan and data collection process to everyone. Role of a TBA, HA and CHCP were discussed in the meeting. CSGs and local people showed their interest in helping with the research.

As a part of community involvement, imams, local political leaders, influential persons, school teachers and a village doctor in Modhur Chor area joined the meeting. The meeting in Modhur Chor CC was chaired by Dohar UHC`s UH&FPO and the researcher was present. As mosque imams were conservative and uncomfortable talking with women, UH&FPO of Dohar UHC who was a male doctor chaired this meeting. The imams were very curious about the research outcome and were very happy to support the researcher to conduct the research in that area. Also land donor and founding members of the Modhur Chor CC participated in the meeting. A brief description of the project was explained.

UH&FPO also deliver a speech on importance of exclusive breastfeeding. Refreshments were provided in the meeting.

4.9.6 Meeting with TBAs, CHCPs and HAs

Final meetings were arranged separately in Modhur Chor and West Moura CCs. CHCPs, HAs and ten TBAs attended the meeting on 7th December 2014 in Modhur Chor CC. On 8th December 2014 CHCP and HA of West Moura CC joined a separate final meeting. The researcher briefly explained the project plan and their roles in the project. All agreed to participate in the training before the study conducted.

4.10 Recruitment of TBAs

The TBAs who had been residing locally in the intervention area, and assisting home deliveries for a long time in the villages around Modhur Chor CC were identified and approached by the HA and CHCP of the Modhur Chor CC. They were all known to the HA and CHCP of Modhur Chor CC. Although some of the TBAs went to school for a few years as reported, none of them could read or write. Ten TBAs were recruited to the study who showed their interest to participate voluntarily (Appendix O). They were aged between 50 years and 64 years. The TBAs were paid an honorarium for attending the training sessions and to visit the mothers according to the schedule. TBAs also agreed to live in the locality throughout the study period. One TBA was allocated for fifteen mothers to be visited residing in the same village. The HA and TBA contacted each other during the home visits and HA monitored each TBA during home visit at least two occations over the study period including the first antenatal visit.

4.11 Training of HAs, CHCPs and TBAs

Prior to the training session, the CHCP and HA from Modhur Chor CC participated in a knowledge test based on breastfeeding practice questions (Appendix G). For TBAs, the questionnaire could not be completed individually due to literacy reasons, but instead they participated in a group discussion. This test gave an idea about all the volunteers' knowledge and beliefs in breastfeeding practices. The majority of the volunteers had children and had experiences of breastfeeding.

A four-days training was provided to the TBAs, HA and CHCP of the Modhur Chor CC. This training helped the volunteers to know in depth about the study, their role and also they had a chance to ask any queries regarding the study and to clear the doubt if they had any. One doctor from Dohar UHC was present in the training session. The HA and CHCP from West Moura CC were trained separately in a two-days training session. The training sessions were divided into two parts: the first part involved training on meeting and greeting to the participant; explaining the purpose of interviewing the mothers; collect the consent for participation; process of interviewing mothers; explaining and completing the questionnaires; writing the log book; length and weight measurement of the infant. This part of the training session was similar for HAs and CHCPs of the control and intervention CC.

In the second part, the session was only attended by the TBAs, HA and CHCP of Modhur Chor CC. Training materials included videos on breastfeeding, images, and flash cards. The session included: lectures on breastfeeding and benefits of breastfeeding; playing videos on breast attachment; flash card and pictures on

breastfeeding. Also, messages and materials developed for the project were promoted in this session (Appendix R). On the last day of the training, one mosque imam joined the session and discussed what the Quran and Prophet Muhammad (Saw) says about breastfeeding. The TBAs played a role play multiple times to build their confidence. The training involved approaching and listening to mothers, learning about their circumstances and breastfeeding difficulties, providing advice and support the mothers according to problem and helping to building their confidence, positioning and attachment of baby during breastfeeding, involving mother-in-law and husband during home visits and motivate them specially the mothers-in-law for supporting the mothers during breastfeeding. It was important to involve the influential family members during the meeting to obtain acceptance for the home visits and to achieve the successful outcome of the research. The breastfeeding message developed for this project involved EIBF in first hour, discourage any ENF and PF especially traditionally practiced PF such as honey, water and sweetened water and to practice exclusive breastfeeding for the first 6 months period. Training was also provided to the TBAs on dealing with any breastfeeding complications, identifying the symptoms of some common neonatal and infant's illnesses so that they could inform the HA. All the training was held in the consecutive CC after 3 pm so that the HA or CHCP did not need to change their schedules of daily work (Training Guidelines: Appendix N).

4.12 Participant recruitment for the control and intervention groups and method of completing the antenatal questionnaire

Various approaches were taken to ensure that the maximum number of eligible women were recruited. It was intended that the antenatal questionnaire would be completed during home visits performed by the HA. The HAs normally carried out a home visit twice a week. During their home visit, they approached the pregnant mothers who were in their last trimester to take part (Door step survey: Appendix J). Pregnant mothers who showed their interest in taking part, had the study purposes and her and family members' role in the study explained. A participant information sheet (Appendix H) describing the objectives of the study and pregnant mothers and family members' role in it was described to the mother and her husband or any older family member and signed. The participant and her family members had their opportunities to query anything regarding the study. After agreeing to participate, a consent form was signed by the expectant mother and her family member either the husband or an elder family member. The mother was then given an ID card with her name and an unique registration number written by the HA. Consent from her husband or other influential elder family members such as the husband's mother had a great influence on the participant and were helpful in avoiding study drop-outs. Also, involvement and co-operation of influential family members increased the chances of success of the project. During this visit, the HA also wrote the ID number on the door of the participant's house using a permanent marker so that the TBA or HA herself could easily identify them on their next visit. Moreover, this also reduced the chances of missing a participant and was also a quick way to find the registration number.

However, a number of eligible pregnant mothers were missed by this procedure due to the following reasons: eligible mother was not at home that time; husband or other guardian was not present that time so could not decide whether they would participate or not. For pregnant mothers who were missed by the HA in the first attempt, a consecutive visit was undertaken by the HA in the following week. The TBAs in the intervention areas were also asked about the possible recruits in the intervention areas and to inform the HA if there was any eligible participant. Most of the interviews were completed at the participant's home. An eligible participant was also identified and approached by the CHCP of the respective CC if a pregnant woman visited the CC during the recruitment period. Later on, the HA interviewed the interested participant during a home visit.

4.13 ID card

Pre-allocated ID cards were distributed among the participating mothers. During their recruitment, the HA gave this card to every mother with a unique registration number. The HA also wrote the same number with permanent marker on the door of participating mother. For the intervention group, the HA distributed I-CARD, numbered from 600 onwards and for the control group, the HA distributed C-CARD numbered from 101-500 numbers. On these I-CARD / C-CARD, the information included were registration number for the project; date of registration; house number and name of the community clinic where mother's regular visits were allocated. These cards were stapled together with the Child Card during the 1st EPI visit which was given for record keeping of baby`s immunization schedule (Sample ID card and Child card: Appendix D & E).

4.14 Antenatal home visit and antenatal interview (Q1)

The antenatal questionnaire was completed by the HA for each of the eligible women. Although the majority of the women completed their 5 years of schooling and some of them were able to sign their name, the questionnaire was not always easily understandable to them. It was therefore decided that each question would be asked and explained by the HA and then completed according to the participant's response. The majority of the questions of the antenatal questionnaire were of a closed type with multiple possible responses. There was minimal writing required in the questionnaire and a choice of answers to each question was offered in most questions. Completing this antenatal questionnaire provided information about the mothers` personal and previous obstetric history and other demographic characteristics. All the questionnaires were then stored in the respective CC and at the end of the week all questionnaires were collected and taken to the research base. Participating mothers and HA exchanged their mobile numbers during first interview session if the mother or her family had a mobile phone facility. Mothers were also encouraged to call the HA and their allocated TBA in the intervention group when the birth took place. If the delivery took place at home with any of the study TBAs, they were encouraged to weigh the baby at the CC. In other cases, The HA helped to arrange a visit to the CC to record birth weight on the first day after delivery.

4.15 Post-natal visits and interviews (Q2, Q3, Q4, Q5)

After the baby was born, at the first visit (between birth to 6 weeks) to the EPI in CC Q2 containing: baby's date of birth; mode of delivery; place of delivery; any

early neonatal and prelacteal feeding; colostrum feeding; exclusive breastfeeding; predominant feeding; start of additional feeds; types of food and illnesses were recorded by the HA in the control and the intervention CC respectively. The time required for each postnatal questionnaire was approximately 4-5 minutes. Completed postnatal questionnaires were then stored in the respective CC until collected by the researcher at the end of the week. Mothers were interviewed while they waited for their turn to come for their infant's immunization. Mothers were encouraged to take up all the vaccines especially the first four immunizations of their infants in the allocated community clinic they were registered in and the first vaccine to be given was as early as possible after the infant's birth. During these visits, weight of the infants was measured with a weighing scale at every visit (0-1½ months, 2 months and onward, between 3 and 4 months and between 5 and 6 months) to the EPI centre. Similarly, the length of the Infants was measured by the HA and CHCP at the same time (see chapter seven for details). The TBAs were also invited to help the mothers while visiting the CC.

4.16 Home visits by the TBA and breastfeeding advice

The intervention group received at least six scheduled visits between the third trimester and five to six months after delivery: one in the last trimester of pregnancy, two in the first month after delivery (one in first week of delivery, one between 15 to 28-30 days after delivery), one visit per month for next two months and one visits between 4 and 5-6 months. In addition, as the TBAs were locally resident and in some cases neighbours to the mothers, they were free to make additional visits with the mothers of the intervention group if the mothers wanted.

Sometimes, however, they just visited when the HA had her regular home visit to a mother. Each visit lasted approximately for 20-30 minutes. The antenatal visit was usually accompanied by the HA. All the TBAs of the intervention group of the study were familiar to the local residents who had been assisting home deliveries for more than a decade. During the antenatal visit, special attention was paid to family members including mother-in-law, husband and any other family members who were encouraged to join the discussion. This was expected to enable the advice and support given by the TBA to be more accepted by the family members and establish the TBA's home visit more comfortably. Moreover, other family members could play a role in supporting the mother for immediate initiation of breastfeeding and avoidance of any PF whether delivery was planned at home or in a health institute. The importance of breastfeeding within the first hour, avoidance of any PF including traditionally practiced prelacteal feeds at any time before and after lactation was initiated was indicated. Mothers and family members were instructed not to feed water to the infant even in hot weather and were reminded not to give water unnecessarily which might cause infection to the newborn. Instead, mothers were encouraged to drink plenty of fluids to be adequately hydrated during hot weather. The antenatal meeting also covered discussion about common breastfeeding problems that the future mother might encounter and necessary steps to avoid or overcome them. Other mothers in the family were encouraged to discuss their breastfeeding experiences in the meeting. The TBAs provided their scheduled home visits postnatally to encourage and monitor the mothers to support exclusive breastfeeding until their final visit. If a mother had a home delivery, with permission of the mother-in-law and husband sometimes the infant was taken to the CC to be weighed. They also

sometimes accompanied the mothers during their EPI visit to the intervention CC for the infant's vaccination and to interview the mother and measure the infant for the study. Mothers-in-law were also encouraged to join the visit to the EPI. Some of the home deliveries amongst the study participants were conducted by the study TBAs, where they supported the mother to initiate breastfeeding in the first hour. In other cases, the TBAs attended the delivery as early as possible and for health institute deliveries, family members were requested to contact their allocated TBA when they reached home. One TBA was allocated to visit fifteen mothers.

4. 17 Weight and length measurements

All the measurements of the infants aged between birth to 5-6 months period were conducted in Modhur Chor and West Moura CCs in four consecutive EPI visits except for the majority of birth weight measurements which were recorded following the birth of the baby in the health institute or at home. Procedures for weighing and measuring the length of the baby are explained below.

4.17.1 Training of the anthropometry personnels

Before data collection, rigorous training and continuous standardisation sessions were conducted at each community clinic organized by the researcher and a doctor from UHC, Dohar. After training of the HAs and CHCPs, close monitoring of the measurement procedures during data collection was maintained to minimize random error and bias. Although all had been trained on taking measurements as a part of their routine duties, this further training was provided so that they were able to maintain standards of technique to take accurate and

precise measurements. During the training sessions, HAs and CHACPs were shown the MGRS anthropometry training video, which highlights key measurement techniques and calibration procedures (de Onis *et al.*, 2004; WHO, 2008; Cheikh Ismail *et al.*, 2013). In addition, HAs and CHCPs from both CC participated in two standardization sessions throughout the intervention period for a continuous assessment of the precision and accuracy of their measurements. The researcher observed their measurement techniques and retraining and corrective action was taken if needed. The HA and the CHCP from each CC worked in a pair, taking measurements independently and repeating measurements that exceeded pre-set maximum allowable differences. The CHCPs from both CCs had completed their higher secondary education and two HAs had at least completed their secondary school education. The educational background of the HAs and CHCPs helped them to be motivated, write legibly and to follow the instruction of the training procedure. HAs and CHCPs lived local to their working place and were comfortable interacting with the targeted participants from different socio-economic classes. The general procedures of measuring weight and length that followed are described below.

4.17.2 Measuring equipment selection

In both CCs, similar measuring equipment were used for accuracy, precision and robustness of the results. Equipment was checked and calibrated regularly, usually in a pre-scheduled day of measurement.

4.17.2.1 Equipment for measuring weight

Infants were weighed using a portable table top baby weighing scale with a precision to the nearest 5 g up to 7.5 kg, and to the nearest 10 g up to 20 kg.

4.17.2.2 Equipment for measuring recumbent length

Infants' length was measured using the locally made wooden infantometer (range 300-1100mm) which had a fixed headboard and moveable footboard.

4.17.3 Measurement procedures

4.17.3.1 Measurement of weight using the baby weighing scale

Some points are taken into consideration when measuring newborns and infants. First, reassuring the parents. During measurements, sometimes infants became agitated and started crying which led the parents becoming annoyed, if they had not been reassured that these measurements are harmless. Second, mothers helped the measurer during weighing and it helped to calm down the infant more easily. Moreover, the presence of the mother helped to obtain the measurement more accurately with less resistance from the infant. If an infant cried at any point of measurement, the procedure was stopped immediately and waited until the infant settled down. Before obtaining the measurements, the HA clearly explained the procedure to the mother and asked if the mother had any questions. During the weighing assessment, measurement and monitoring of vital signs as well as the observation of appearance were also maintained. Prior to use, the weighing scale was checked, cleaned and calibrated. The scale was placed on a flat hard surface. The child was kept lying on the machine for approximately 15-20

seconds to get the correct reading. The child`s privacy and dignity were maintained at all times. All the infants were weighed and recorded twice by HA and CHCP, one after the other and the infant was repositioned between measurements. The average was then used. All measuring took place in the consecutive CCs.

4.17.3.2 Measurement of recumbent length using infantometer

Recumbent length was measured in lying position using an infantometer. The infantometer was placed on the table or on the floor. The infant was then undressed and positioned on the board. The first measurer (either HA or CHCP) stood by the side of the infantometer and placed the infant's head at the headboard at vertical plane. The second measurer held the infant's leg and positioned the footboard. The measurer positioned the footboard towards infant's feet with soles flattened and toes upwards. Gentle pressure was applied so that the knees were straight, feet were together and heels, buttocks and shoulder blades were in contact with the base of the infantometer (WHO, 2008). A TBA and infant's mother was present and helped the measurers. Length was recorded in cm to the last completed mm. All the infants were measured and recorded twice by two measurers. For length, a maximum 7mm difference was allowed (WHO, 2008). Any error of measurements outside that maximum was repeated by both measurers. If the repeated values still exceeded the maximum limit for the measurement, another third and final measurement was obtained.

All the measurements were entered on the questionnaire which was checked by the HA for completeness. Finally, all recorded measurements were entered into

the computer. On some occasions, if the infant was too agitated to repeat the measurement, only a single measurement was taken.

4.17.4 Quality of measurements

The nutritional status of the children in this project is compared against the WHO Child Growth reference. The quality of this analysis is highly dependent on the accuracy and precision of the measurements collected. Hence, the extent to which measurement error influences the quality of the anthropometric variables was determined prior to data collection for this study. In case of repeated measurements, close monitoring was maintained as a quality control measure. The influence of measurement error on the quality was determined prior to the data collection process. Overall the rate of necessary repeated length and weight measurements in this study was 5% of the total.

Unreliability and inaccuracy were checked to maintain quality of measurements.

4.17.4.1 Accuracy and reliability of the weight (kg) measurement

Whilst measuring weight, it was ensured that the technique did not affect the accuracy of the measurements. Steps were taken by all the measurers to ensure that infants were only measured in minimal light clothing. The reliability of the weight measurements was assessed by weighing two infants ten consecutive times on infant weighing scale. No variation observed between the measurements for both infants demonstrating the reliability of the weight measurements. In order to minimise the inter and intra-observer errors, measurers were asked to follow a set of protocol. This protocol required them to

check that each subject was either nude or wearing only minimal light clothing. Weight of the clothing was deducted later.

4.17.4.2 Accuracy and reliability of the length (cm) measurement

Length measurements were performed by two measurers. The HA took the measurement and CHCP monitored it and vice versa. Measurements were closely monitored as an important quality control measure. However, it was not practical for one measurer to perform all the length measurements due to time constraints. Therefore, the level of inter-observer error could be reduced by ensuring that majority of the measurements obtained in consecutive CC performed by either HA or CHCP. Inter and intra-variability in length measurement was obtained for two of the measurers (HA and CHCP). The measurers were provided with the protocol of measuring length (described earlier). Moreover, the CHCP and the HA had a number of years of practical experience in this field.

The level of two measurers variability in length measurements was determined using coefficient of variation (CV). Two subjects were measured in cm ten consecutive times on the infantometer. Below the average level of precision for the length measurement mentioned using the equation for CV.

(CV= SD / mean x 100) Here, SD= Standard deviation

= 0.185/49.51X100

=0.37

The result shows the level of precision for the length measurements obtained for this study. In practice, CV for two measurers errors were considerably lower than the acceptable limit of 5%.

Differences between duplicate measurements for weight (100g) and recumbent length (7mm) was much less than this value.

4.17.5 z-scores, centiles and LMSgrowth

Measurements of weight, length and BMI were transformed and age-adjusted relative to the reference data in the form of z-scores / standard deviation scores (SDS) and centiles. The z-scores and centiles for length, weight and BMI for the study infants were calculated using the WHO 2007 Growth data as the reference population. Calculation of z-scores and centiles for individual infants were achieved using the LMSgrowth package (Harlow Printing Limited, UK) which is an Excel add-in written software, into which a range of national and international references are incorporated, including the WHO data. In order to calculate the z-scores, decimal age and gender were required variables.

Chapter Five:

Demographic, economic and social characteristics of expectant mothers

Chapter 5: Demographic, economic and social characteristics of expectant mothers

5.1 Background

Almost all mothers in Bangladesh begin breastfeeding, but inappropriate feeding practices hinder the benefits of breastfeeding. The practice is influenced by a range of factors spanning from sociocultural to economic. Surveys have demonstrated strong associations between mothers' socio-demographic characteristics and their infant feeding practice. The latest demographic survey of Bangladesh has highlighted notable variations in practice based on geographic divisions (NIPORT *et al.,* 2016). The timing of breastfeeding initiation varies with characteristics such as the place and mode of delivery, facilities received during delivery, mother's age, parity, education and wealth status (Awi and Alikor, 2006; Tariku *et al.,* 2017; Mekonen, Seifu and Shiferaw, 2018). More educated and wealthy mothers who deliver in a healthcare facility with a health professional are less likely to attempt to breastfeed in the first hour postnatally, compared to less educated, poorer rural mothers (Haider *et al.,* 2010; NIPORT *et al.,* 2016).

Adolescent mothers tend to face more challenges to successful breastfeeding and are at a higher risk of not breastfeeding or of early interruption of this practice (Smith *et al.,* 2012; Muelbert and Giugliani, 2018). A lack of confidence and knowledge about the benefits of breastfeeding act as a barrier to breastfeeding practice among this group of mothers (Haider *et al.,* 2010; Hackett *et al.,* 2015). As in many developing countries, Bangladeshi grandmothers play the central role in taking decisions in pregnancy care and child upbringing within the family. They are regarded as being experienced and conversant regarding the traditional

infant feeding practices (Haider *et al.,* 2010, Negin *et al.,* 2016). Although external factors reflect the mothers' behaviour towards breastfeeding, for the success of breastfeeding, the mothers' perspectives are the most important in the day-to-day decisions on their infants' feeding practices.

With this in mind, it is important when designing and delivering a breastfeeding intervention programme to gain a clear understanding of the population group who will receive the intervention, with respect to demographic, economic and social characteristics. Hence the following objectives:

5.2 Objectives for the collection of demographic data

1. To collect, assess and compare the demographic characteristics between the intervention and control groups.

2. To develop an acceptable and efficient means of communication by establishing personal contacts between the TBAs and all the mothers in the intervention group, both antenatally and postnatally over a defined period of time, without affecting the delivery of routine services.

3. To develop an acceptable and efficient means of communication between the HAs and mothers, both antenatally and postnatally over a defined period of time, without affecting the delivery of routine services.

5.3 Results

Maternal characteristics are presented in Table 5.1. Generally, the two groups were broadly similar in a range of characteristics. The Mann-Whitney test showed no significant difference between the control and intervention groups for maternal mean age. Unpaired t-test for mean age of marriage and mean age of first pregnancy showed no significant difference between the two groups. For educational background, a similarity was seen between groups and a large number of women (>75%) from both groups had received either no education or up to primary level. More than 96% of women in both groups stayed at home and contributed to household works.

The husband's and other demographic characteristics are shown in Table 5.2 and these were also comparable between groups. The majority of husbands lived in foreign countries for work. Other common professions among husbands were small business owner, farmer, Rickshaw puller, driver, day labourer and few were jobless. Women who lived with their in-laws and their children were counted as one joint family (family members >5). The majority of the families in the study had accessed to a tube well for safe drinking water while few families collected drinking water from a river or a pond. According to monthly family expenses, the majority families had monthly expenditure more than 10,000 taka and was comparable between groups.

Table 5.1: Maternal characteristics recorded during the antenatal interview

General characteristics	Control (n=122)	Intervention (n=136)	p value
Age (Mean±SD)	24.3±5.46	23.0±4.52	p= NS
Age group (years)	freq. (%)	freq. (%)	
15-19	29 (23.8%)	34 (25%)	
20-25	42 (34.4%)	57 (41.9%)	
26-31	35 (28.7%)	39 (28.7%)	
32 and over	16 (13.1%)	6 (4.4%)	
Education			p= NS
No education	9 (7.4%)	11 (8.1%)	
Primary education	86 (70.5%)	96 (70.6%)	
S.S.C	25 (20.5%)	24 (17.6%)	
H.S.C	1 (0.8%)	4 (2.9%)	
Graduate or over	1 (0.8%)	1 (0.7%)	
Occupation			
Household works	118 (96.7%)	131 (96.3%)	
In field	2 (1.6%)	0	
Others	2 (1.6%)	5 (3.7%)	
Age of marriage (years)			
Mean age of marriage±SD	17.1±1.61	17.2±1.42	p= NS
Age of 1st pregnancy (years)			
Mean age of 1st pregnancy±SD	18.7±2.31	19.1±1.71	p=NS

S.S.C= Secondary school certificate; H.S.C= Higher secondary school certificate; NS= Not significant

Table 5.2: Husband`s occupation and other demographic characteristics

Husband's occupation	**Control** (n=122) freq. (%)	**Intervention** (n=136) freq. (%)	
Expatriate workers	50 (41%)	79 (58.1%)	
Small business	25 (20.5%)	22 (16.2%)	
Farmer	15 (12.3%)	16 (11.8%)	
Others	32 (26.2%)	19 (13.9%)	
Family structure			p=NS
Joint family	65 (53.3%)	75 (55.1%)	
Nuclear family	57 (46.7%)	61 (44.9%)	
Source of drinking water			
Tap water placed at house	22 (18%)	29 (21.3%)	
Tube well	91 (74.6%)	102 (75%)	
River or pond water	9 (7.4%)	5 (3.7%)	
Monthly family expenses (Taka)			
<5,000	9 (7.4%)	13 (9.6%)	
5,000 to 10,000	41 (33.6%)	34 (25%)	
>10,000	72 (59%)	89 (65.4%)	p= NS

NS= Not significant

Table 5.3 showed that significantly more mothers in the intervention group than in the control group ($p < 0.05$) were pregnant for the first time. Significantly more mothers from the control group planned for a home delivery than the intervention group ($p<0.01$), though the actual practice was different, with no significant difference observed between groups (chapter seven). The majority of the mothers from both groups attended ANC, although many did not complete full visits. Mean visits were comparable in the groups.

Table 5.3: Obstetric histories reported during the antenatal interview

Characteristics	**Control** (n=122) freq. (%)	**Intervention** (n=136) freq. (%)	**p value**
Pregnancy type			
Primigravida	45 (36.9%)	67 (49.3%)*	*P<0.05
Multigravida	77 (63.1%)	69 (50.7%)	
Preferred choice of delivery			
Home delivery with a TBA	67 (54.9%)**	46 (33.8%)	**P<0.01
UHC or govt. hospital	6 (4.9%)	2 (1.5%)	
Private clinic	49 (40.2%)	88 (64.7%)	
Antenatal check-up (ANC)			
no. of visits (Mean±SD)	2.6±1.4	2.8±1.2	p= NS
Attended at least once	**106 (86.9%)**	**128 (94.1%)**	
Once	9 (8.5%)	10 (7.8%)	
Twice	25 (23.6%)	32 (25%)	
Three times	32 (30.2%)	34 (26.6%)	
Four times or more	40 (37.7%)	52 (40.6%)	
Never attended	**16 (13.1%)**	**8 (5.9%)**	

TBA= Traditional birth attendant; UHC= Upazila health complex; NS= Not significant

Table 5.4 showed that all the mothers received some breastfeeding advice from different sources and the most common breastfeeding advice reported by mothers from both groups was that between birth to two years baby needs to be breastfed. This came mainly from the mother, mother-in-law or older relatives and from the TBAs. 8.5% mothers understood that the baby needs to be exclusively breastfed for the first six months. The majority of women (77.1%) had a plan to breastfeed their infants and to continue for minimum two years. Some mothers did not make any plan, but around 10% of mothers from both groups said they would bottle feed in addition to breastfeeding. 70.2% women said they would not give anything (ENF or PF) before starting breastfeeding.

Table 5.5 shows the history of previous infant feeding practices in both groups. This information was collected from mothers who only had children under the age of 5 years. Feeding histories were comparable in both groups. Although breastfeeding was almost universal and the majority of infants were fed colostrum and breastfed for two years or longer, exclusive breastfeeding was rare as early neonatal and prelacteal feeding were usually started in the first week. ADF (fluid and or semisolid or solid) typically commenced as soon as in the first month postnatally

Table 5.4: Breastfeeding advice and feeding intention

Breastfeeding advice	**Control** (n=122) freq. (%)	**Intervention** (n=136) freq. (%)
From birth to two years baby needs to be breastfed	49 (40.2%)	58 (42.6%)
Baby needs to be fed colostrum immediately after birth	30(24.6%)	17 (12.5%)
No substitute of breastfeeding	16 (13.1%)	14 (10.3%)
Baby needs to be exclusively breastfed for 6 months	9 (7.4%)	13 (9.6%)
Baby needs to be breastfed after birth	10 (8.2%)	11 (8.1%)
Other advices	8 (6.6%)	23 (16.9%)
Source of breastfeeding advice		
Mother /mother-in-law / older relatives	70 (57.4%)	90 (66.2%)
TBA	54 (44.3%)	47 (34.6%)
Healthcare professional (doctor, HA, nurse)	31 (25.4%)	37 (27.2%)
TV /Radio	12 (9.8%)	16 (11.8%)
Husband, neighbours and others	14 (11.5%)	23 (16.9%)
Planning for feeding		
Exclusive breastfeeding	90 (73.8%)	109 (80.1%)
Mixed feeding	12 (9.8%)	14 (10.3%)
No plan	20 (16.4%)	13 (9.6%)
Planning for Breastfeeding duration		
Two years	97 (79.5%)	107 (78.7%)
> two years	25 (20.5%)	29 (21.3%)
Planning for any first week feeding other than breast		
Yes	6 (4.9%)	5 (3.7%)
No	91 (74.6%)	90 (66.2%)
Do not know	25 (20.5%)	44 (32.4%)

*Total number of responses is more than the total number of participants because of multiple responses
TBA= Traditional birth attendant; HA=Health assistant

.

Table 5.5: Feeding history of previous babies aged under 5 years

	Control	Intervention
	(n=40)	(n=24)
	freq. (%)	freq. (%)
Breastfed your baby	39 (97.5%)	23 (95.8%)
Breastfeeding duration	n=39	n=23
6 months to 1year	6 (15.4%)	2 (8.7%)
2 years	24 (61.5%)	15 (65.2%)
>2 years	9 (23.1%)	6 (26.1%)
Fed Colostrum	39 (97.5%)	23 (95.8%)
Fed any PF	32 (80%)	21 (87.5%)
Age when Complementary food (fluid / semi or solid) started		
In first month	19 (47.5%)	12 (50%)
From 2nd month	11 (27.5%)	7 (29.2%)
From 6 months or later	10 (25%)	5 (20.8%)

PF= Prealacteal feeding

5.4 Discussion

This chapter set out to determine a range of demographic, social and economic characteristics of the mothers as well as detail of their obstetric history and previous infant feeding practices. The two groups were mostly comparable in all characteristics. Almost a quarter of mothers were adolescents. Early marriage was also common amongst participants. Typically, in Bangladesh, one in ten girls become pregnant before the age of 15 years and this number rises to one in three before 19 years (Islam *et al.,* 2017). This is more prominent in rural low-income settings (Schuler *et al.*, 2006). This was also reflected in this study.

The majority of the mothers in the study had not attended school beyond primary level. This could be due to the fact that adolescents are less likely to finish school and more likely to marry early, as reported in a national survey on child marriage

conducted by the International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b) (icddr,b, 2013). In poorer settings, a female child is often considered as a financial burden to the family and marriage is considered to be a way of relieving financial stress on the family (Marphatia, Ambale and Reid, 2017). Mothers in rural settings mainly stayed at home and contributed to household work. Although villages in Dohar Upazila are considered to be a rural area, farming was not a very common profession. Instead, the majority of the husbands lived in foreign countries. Many parts of Bangladesh do not have access to fresh water and improved sanitation facilities, fortunately people in Dohar had access to a tube well for drinking water. The majority of the families in the study had either their own or shared tube well.

In Bangladesh, families follow the pattern of traditional joint or extended and nuclear families (Barkat-E-Khuda, 1985). In a joint family, generations live together where a woman lives with her husband, his parents and his brothers and sisters (Samad, 2015). A woman's father-in-law and mother-in-law are the family head who take decisions on family matters. A traditional joint family is common in rural areas of Bangladesh. On the other hand, in a nuclear family couples live on their own. In this study, slightly more participants were from a joint family in both groups which is likely to be reasonably representative of rural areas of Bangladesh. Families were categorised based on whether the participating mother lived with her husband's parents and their children or not (>=5 family members categorised as a joint family and <5 as nuclear family).

Among the expectant mothers, there were significantly more primigravida in the intervention group than control whereas more of the control group had previous breastfeeding experience. These differences could have impacted on the

outcome of the study. In addition, this study provides evidence that many mothers were interested in delivering at home and avoided antenatal check-up. A majority of women in rural areas of Bangladesh rely on home delivery with TBAs. Evidence showed that 62% of births still take place at home and more than 56% are assisted by TBAs or relatives (NIPORT *et al.,* 2016). Childbirth assisted by skilled personnel is still not very common in rural areas of Bangladesh. The Bangladesh National Strategy for Maternal Health 2014-2024 aimed to reduce maternal mortality to 50/100,000 live births by increasing the number of deliveries by skilled birth attendants to more than 80%. Barriers such as the shortage of healthcare facilities, cultural norms and taboos were often the reasons for choosing home deliveries with TBAs. Due to a fear of Caesarean delivery, mothers often choose not to go to a hospital. Moreover, conservative Muslim families prefer the delivery to happen by a woman in the home environment. However, mothers-in-law often prohibit their daughters-in-law from going to the hospital because she herself did not go to a hospital for delivery or an antenatal check-up (Sarker *et al.*, 2016).

All the mothers had been exposed to breastfeeding information from multiple sources. However, very few mothers knew about the practice of exclusive breastfeeding for six months. Their main source of knowledge regarding breastfeeding was their mothers, mothers-in-law or elder relatives. Slightly higher than a quarter of mothers had been the recipients of breastfeeding advice from healthcare professionals. Mothers from rural and urban areas of Bangladesh universally practice and intend to practice breastfeeding. This study showed a similar picture. The majority of the mothers were interested in breastfeeding and continuing breastfeeding their infants for at least the first two years after birth.

Antenatal data amongst the multipara mothers showed that most of the mothers breastfed their infants, although in the majority of cases, PF was evident. The mothers showed no intention of adding any feed before the establishment of breastmilk at the first week after birth, but practice showed a different picture (see chapter six). Very few mothers were aware of exclusive breastfeeding practice for the first six months after birth.

Overall the findings from this aspect of the study suggested that the mothers' characteristics were comparable between the control and intervention groups and generally reflected the general characteristics of rural mothers in Bangladesh. The findings also suggested that no obvious barriers to the intervention were evident, thus giving the researcher confidence that the study should be completed without any serious problems. The findings also suggested that the mother would be receptive to the intervention and no cultural, religious or social issues would prevent the conduct of the study. One limitation of this approach was that no data were collected on the expectant mothers' nutritional status. At the planning stage of the study, it was identified that collecting such information would add further burden to the researcher and associate workers. Thus, no information was collected on maternal weight, height, BMI, dietary intake or micronutrient status. A major determinant of birth outcome is maternal iron status. This necessities blood collection to measure Hb, ferritin, MCV etc. It could be argued however, that maternal iron status is irrelevant to this study as birth outcome may not impact upon breastfeeding practices. In support of this argument, geographical location and characteristics are similar between the two communities as well as food security, source of water, sanitation and mean family expenditure. Furthermore, in selecting the villages, it was ensured that they were sufficiently

geographically distance apart so that there was very little chance of mothers attending the same CC and sharing breastfeeding experiences. Therefore, confidence was ensured that any differences in the impact of the intervention would unlikely be due to external factors discussed above.

Chapter Six:

Impact of intervention on feeding practices

Chapter 6: Impact of intervention on feeding practices

6.1 Introduction

Ideal infant feeding practices are crucial for achieving and maintaining healthy nutritional status and development of infants and children (Britton *et al.,* 2007; Saha *et al.,* 2008; Brockway *et al.*, 2018). Many studies on the association between feeding practices and growth during infancy and childhood primarily observed growth and other health outcomes of infants and children in relation to both breastfeeding and the timing and type of introduction of complementary foods. Studies conducted in rural and urban areas of Bangladesh have shown that infants who were fed according to WHO infant feeding recommendations grew better during infancy and early childhood with a substantially reduced incidence of malnutrition (Arifeen *et al.*, 2001b; Chisti *et al.*, 2011; Thakur *et al.*, 2012). There is a global public health recommendation that infants should be exclusively breastfed for the first 6 months of life. After completion of first 6 months, nutritionally adequate and safe complementary food should be introduced to meet the infant's additional nutritional requirements together with continuing breastfeeding for up to two years or beyond (WHO, 2002b). Except for a few medical conditions, almost all mothers can breastfeed their infants. Although a high prevalence of breastfeeding practice is seen in Bangladesh, 96% during the first year of life and 87% of children are breastfed until 2 years of age (NIPORT *et al.,* 2016), the pattern of breastfeeding is not necessarily ideal (Roy *et al.,* 2002; Haider *et al.,* 2010; Kabir *et al.,* 2012). For example, PF, giving non-breastmilk feeds as a neonate's first source of nutrition or feeding before establishment of breastfeeding, is traditionally practiced in many parts of

Bangladesh (Tarannum and Hyder, 1998; Haider *et al.,* 2010). Mothers often believe that offering water to the newborn is essential to satisfying thirst and breastmilk alone is not enough (Haider *et al.,* 2010; Swigart *et al.*, 2017). A systematic review of studies from eight South Asian countries including Bangladesh revealed that PF was identified as one of barriers to the early initiation and practicing exclusive breastfeeding (Sharma and Byrne, 2016). Usually honey or water were initiated as a cultural practice, or due to misperception of breastfeeding by the mother, grandmother or a TBA (Tarannum and Hyder, 1998; Sundaram *et al.,* 2013). The practice of PF potentially affects the timely initiation of breastfeeding within an hour after birth as well as exclusive breastfeeding in first six months of life (Haider *et al.,* 2010; Alzaheb, 2017). According to BDHS 2004, delayed initiation of breastfeeding was significantly higher in urban areas. Evidence from a systematic review and meta-analysis on early initiation revealed that breastfeeding initiation after the first hour of birth doubles the risk of neonatal mortality compared to initiation within the first hour (Khan *et al.,* 2015). In addition, short duration of exclusive breastfeeding and inappropriate feeding practices are common in both urban and rural areas of Bangladesh (Sundaram *et al.,* 2016; Fatima, 2017).

Evidence has shown that many mothers in Dohar do not access pre and postnatal facilities provided in the UHC and CC and prefer home deliveries conducted by TBAs living locally (MOHFW, 2014). Therefore, for this group of women, delivering breastfeeding messages by TBAs tends to be more beneficial and convenient. The Dohar Health Bulletin (MOHFW, 2014) showed that neonatal mortality rate was 14.53 per 1000 live birth. Although the majority of people in Dohar have access to clean water and improved sanitation facilities (MOHPW,

2015), cholera, diarrhoea, dysentery and pneumonia remained in the top ten of all diseases in 2013. A previous pilot observational study conducted in Dohor UHC showed that the rate of exclusive breastfeeding was very low during the interview period (30.9%) and mothers often practiced PF before breastfeeding had started and continued additional feeding together with breastfeeding within the first 6 months (see chapter three). In view of the evidence to date on PF and breastfeeding practices in South Asian population, the aim of this chapter was to describe and evaluate infant feeding practices as a result of the TBA-led intervention during the first six months of life according to WHO current recommendations. Also, to study infant feeding practices in relation to maternal characteristics and other influential factors in a rural part of Bangladesh. Together, the aims of this study were to assess the impact of a TBA-led intervention on the prevalence of exclusive breastfeeding for the first six month; prevalence of practicing early neonatal and prelacteal feeding and ADF before six months and to evaluate the impact of the intervention on the prevalence of diarrhoeal diseases, malnutrition and infant mortality. All these were the context of a TBA-led breastfeeding advice intervention.

6.2 Results

6.2.1 First EPI visit

Breastfeeding initiation and practices recorded during 1st EPI visit are shown in Table 6.1. All the infants from the control and 144 infants from the intervention groups were breastfed up to the first EPI visit. The majority of infants in both groups were fed colostrum. There were significantly more mothers in the intervention group who started breastfeeding earlier than in the control group, 86.8% within first hour of birth, compared to 31.5% of the control mothers (p<0.0001).

Table 6.1: Breastfeeding initiation history

Colostrum feeding	**Control (n=124)**	**Intervention (n=145)**	**p value**
	freq. (%)	freq. (%)	
Received colostrum	122 (98.4%)	144 (99.3%)	p=NS
Time when breastfeeding established			
	(n=124)	**(n=144)**	
In first hour	39 (31.5%)	125 (86.8%)*	*p<0.0001
Within 6 hours	59 (47.6%)	13 (9%)	
Within 24 hours	17 (13.7%)	6 (4.2%)	
In 2nd day & after	9 (5.6%)	0	

Note: One mother from the intervention group did not breastfed her infant reported during 1st EPI

NS= Not significant

Table 6.2 shows the infants who were breastfed later in the 24-72 hours postnatal period had received PF as the first feeding soon after birth. After asking about first feeding of their infants, few mothers from both groups reported feeding non-breastmilk food as early neonatal feeds, but this was not statistically significant. However, when the question was asked about PF in the first week, the rate increased four-fold (82.3%) in the control group and was highly significant (p<0.0001) compared to the intervention group (8.3%). The most common

prelacteal feeds in the control group were honey, sweetened water and infant formula. In the intervention group, despite only a small number of infants received PF, the majority of the infants received infant formula as PF. Mothers added PF to their infants mainly in order to satisfy hunger, baby couldn't suckle and to stop the baby crying. However, more than half of the mothers in the control group (54.9%) traditionally added PF. Maternal and paternal grandmothers, TBAs and doctors were the prime decision makers for introducing PF.

Table 6.2: Feeding history in the first week postnatally

First week feeding history	**Control** (n=124) freq. (%)	**Intervention** (n=145) freq. (%)	**p value**
Late initiation of breastfeeding in 24-72 hours fed by (ENF)	26 (20.9%)	6 (4.1%)	p=NS
Types of feed	(n= 26)	(n= 6)	
Mothers unsuccessfully tried to feed her baby	3 (11.5%)	1 (16.7%)	
Water	4 (15.4%)	0	
Water sweetened with sugar / crystalline sugar	11 (42.3%)	1 (16.7%)	
Infant formula	10 (38.5%)	1 (16.7%)	
Diluted cow`s or goat milk / powder milk / others	1 (3.8%)	4 (66.7%)	
Prelacteal feeding (PF)	**102 (82.3%)***	**12 (8.3%)**	*P<0.0001
Honey	52 (51%)	0	
Water sweetened with sugar / crystalline sugar	36 (35.3%)	1 (8.3%)	
Infant formula	35 (34.3%)	8 (66.7%)	
Water	9 (8.8%)	2 (16.7%)	
Honey & Mustard oil	1 (1%)	0	
Diluted cow`s or goat's milk / powdered milk / Others	10 (9.8%)	4 (33.3%)	
Reasons for introducing PF			
Baby couldn`t suckle	32 (31.4%)	7 (58.3%)	

To satisfy hunger	54 (52.9%)	2 (16.7%)
To stop baby crying	32 (31.4%)	7 (58.3%)
Traditional beliefs	56 (54.9%)	0
To make sweet voice	25 (24.5%)	0
Colostrum insufficient	15 (14.7%)	0
Family decision	14 (13.7%)	1 (8.3%)
Others	7 (6.9%)	2 (16.7%)
PF advised by		
Mother / Mother-in-law	95 (93.1%)	11 (91.7%)
Doctor	24 (23.5%)	6 (50%)
TBA	29 (28.4%)	0
Friends-neighbours	21 (20.6%)	0
Nurse / Health worker	3 (2.9%)	0
Husband	1 (1%)	1 (8.3%)
TV/Radio	0	0
Others	2 (1.9%%)	1 (8.3%)

ENF= Early neonatal feeding; PF= Prealacteal feeding; TBA= Traditional birth attendant

Table 6.3 shows that significantly more mothers in the control group added water or additional fluid after starting breastfeeding ($p<0.0001$), usually sweetened water (53.2%) or formula (57.4%) to satisfy hunger or thirst (89.4%), or to stop the baby from crying (48.9%). In the intervention group, the percentage was low (5.5%) compared with the control group but the most common fluids and reasons for adding fluids were the same in both groups. Common additional fluids in both groups were infant formula (57.4% in control vs 37.5% in intervention) and sweetened water (53.2% in control vs 25% in intervention). The mothers reported that the reasons for giving additional fluid were to stop hunger and thirst (89.4% in control vs 62.5% in intervention), to stop the baby crying (48.9% in control vs 62.5% in intervention) or because the baby was unable to suckle (46.8% in control vs 25% in intervention). None of the 269 mothers from either group had added any solid food to their infants' feed during first EPI visit.

Table 6.3: Water or additional fluid during 1st EPI visit.

Time when water or additional fluid started	Control (n= 47)* freq. (%)	Intervention (n= 8) freq. (%)	p value
In first 7 days	28 (59.6%)	2(25%)	*(p<0.0001)
Between 10th and 15th days	10 (21.3%)	3(37.5%)	
End of 1st month	9 (19.1%)	3(37.5%)	
Types of the fluids			
Plain water	5 (10.6%)	1 (12.5%)	
Water sweetened with sugar / crystalline sugar	25 (53.2%)	2 (25%)	
Infant formula	27 (57.4%)	3 (37.5%)	
Diluted cow`s or goat`s milk / powdered milk	9 (19.1%)	4 (50%)	
Reasons for introducing water and additional fluid			
To satisfy hunger and thirst	42 (89.4%)	5 (62.5%)	
To stop baby crying	23 (48.9%)	5 (62.5%)	
Baby couldn`t suckle the breast	22 (46.8%)	2 (25%)	
Family decision	7 (14.9%)	2 (25%)	
Breastmilk is not enough	2 (4.3%)	1 (12.5%)	
Baby needed more	2 (4.3%)	0	
Others	5 (10.6%)	2 (25%)	

Total number of responses is more than the total number of participants because of multiple responses.

EPI= Expanded programme on immunization

Table 6.4 shows the majority of mothers from the control and all from the intervention group did not notice any differences in well-being of their infant while giving ADF.

Table 6.4: Mothers' perception of infants' wellbeing after adding water or fluid during 1st EPI visit

Mothers' perception of infant`s wellbeing after starting additional fluid	Control (n= 47) freq. (%)	Intervention (n= 8) freq. (%)
Less ill	1 (2.1%)	0
No change	41 (87.2%)	8 (100%)
More ill	5 (10.6%)	0

EPI= Expanded programme on immunization

In Table 6.5, mothers were asked in a 24-hour recall the feeding that was given in addition to breastmilk. 51.6% of infants from the control group received ADF, which was higher than the percentage of additional fluid (37.9% in Table 6.3) in first EPI visit. The percentage of mothers reporting no ADF was significantly higher ($p<0.0001$) in the intervention group. The percentage of additional feeds from a 24-hour recall and additional feeds reported during the first EPI visit was the same in the intervention group (5.5%).

Table 6.5: A 24-hour recall of feeding other than breastfeeding during 1st EPI visit

24-hour recall (other than breastfeeding)	Control (n=124) freq. (%)	Intervention (n=145) freq. (%)	p value
Nothing	60 (48.4%)	137 (94.5%)*	*(p<0.0001)
Received	**64 (51.6%)**	**8 (5.5%)**	
Water	24 (19.4%)	0	
Infant formula	27 (21.8%)	4 (2.8%)	
Diluted cow`s milk	5 (4%)	0	
Water sweetened with sugar / crystalline sugar	22 (17.7%)	2 (1.4%)	
Others	2 (1.6%)	4 (2.8%)	

Total number of responses is more than the total number of participants because of multiple responses

EPI= Expanded programme on immunization

In Table 6.6, 45 mothers in the control and 41 in the intervention reported illnesses in their infants during the 1st EPI visit but there was no significant difference in the reported illness between groups. Among all the illnesses reported, the percentage of cold and cough (22.6% vs 14.5%) was highest in both control and intervention groups followed by fever, at around (10%) from both groups.

Table 6.7 shows that the majority of infants from both groups who suffered any illness received treatment for pneumonia, fever and cold and cough. There was no significant difference between two groups**.** 13.8% of infants in the control group had received treatment for the management of diarrhoea.

Table 6.6: Reported illnesses of infants during 1st EPI visit

	Control	**Intervention**	**p value**
	(n=124)	(n=145)	
	freq. (%)	freq. (%)	
No illness reported	79 (63.7%)	104 (71.7%)	p=NS
Reported illnesses	**45 (36.3%)**	**41(28.3%)**	
Cold and cough	28 (22.6%)	21 (14.5%)	
Fever	12 (9.7%)	15 (10.3%)	
Diarrhoea	6 (4.8%)	0	
Pneumonia	9 (7.3%)	7 (4.8%)	
Others	1 (0.1%)	0	

Total number of responses is more than the total number of participants because of multiple responses

EPI= Expanded programme on immunization; NS= Not significant

Table 6.7: Infants who were treated for their illnesses reported during 1st EPI visit

Ill infants	Control (n=45) freq. (%)	Intervention (n=41) freq. (%)	p value
Treatment received	**27 (60%)**	**20 (48.8%)**	p=NS
Pneumonia	7 (24.1%)	7 (35%)	
Cold and cough	3 (10.3%)	5 (25%)	
Fever	6 (20.7%)	7 (35%)	
Fever, cold and cough	5 (17.5%)	1 (5%)	
Diarrhoea	4 (13.8%)	0	
Dysentery	1 (3.4%)	0	
Skin disease	1 (3.4%)	0	

Total number of responses is more than the total number of participants because of multiple responses

EPI= Expanded programme on immunization; NS= Not significant

In Table 6.8, significantly more mothers (34.7%, p<0.0001) from the control group experienced problems while breastfeeding. The equivalent figure was 9.7% in the intervention group.

Table 6.8: Breastfeeding problem reported by mothers during 1st EPI visit

Problem while breastfeeding	Control (n=43)* freq. (%)	Intervention (n=14) freq. (%)	p value *(p<0.0001)
Baby couldn`t suckle	2 (4.7%)	0	
Maternal feeling of low milk supply	13 (30.2%)	9 (64.3%)	
Lack of feeling full	18 (41.9%)	1 (7.1%)	
Milk doesn`t come to breast	5 (11.6%)	3 (21.4%)	
Baby doesn`t want to be fed	4 (9.3%)	0	
Excess breastmilk	1 (2.3%)	0	
Breast pain	0	1 (7.1%)	

EPI= Expanded programme on immunization

6.2.2 Second EPI Visit

During the 2nd EPI visit, 2 mothers from the control group and 1 mother from the intervention group reported that they had stopped breastfeeding their infants.

Table 6.9 shows that in the 2nd EPI visit, 66.1% of mothers from the control and 15.2% of mothers from the intervention group reported ADF, either fluid or solid and the difference between groups was highly significant (p<0.0001). Frequently given additional fluids in the control group were infant formula, sweetened water, water and diluted cow's milk. In the intervention group, infant formula, diluted cow's or goat's milk or powdered milk were added. The top three reasons for feeding additional fluid in both groups were breastmilk was insufficient, to satisfy hunger and thirst and baby needed more. Very few mothers from either group reported adding solid food to their infants' feed during 2nd EPI visit (7.3% in the control and 1.4% in the intervention group) (p<0.05). The main additional feeds were shuji (semolina) or rice gruel. Mothers started solid feeding early, mainly due to a family decision (44.4% in the control vs 100% in the intervention).

Table 6.9: ADF (fluid, semisolid or solid) during 2nd EPI visit

Time when ADF introduced (fluid / semisolid or solid)	**Control** (n=82) freq. (%)	**Intervention** (n=22) freq. (%)	**p value**
Time when fluid introduced postnatally			
	(n=82)*	(n=22)	*(p<0.000)
1st day	19 (23.2%)	2 (9.1%)	
2-15 days	21 (25.6%)	3 (13.6%)	
After 1 month	21 (25.6%)	3 (13.6%)	
1.5 to 2 months	21 (25.6%)	1 (4.5%)	
2.5 to 3 months	0	13 (59.1%)	
Types of fluid			
Infant formula	51 (62.2%)	14 (63.6%)	

Water sweetened with sugar or crystalline sugar	36 (43.9%)	4 (18.2%)	
Plain water	25 (30.5%)	0	
Diluted cow`s or goat milk	18 (22%)	5 (22.6%)	
Powdered milk	8 (9.8%)	7 (31.8%)	
Others	0	2 (9.1%)	
Reasons for introducing water or additional fluid			
To satisfy hunger & thirst	59 (72%)	11 (50%)	
Breastmilk is not enough	28 (34.1%)	17 (77.3%)	
Baby needed more	22 (27.2%)	10 (45.5%)	
To stop baby crying	20 (24.4%)	5 (22.7%)	
Baby couldn`t suckle the breast	12 (14.6%)	0	
To gain baby weight	12 (14.6%)	3 (13.6%)	
Family decision	12 (14.6%)	9 (40.9%)	
Household workload	4 (4.9%)	4 (18.2%)	
Others	11 (13.4%)	6 (27.3%)	
Time when semisolid or solid introduced	(n=9)**	(n=2)	**p<0.05
1.5 to 2 months	7 (77.8%)	1 (50%)	
3 months	2 (22.2%)	1 (50%)	
Types of semisolid or solid			
Shuji (semolina)	9 (100%)	1 (50%)	
Rice gruel	2 (22.2%)	1 (50%)	
Reasons for introducing semisolid or solid			
Family decision	4 (44.4%)	2 (100%)	
To gain baby weight	7 (77.8%)	0	
Increased need	4 (44.4%)	0	
Breastmilk is not enough	1 (11.1%)	0	
Mother ill	1 (11.1%)	1 (50%)	

Total number of responses is more than the total number of participants because of multiple responses

EPI= Expanded programme on immunization; ADF= Additional feeding

In Table 6.10, the majority (67.1% in control & 59.1% in intervention) of mothers from both groups did not find any difference in the wellbeing of their infants after giving additional fluid or solid. However, 30.5% of mothers from the control and

36.4% from the intervention group felt that their infants were more ill than before following ADF.

Table 6.10: Mothers' perception of infants' wellbeing after giving ADF (fluid, semisolid or solid) during 2nd EPI visit

Mothers' perception of infant`s wellbeing after adding fluid or solid during 2nd EPI visit	**Control** (n=82) freq. (%)	**Intervention** (n=22) freq. (%)
No change	55 (67.1%)	13 (59.1%)
More ill	25 (30.5%)	8 (36.4%)
Less ill	2 (2.4%)	1 (4.5%)0

EPI= Expanded programme on immunization; ADF= Additional feeding

In Table 6.11, 66.1% of infants from control group and 15.2% from the intervention group received fluids, semisolid or solid according to a 24-hour recall and this difference was highly significant (p<0.0001). Common feeds given were formula, water or sweetened water.

Table 6.11: A 24-hour recall of feeding other than breastfeeding during 2nd EPI visit

Types of ADF reported during 24-hour recall	**Control** (n=124) freq. (%)	**Intervention** (n=145) freq. (%)	**p value**
Nothing	42 (33.9%)	123 (84.8%)	
Received	**(82) (66.1%)***	**(22) (15.2%)**	*p<0.0001
Infant formula	46 (37.1%)	14 (9.7%)	
Plain water	23 (18.5%)	3 (2.1%)	
Diluted cow`s / goat milk	20 (16.1%)	5 (3.4%)	
Water sweetened with sugar / crystalline sugar	21 (16.9%)	3 (2.1%)	
Shuji (semolina)	6 (4.8%)	1 (0.7%)	
Family food, khichri and others	10 (8.1%)	6 (4.1%)	

EPI= Expanded programme on immunization; ADF= Additional feeding

As seen in Table 6.12, significantly (p<0.0001) more infants from the control group (70.2%) suffered from illness since the 1st EPI visit reported during 2nd EPI visit, compared to the intervention group (22.1%). For both groups, of those who reported illness, the majority of the infants had cold and cough (28.2% in control vs 11% in intervention). The second most common illness in the control was diarrhoea (25.8%) compared with 5.5% in the intervention group.

Table 6.12: Reported Illnesses of infants during 2nd EPI visit

	Control	**Intervention**	**p value**
	(n=124)	(n=145)	
	freq. (%)	freq. (%)	
No illness reported	37 (29.8%)	113 (77.9%)	
Reported Illness	87 (70.2%)*	32 (22.1%)	*P<0.0001
Cold and cough	35 (28.2%)	16 (11%)	
Diarrhoea	32 (25.8%)	8 (5.5%)	
Fever	24 (19.4%)	9 (6.2%)	
Pneumonia	13 (10.5%)	9 (6.2%)	
Others	2 (1.6%)	1 (0.7%)	

Total number of responses is more than the total number of participants because of multiple responses

EPI= Expanded programme on immunization

Table 6.13 describes the infants who received treatment for their illnesses reported during 2nd EPI visit. Significantly more infants in the control group were treated for their illnesses compared to intervention group (p<0.0001).

Table 6.13: Infants who were treated for their illnesses reported during 2nd EPI visit

Ill infants during 2nd EPI	Control (n=87) freq. (%)	Intervention (n=32) freq. (%)	p value
Treatment received	64 (73.6%)	26 (81.3%)*	*P<0.0001
Types of illness			
Diarrhoea	27 (42.2%)	6 (23.1%)	
Pneumonia	12 (18.8%)	9 (34.6%)	
Cold and cough	6 (9.4%)	3 (11.5%)	
Fever	8 (12.5%)	3 (11.5%)	
Fever with cold and cough	4 (6.3%)	3 (11.5%)	
Diarrhoea & fever	4 (6.3%)	2 (7.7%)	
Dysentery	2 (3.1%)	0	
Pneumonia & Diarrhoea	1 (1.6%)	0	

Total number of responses is more than the total number of participants because of multiple responses

EPI= Expanded programme on immunization

6.2.3 Third EPI visit

Table 6.14 shows that during the 3rd EPI visit, 70.9% of mothers from the control and 20% of mothers from the intervention group reported to adding either fluid (p<0.0001) or semisolid and solid (p<0.001), usually formula (62.5% in control vs 65.5% in intervention), diluted cow's milk (35.2% in control vs 31% in intervention) or water (33% in control vs 34.5% in intervention). The main reasons for adding additional fluid were that mothers thought breastmilk was not enough or the baby needed more. Few mothers from both groups introduced semisolid or solid to their infants, usually shuji or rice gruel.

Table 6.14: ADF (fluid, semisolid or solid) during 3rd EPI visit

Time when ADF (fluid, semisolid or solid) introduced	**Control** (n=88) freq. (%)	**Intervention** (n=29) freq. (%)	**p value**
Time when fluid introduced	(n=88)*	(n=29)	*(P<0.0001)
1st day	19 (21.6%)	2 (6.1%)	
2-15 days	21 (23.9%)	3 (10.3%)	
Completing 1 month	21 (23.9%)	2 (6.9%)	
1.5 to 2months	16 (18.2%)	2 (6.1%)	
2.5 to 3 months	6 (6.8%)	13 (44.8%)	
3.5 to 4 months	5 (5.7%)	7 (24.1%)	
Types of the fluid			
Infant formula	55 (62.5%)	19 (65.5%)	
Plain water	29 (33%)	10 (34.5%)	
Water sweetened with sugar / crystalline sugar	30 (34.1%)	6 (20.7%)	
Diluted cow`s or goat's milk	31 (35.2%)	9 (31%)	
Powder milk	7 (8%)	7 (24.1%)	
Others	2 (2.3%)	7 (24.1%)	
Reasons for introducing additional fluid			
Breastmilk is not enough	62 (70.5%)	23 (79.3%)	
Baby needed more	61 (69.3%)	21 (72.4%)	
To gain weight	27 (30.7%)	11 (37.9%)	
To satisfy hunger-thirst	23 (26.1%)	10 (34.5%)	
Family decision	15 (17%)	13 (44.8%)	
Household workload	13 (14.8%)	7 (24.1%)	
To stop baby crying	5 (5.7%)	0	
Baby couldn`t suckle breast	4 (4.5%)	0	
Others	3 (3.4%)	3 (10.3%)	
Time when semisolid or solid introduced			
	(n=14)**	**(n=4)**	** (p<0.001)
1.5 to 2 months	8 (57.1%)	1 (25%)	
3 months	5 (35.7%)	1 (25%)	
3.5 to 4 months	1 (7.1%)	2 (50%)	
Types of semisolid or solid			
Shuji (semolina)	14 (100%)	3 (75%)	

Rice gruel	8 (57.1%)	3 (75%)
Banana /Other fruits	2 (14.3%)	2 (50%)
Khichri	0	1 (25%)
Reasons for introducing semisolid or solid		
Family decision	5 (35.7%)	4 (100%)
To gain baby weight	13 (92.9%)	2 (50%)
Breastmilk is not enough	6 (42.9%)	1 (25%)
Increased need	6 (42.9%)	2 (50%)
Family decision	5 (35.7%)	4 (100%)
Others	0	2 (50%)

EPI= Expanded programme on immunization; ADF= Additional feeding

In Table 6.15, more than half of mothers (59.3%) in the control group reported that they did not notice any difference in their infant's wellbeing while introducing fluid, semisolid or solid and no statistical significance was observed. More mothers in the intervention group felt that their infants were ill after introducing any kind of feeding other than breastfeeding.

Table 6.15: Mothers' perception of infants' wellbeing after giving ADF (fluid, semisolid or solid) during 3rd EPI visit

Mothers' perception of infant`s wellbeing after giving ADF (fluid, semisolid or solid)	**Control** (n=86) freq. (%)	**Intervention** (n=29) freq. (%)
No change	51 (59.3%)	14 (48.3%)
More ill	33 (38.4%)	15 (51.7%)
Less ill	2 (2.3%)	0

EPI= Expanded programme on immunization; ADF= Additional feeding

In Table 6.16, significantly more infants (67.7%) from the control group received additional feeds reported in the 24-hour recall during 3rd EPI visit.

Table 6.16: A 24-hour recall of feeding other than breastfeeding during 3rd EPI visit

24hour recall (other than breast milk)	**Control** (n=124) freq. (%)	**Intervention** (n=145) freq. (%)	**p value**
Nothing	40 (32.3%)	116 (80%)	
Received	**84 (67.7%)***	**29 (20%)**	*p<0.0001
Infant formula	49 (39.5%)	19 (13.1%)	
Diluted cow`s or goat's milk	29 (23.4%)	5 (3.4%)	
Plain water	20 (16.1%)	7 (4.8%)	
Shuji (semolina)	14 (11.3%)	3 (2.1%)	
Water sweetened with sugar / crystalline sugar	9 (7.3%)	4 (2.8%)	
Khichri	1 (0.8%)	1 (0.7%)	
Others	11 (8.9%)	13 (9%)	

Total number of responses is more than the total number of participants because of multiple responses

EPI= Expanded programme on immunization

In Table 6.17, 51.6% from the control and 18.6% of mothers from the intervention reported their infants' illness since the 2nd EPI visit to 3rd EPI visit which was highly significant (p<0.0001). Of those who reported an illness, most infants in the control group suffered from fever (23.4%) whereas diarrhoea (8.3%) was reported in the intervention group.

Table 6.18 shows that the majority of the infants (70.3% in control vs 81.5% in intervention) received treatment for their illnesses.

Table 6.17: Reported Illnesses of infants during 3rd EPI visit

	Control	Intervention	p value
	(n=124)	(n=145)	
	freq. (%)	freq. (%)	
No illness reported	60 (48.4%)	118 (81.4%)	
Reported illnesses	**64 (51.6%)***	**27 (18.6%)**	*p<0.0001
Cold and cough	23 (18.5%)	9 (6.2%)	
Fever	29 (23.4%)	4 (2.8%)	
Diarrhoea	7 (5.6%)	12 (8.3%)	
Pneumonia	15 (12.1%)	3 (2.1%)	
Others	5 (4.03%)	4 (2.8%)	

Total number of responses is more than the total number of participants because of multiple responses

EPI= Expanded programme on immunization

Table 6.18: Infants who were treated for their illnesses reported during 3rd EPI visit

Ill infants	Control	Intervention	p value
	(n=64)	(n=27)	
	freq. (%)	freq. (%)	
Treatment received	**45 (70.3%)**	**22 (81.5%)**	p<0.0001
Pneumonia	14 (31.1%)	4 (18.2%)	
Cold & cough	2 (4.4%)	3 (13.6%)	
Fever	16 (35.6%)	1 (4.5%)	
Fever with cold & cough	2 (4.4%)	1 (4.5%)	
Diarrhoea	7 (15.6%)	11 (50%)	
Diarrhoea & fever	0	1 (4.5%)	
Dysentery	1 (2.2%)	0	
Pneumonia & Diarrhoea	0	0	
Skin disease	3 (6.7%)	0	
Chicken pox & fever	0	1 (4.5%)	

EPI= Expanded programme on immunization; ADF= Additional feeding

6.2.4 Fourth EPI Visit

Out of 120 infants from the control group, 117 were still breastfed during the 4th EPI visit. However, 4 mother-infant pairs declined the 4th interview. In the intervention group, 144 infants were still breastfed during the 4th EPI visit. And significantly more mothers (78.6%, 114/145) in the intervention group exclusively breastfed reported during 4th EPI visit compared to 29.2% (35/120) in the control group (p<0.0001).

Table 6.19 shows that during the 4th EPI visit, 70.8% mothers from the control and 21.4% mothers from the intervention group reported adding additional feeds, either fluid or semisolid and solid, usually formula (62.4% in control vs 67.7% in intervention, p=NS), or water (50.6% in control vs 29% in intervention). The main reasons for adding these additional feeds were mothers thought breastmilk was not enough, baby needed more or to gain weight.

Table 6.19: ADF (fluid, semisolid or solid) during 4th EPI visit

Time when ADF (fluid, semisolid or solid) introduced	**Control** (n=85) freq. (%)	**Intervention** (n=31) freq. (%)	**p value**
Time when fluid introduced	(n=85)*	(n=31)	*(p<0.0001)
1st day post-natally	19 (22.3%)	2 (6.5%)	
2-15 days post-natally	20 (23.5%)	3 (9.7%)	
After 1 month	21 (24.7%)	2 (6.5%)	
1.5 to 2months	16 (18.8%)	2 (6.5%)	
2.5 to 3 months	5 (5.8%)	13 (41.9%)	
3.5 to 4 months	4 (4.7%)	7 (22.6%)	
5 to 6 months	0	2 (6.5%)	
Types of the fluids			
Infant formula	53 (62.4%)	21 (67.7%)	
Diluted cow`s or goat's milk	38 (44.7%)	6 (19.4%)	
Plain water	43 (50.6%)	9 (29%)	

Water sweetened with sugar / crystalline sugar	30 (35.3%)	4 (12.9%)	
Powder milk	8 (9.4%)	7 (22.6%)	
Others	3 (3.5%)	7 (22.6%)	
Reasons for introducing fluid			
Breastmilk is not enough	63 (74.1%)	22 (71%)	
Baby needed more	58 (68.2%)	23 (74.2%)	
To gain weight	22 (25.9%)	13 (41.9%)	
To satisfy hunger and thirst	15 (17.6%)	7 (22.6%)	
Family decision	14 (16.5%)	7 (22.6%)	
Household workload	12 (14.1%)	6 (19.4%)	
Others	9 (10.6%)	5 (16.1%)	
Time when semisolid or solid introduced (months)			
	(n=20)**	(n=8)	**(p<0.001)
1.5 to 2	9 (45%)	1 (12.5%)	
3 to 3.5	5 (25%)	1 (12.5%)	
4 to 4.5	6 (30%)	4 (50%)	
5 to 6	0	2 (25%)	
Types of semisolid or solid			
Shuji (semolina)	20 (100%)	6 (75%)	
Rice gruel	7 (35%)	3 (37.5%)	
Biscuits	3 (15%)	2 (25%)	
Banana /Other fruits	2 (10%)	4 (50%)	
Khichri / Family foods and others	3 (15%)	5 (62.5%)	
Reasons for introducing semisolid or solid			
Family decision	7 (35%)	5 (62.5%)	
Breastmilk is not enough	13 (65%)	4 (50%)	
Increased need	14 (70%)	3 (37.5%)	
To gain weight	13 (65%)	2 (25%)	
Others	1 (5%)	2 (25%)	

EPI= Expanded programme on immunization; ADF= Additional feeding

In Table 6.20, the majority of mothers from the control and intervention groups (58.1% vs 73.3%) felt there was not any change to their infants' wellbeing after giving additional feeding.

Table 6.20: Mothers' perception of infants' wellbeing after giving ADF (fluid, semisolid or solid) during 4th EPI visit

Mothers' perception of infant's wellbeing after introducing fluid, semisolid or solid	**Control** (n=82) freq. (%)	**Intervention** (n=30) freq. (%)
No change	50 (58.1%)	22 (73.3%)
More ill	29 (33.7%)	7 (23.3%)
Less ill	3 (3.5%)	1 (3.3%)

EPI= Expanded programme on immunization; ADF= Additional feeding

In Table 6.21, 70% infants from the control group received fluid, semisolid or solid as additional feeds from the 24 hour-recall during 4th EPI visit as opposed to 18.6% in the intervention group (p<0.0001).

Table 6.21: A 24-hour recall of feeding other than breastfeeding during 4th EPI visit

24-hours recall (other than breastmilk)	**Control (n=120)** freq. (%)	**Intervention (n=145)** freq. (%)	**p value**
Nothing	36 (30%)	118 (81.4%)	
Received	**84 (70%)***	**27 (18.6%)**	*p<0.0001
Infant formula	50 (41.7%)	20 (13.8%)	
Plain water	33 (27.5%)	12 (8.3%)	
Diluted cow`s or goat's milk	26 (21.7%)	7 (4.8%)	
Water sweetened with sugar or crystalline sugar	11 (9.2%)	2 (1.4%)	
Shuji (Semolina)	17 (14.2%)	7 (4.8%)	
Family food	0	3 (2.1%)	
Khichri	1 (0.8%)	1 (0.7%)	
Others	11 (9.2%)	17 (11.7%)	

Total number of responses is more than the total number of participants because of multiple responses

EPI= Expanded programme on immunization

In Table 6.22, although more infants in the control group than in intervention group suffered illnesses, no statistical significance was observed.

Table 6.22: Reported illnesses of infants during 4th EPI visit

	Control	**Intervention**	**p value**
	(n=120)	(n=145)	
	freq. (%)	freq. (%)	
No illness reported	61 (50.8%)	90 (62.1%)	
Reported illnesses	**59 (49.2%)**	**55 (37.9%)**	p=NS
Cold and cough	12 (20.3%)	24 (43.6%)	
Fever	13 (22.0%)	18 (32.7%)	
Diarrhoea	30 (50.8%)	7 (12.7%)	
Pneumonia	7 (11.9%)	5 (9.1%)	
Others	6 (10.2%)	5 (9.1%)	

Total number of responses is more than the total number of participants because of multiple responses

EPI= Expanded programme on immunization; NS= Not significant

Table 6.23 shows that more infants in the control group than in the intervention group were treated for their illnesses.

Table 6.23: Infants who were treated for their illnesses reported during 4th EPI visit

Ill infants	**Control**	**Intervention**	**p value**
	(n=59)	(n=55)	
	freq. (%)	freq. (%)	
Treatment received	**48 (81.4%)**	**22 (40%)**	p=NS
Pneumonia	7 (14.3%)	6 (27.3%)	
Cold and cough	3 (6.3%)	0	
Fever	7 (14.3%)	5 (22.7%)	
Fever with cold and cough	2 (4.2%)	0	
Diarrhoea	27 (56.3%)	7 (31.8%)	
Others	3 (6.3%)	4 (18.2%)	

EPI= Expanded programme on immunization

Table 6.24 shows the association between PF and breastfeeding establishment. A significant association between fewer PF and breastfeeding establishment in first hour in intervention group was observed (p<0.001). No significant association was found in the control group.

Table 6.24: Association between PF and breastfeeding initiation time

PF (113)	**BF in 1st hour (36)**	**BF in >=6 hours (77)**	**p value**
	freq. (%)	freq. (%)	
I (11)*	**I** 2 (5.6%)*	**I** 9 (11.7%)	*p<0.001
C (102)	**C** 34 (94.4%)	**C** 68 (88.3%)	

PF= Prelacteal feeding; I= Intervention group; C= Control group

In Table 6.25, there was a significant association between PF and Caesarean delivery was observed in the intervention group (p<0.01) where more mothers who had Caesarean delivery added PF as first feed to their infant. No such association was found in the control group.

Table 6.25: Association between PF and mode of delivery

PF (114)	**NVD**	**C/S**	**p value**
	(n=53)	(n=61)	
	freq. (%)	freq. (%)	
I (n=12)*	**I** 2 (3.8%)	**I** 10 (16.4%)*	*p<0.01
C (n=102)	**C** 51 (96.2%)	**C** 51 (83.6%)	

PF= Prelacteal feeding; I= Intervention group; C= Control group; C/S= Casarean section

Table 6.26 shows the association between PF and ADF (fluid) during the all the EPI visits. The infants who had received PF significantly received additional fluid ($p<0.0001$) during 1st, 2nd, 3rd and 4th EPI in both groups.

Table 6.26: PF & fluid given reported during 1st , 2nd , 3rd and 4th EPI visits

PF (n=114)	**Additional fluid added**				**p value**
	1st EPI (n=52) freq. (%)	**2nd EPI** (n=91) freq. (%)	**3rd EPI** (n=9) freq. (%)	**4th EPI** (n=91) freq. (%)	P<0.0001
I (12)	**I** 5 (9.6%)	**I** 12 (13.2%)	**I** 12 (12.9%)	**I** 12 (13.2%)	
C (102)	**C** 47 (90.4%)	**C** 79 (86.8%)	**C** 81 (87.1%)	**C** 79 (86.8%)	

PF= Prelacteal feeding; I= Intervention group; C= Control group; EPI= Expanded programme on immunization

In Table 6.27, there was a significant association between mode of delivery and breastfeeding initiation time in the control group. Significantly more mothers in the control group who had a normal delivery, initiated breastfeeding in the first hour ($p<0.001$) compared to mothers who had received a C/S. Although no significant association was found between mode of delivery and breastfeeding initiation time in the intervention group, more mothers who had a normal delivery establish breastfeeding in the first hour.

Table 6.27: Association between mode of delivery & breastfeeding initiation time

Mode of delivery	**BF 1st hour** (n=39) freq. (%)	**BF >=6 hours** (n=85) freq. (%)	**p value**
Control (n=124)			
NVD (n=61)*	35 (89.7%)*	26 (30.6%)	*p<0.001
C/S (n=63)	4 (10.3%)	59 (69.4%)	
Intervention (n=144)	**(125)**	**(19)**	
NVD (n=81)	74(59.2%)	7(36.8%)	
C/S (n=63)	51(40.8%)	12(63.2%)	

BF= Breastfeeding; NVD= Normal vaginal delivery; C/S= Caeserean section;

Table 6.28 shows a significant association between maternal age and breastfeeding establishing time in the intervention group ($p<0.05$). No significance was determined in the control group.

Table 6.28: Association between maternal age and breastfeeding initiation time

Maternal age	**BF 1st hour**	**BF >= 6 hours**	
(n=257)	(n=155)	(n=102)	
	freq. (%)	freq. (%)	
Teen mothers (15-19yrs)			
I (n=34)	**I** 25 (16.1%)	**I** 9 (8.8%)*	*p<0.05
C (n=29)	**C** 13 (8.4%)	**C** 16 (15.7%)	
20yrs & over			
I (n=101)	**I** 92 (59.4%)	**I** 9 (8.8%)	
C (n=93)	**C** 25 (16.1%)	**C** 68 (66.7%)	

BF= Breastfeeding; I= Intervention group; C= Control group

6.3 Discussion

This chapter of the TBA-led intervention study accumulated all the information about the infant feeding practices between the two groups collected during interviewing the mothers from both groups. Infant feeding practices between birth and 5 to 6 months period were compared between the control group who did not receive breastfeeding advice and the intervention group that received the breastfeeding advice and visited by the TBAs.

The TBA-led intervention effectively improved early feeding practices, delaying adding fluid and or semisolid or solid food. In addition, infants in the intervention group suffered fewer illnesses, which might have been associated with lower morbidity as well as better growth (see chapter seven) in that group. PF especially traditionally practiced PF was less common in the intervention group who likely established first hour initiation of breastfeeding. Provision of breast milk within

one hour of birth ensures that the infant receives essential colostrum which is rich in immunoglobulins and nutrients vital for growth and immunity (Godhia and Patel, 2013). In contrast, PF tends to have no or fewer nutrients and no immunological components as opposed to breastmilk (Goyle *et al.,* 2004). Some traditionally practised poor quality prelacteal feeds can be harmful for newborns and have been associated with suboptimal breastfeeding practices (Sundaram *et al.,* 2016). Studies have found that honey, water sweetened with sugar or crystalline sugar (sucrose) are widely practiced as prelacteal or early neonatal feeds in many rural and urban areas of Bangladesh (Tarannum & Hayder, 1998; Sundaram *et al.,* 2013; Joshi *et al.,* 2014). The practice of PF in the TBA-led intervention study was consistent with other reports of PF in rural Bangladesh (Sundaram *et al.,* 2013; Joshi *et al.,* 2014; Sundaram *et al.,* 2016).

Mothers who fed ENF in the first 24 to 72 hours after birth were more likely to feed PF in the first week as well as additional early feeding. In addition, a reported perception of milk insufficiency and difficulty suckling were more common among the mothers fed ENF or PF. Mothers who practiced ENF or PF were likely to continue early additional feeding in order to try to nourish their infants. Studies have suggested that perception of breastmilk insufficiency led mothers to add some food until breastfeeding was established (Sachdev and Mehrotra, 1995; Gatti, 2008; Wood *et al.,* 2017). This study suggested that mothers who established breastfeeding in the first hour were less likely to feed ENF or PF. Alternatively, mothers who reported difficulty in suckling were more likely to establish breastfeeding later and top-up with ENF, PF in the first week. In support of this finding, a secondary analysis has shown that perceived inability to suckle after birth was closely related to the risk of an infant being fed ENF (Sundaram *et*

al., 2013) and identified this problem as a “vicious cycle,” where difficulty in suckling leads to feeding ENF or PF, which ultimately leads to reduced suckling desire and behaviour (Sundaram *et al.,* 2013).

In this study, mode of delivery was found to have had some influence on breastfeeding. Mothers who had a normal vaginal delivery were prone to initiate breastfeeding earlier than mothers who had a caesarean delivery. A number of studies have been conducted to investigate whether the mode of delivery influenced other establishment of breastfeeding. A Caesarean delivery has been reported to be one major barrier to the early initiation of breastfeeding as well as a lower duration of exclusive breastfeeding (Rowe-Murray and Fisher, 2002; Patel, Banerjee and Kaletwad, 2013; Khanal *et al.,* 2015) and increased risk of PF (Karkee *et al.,* 2014). Our study also found that the infants who were delivered by CS were also at risk of not being breastfed within the first hour of birth. This might be due to the effect of anaesthesia which reduces maternal alertness, operational procedure, maternal tiredness and inadequate maternal skills to initiate breastfeeding (Patel, Banerjee and Kaletwad, 2013; Khanal *et al.,* 2015).

Previous literature has shown that PF is associated with multiple factors such as mode of delivery and place of delivery, mother’s education, occupation, size at birth and geographical region. Mode of delivery was a significant predictor of PF in the study infants. Fewer illnesses in the infants of the intervention group throughout the four EPI visits clearly showed the impact of the intervention compared to the control group. A better knowledge of breastfeeding among mothers of the intervention group was most likely the main driver of the fewer illnesses in the infants in this group. There was on average a low level of knowledge about breastfeeding prior to the intervention across both groups. Only

8.5% of women had knowledge of exclusive breastfeeding practice in this study and the majority of them (62%) heard breastfeeding advice from their mothers and or mothers-in-law. It has shown that an education-based approach can help promote and protect breastfeeding practice. There is a wealth of research on education-based approaches to promoting breastfeeding with nurses, pregnant women, peer counsellors and mothers (Brown *et al.*, 1992; Haider *et al.,* 2000; Haque *et al.,* 2002; Cantrill, Creedy and Cooke, 2003a; Cantrill, Creedy and Cooke, 2003b; Tylleskär *et al.*, 2011; Schwartz *et al.*, 2015).

There are several factors that have been identified as being associated with successful promotion of behaviour change. This includes the use of messages that are clearly understood, easy to adopt within available resources, and not in contradiction with prevailing beliefs. The aim of the intervention was to reach the mothers through channels that are credible, so that the messages could be delivered consistently and with enough intensity to motivate the mothers to practice and sustain new behaviours to promote improved child feeding behaviour. It appeared that the education session worked well and exclusively breastfed infants continued to grow better until age 5 months (see chapter seven) and suffered less illness.

Mothers, especially the teen mothers, who had a baby for the first time needed extensive support and confidence to breastfeed. Among the first-time pregnant mothers and the teen mothers, there was some lack of confidence regarding childcare and breastfeeding. Even for the multipara mothers who had their second or third child during the randomization to the intervention group, this might have given them more confidence this time to practice exclusive breastfeeding behaviour. In the intervention group, mothers had a chance to discuss all their

difficult situations during their child birth including breastfeeding problems with the TBAs. Mothers could contact their allocated TBA and discuss their problems when the TBA visited their home or contact them via a mobile phone. TBAs won mothers' trust and mothers were also relieved to share their stories and difficult situations. Although there was no difference in the age, education or demographic characteristics between two groups, the intervention seemed to have positive impact on the growth and morbidity of the infants in the intervention group which could be directly linked to the education received.

While the potential benefits of exclusive breastfeeding for the first 6 months is well-established, an increased knowledge of recommended breastfeeding-related practices is important and an improved understanding of mothers' beliefs and attitudes are integral to providing more effective exclusive breastfeeding practice efforts in Bangladesh. In this study, results from the rate of exclusive breastfeeding and 24-hour recalls indicated that there was a gap between mothers' knowledge about exclusive breastfeeding and actual exclusive breastfeeding practices. However, any information that is self-reported relies on mothers' memory and mothers' honesty. In addition, it is feasible that mothers may not have fully understood the education session. However, this suggestion is not borne out by the findings from the intervention group. To establish any breastfeeding promotional programme in the rural community of Bangladesh, it is important to know in depth about the mothers' knowledge and attitude including other influential factors such as religious views, traditional practices and other family members' attitudes.

To work on culturally practiced improper feeding practices, it is beneficial to understand mothers' source of knowledge and beliefs. During the antenatal

interview, the majority of mothers' response to the source of breastfeeding advice was mother and mother-in-law of the study participants (62%) (see chapter five) and ENF and PF were advised by the TBAs or mother or mother-in-law. In many studies, it was believed that breastmilk alone is not enough for the baby (Mishrshahi *et al.,* 2007; Swigart *et al.,* 2017).

In rural Bangladesh, the majority of the births take place at home (62%) and of them, above 56% of deliveries are assisted by locally practiced TBAs or elder relatives (The Millennium Development Goals, 2013). Delivery by TBA or an elder relative is an established cultural practice in many parts of Bangladesh. A recent study conducted to find the reasons for a preference home delivery by TBAs showed multiple barriers such as poverty, traditional views, religious misconceptions, travel distance combined with availability of transportation. Therefore, in a joint family, women are not allowed to take any decision, these are made by elder family members. A fear of Caesarean delivery at hospital, unawareness of service delivery points and a lack of female doctors in health care facilities may make mothers prefer to be delivered by TBAs who are women (Sarker *et al.,* 2016).

However, a shortage of staff in the health sector especially in rural areas is also a burden to provide equal health service in every part of Bangladesh. Bangladesh has approximately five physicians and two nurses per 10,000 population and the ratio between nurses and physicians is merely 0.4 (Ahmed *et al.,* 2011). 41% of women from rural areas do not have any antenatal visit from medically trained persons. Many poor families in rural areas prefer a delivery at home due to the lower cost of a TBA. However, as local inhabitants, TBAs are regarded as very

trustworthy and familiar and women feel more comfortable giving birth at home in familiar surroundings with known faces ((Sarker *et al.,* 2016). In many places, religious restrictions, conservativeness and strict rules of maintaining the Islamic principle of the veil also limit the mobility of women.

Whether by choice or out of necessity, the community has a very strong faith in TBAs. Bringing them in the public health service to improve infant feeding practices in the rural parts especially in the areas with limited access to health facilities of Bangladesh seems to be convenient, cost effective and beneficial to reduce infant mortality due to harmful traditional infant feeding practices. In the 1970s, interventions had been developed and implemented relying on TBAs relevant to rural communities in developing countries where 47 percent of births are assisted by TBAs or by family members to improve maternal child health (Saravanan *et al.,* 2010). In many parts of Africa, birth attendants have become part of the healthcare system, where they were trained to provide many services like malaria prevention to pregnant women and perinatal transmission of HIV. TBAs in India are also trained to assess and provide prophylactic management to neonatal sepsis (Bang *et al.,* 1999; Nahlen, 2000; Bulterys *et al.*, 2002).

There were some limitations of the TBA-led intervention. The study was completely based on a questionnaire and during the interview sessions, mothers were asked to look back at what they have practiced. As a questionnaire-based study, it entirely relies on respondent's memories and the quality of data based on recalling memories is not strong. However, there is no way of determining how much a respondent thought about their answers and how truthful mothers are being. It is also possible that mothers might tend to say what was expected rather than what they were really practicing. Although the questionnaires were piloted

and some changes were made based on the respondents' answer, it might be possible that some important factors were missed based on assumptions. This is a limitation of questionnaire-based research especially in developing countries, rural areas with limited education and in a resource poor environment.

In conclusion, this study demonstrated that TBA-led breastfeeding advice from an intervention can lead to positive outcomes with respect to ideal infant feeding practices amongst rural Bangladeshi mothers and supports the suggestion that such interventions could be extended across the country in a cost-effective manner.

Chapter Seven:

Impact of intervention on infants' growth

Chapter 7: Impact of intervention on infants' growth

7.1 Introduction

Malnutrition among children aged under five years is a major public health problem in Bangladesh. Although there has been some improvement in under-five year olds' nutritional status over the past decade, prevalence of malnutrition is still among the highest in the world (NIPORT *et al.,* 2013; Save the Children, 2015; NIPORT *et al.,* 2016). Despite exhibiting a declining trend since the last demographic survey, the most recent estimate from BDHS 2014, indicates the nutritional status of children compared with the WHO Child Growth references have showed approximately 36 percent of children aged under five years were stunted (short for age, below -2SD) and 12 percent were severely stunted (below -3 SD), approximately 14 percent were wasted (thin for height) and 33 percent were underweight (thin for age) (NIPORT *et al.,* 2016). Of the underweight children, 19 percent were aged below 6 months which continued to increase with age and reached highest level of 38 percent at age 48-59 months. Similarly, the percentage of chronically malnourished children also increased with age, from 14 percent among the children aged under 6 months to 46 percent of children aged 18-23 months (NIPORT *et al.,* 2016). The rate of underweight and stunted children were more likely to be higher in rural areas: underweight constituting 35% of children in rural areas compared with 26% of children in urban areas and stunting was 38% compared with 31%. Approximately 20% of babies in Bangladesh are born stunted, with half of all stunting in under-fives occurring before birth (Save the Children, 2015).

Tackling maternal and child malnutrition at an early stage could prevent around 45% of child death (Black *et al.,* 2013). The long-term impact of child malnutrition can be irreversible which leads to lifelong consequences for a child's physical and cognitive development. These chronically malnourished children may have to late enrolment & poor performances at school and 20% less earning power than other children (Grantham-McGregor *et al.*, 2007). The economic burden of malnutrition for the Bangladeshi government is huge - an estimation of US$ 1 billion a year - a 2-3% loss of national income (FAO, 2012). On the other hand, mild under weight has a stronger correlation with child mortality than for severe under weight. A study, among children aged between 3 months and 3 years through demographic and health surveys in 53 countries over a period from 1986 to 2006 found that the variance in mild underweight has a larger and more strong correlation with child mortality than variance in severe underweight which could be a useful sign of the public health condition of preschool children in developing countries (Bhagowalia, Chen and Masters, 2011). The major drivers of infant malnutrition and malnutrition-associated death are still a major cause of infant mortality in rural as well as urban areas. Ideal feeding practices including optimum breastfeeding practices play a vital role in optimum nutrition of the infant. It is important for infant survival and growth for a mother to receive optimal breastfeeding advice, ideally during the ante-natal and early post-natal period and to monitor the growth of the child. With this in mind, this TBA-led intervention study examined the role of delivering health education and advice by the TBA to establish healthy breastfeeding practices at a very early stage. Here TBAs who engage with pregnant women have a window of opportunity to influence pregnant

women about positive health choices and breastfeeding practices from regular contact and the building of relationships through continuity of care.

One of the key aims of this study was to look at the impact of the TBA-led intervention on early infant growth into two populations; the control group whose mothers did not receive targeted breastfeeding advice and the intervention group who did receive the breastfeeding advice. Infant weights and lengths measured at the 1st (0 to 1½months), 2nd (2months) 3rd (3 to 4 months) and 4th (5 to 6 months) EPI visits have been summarised in this chapter. Of the 219 infants whose birth weights were measured on the day of their birth, was collected during first postnatal interview.

7.2 Assessing growth of infants

The growth status of the infants in the TBA-led study was compared with the WHO Child Growth reference data. The WHO growth reference data is based on a sample of healthy children growing in an ideal environment to achieve a child's full genetic growth potential. The diversity in ethnicity, culture and genetics are also added to the international standard and can therefore be used to determine the nutritional status of children all over the world without consideration of any other influences (de Onis *et al.,* 2004; WHO, 2008). The WHO considers breastfed children as the standardised model for growth and development and shows how children should grow under optimum conditions with ideal infant feeding and child health practices. The WHO Multicentre Growth Reference Study (MGRS) and standard indices of physical growth in z-scores are explained in detail.

In this chapter, the growth outcomes were presented first for the control and intervention groups, then compared with WHO references.

7.2.1 The WHO Growth references

For the assessment of the growth and development of infants and young children from around the world, the WHO Multi Growth Reference Study (MGRS) generated new growth curves (WHO, 1999; WHO, 2008). Children from six countries including Brazil, Ghana, India, Norway, Oman and United States are represented in the growth curves. These WHO MGRS procedures act as a model training manual for any research settings. WHO measurements were weight, length, head circumference, arm circumference, triceps skinfold and subscapular skin fold (de Onis *et al.,* 2004).

Indicators of physical growth that describe the nutritional status of children are:

• Height-for-age (stunting) z-score

• Weight-for-height (wasting) z-score

• Weight-for-age (underweight) z-score

Height-for-age (HAZ) z-score measures linear growth compared against the reference. A child who lies below two standard deviations from the WHO reference median (-2 SD) in terms of height-for-age is considered short for age and more than three standard deviations (-3 SD) is considered severely stunted. Stunting indicates the progressive effect of chronic malnutrition where children have not received adequate nutrition over a long period, and where there may

have been repetitive and chronic illness, rather than their current nutritional status.

Weight-for-height (WAH) z-score reflects recent nutritional status. A child who is more than two standard deviations below (-2 SD) the reference median for weight-for-height is considered to be too thin for his or her height or wasted. Current nutritional deficit is measured by wasting and considered to be more severe than stunting if wasting is more than three standard deviations below the reference median. The risk of mortality increased with severe wasting.

Another indicator is weight-for-age (WAZ) z-score. A child whose weight-for age is below two standard deviations (-2 SD) from the median of the reference population is classified as underweight and below three standard deviations (-3 SD) from the median of the reference population is considered severely underweight. Weight-for-age is an overall indicator of a population's nutritional health.

Details on how the infants' weight and length were measured throughout the study period are explainedd in methodology chapter (see chapter four).

7.3 Results

As seen in Table 7.1, the percentage of male infants was slightly higher in both groups compared to female infants and home delivery with TBAs was common in both groups. The percentage of low birth weight (LBW) (<2.5 kg) in this study was 21.4% and comparable in the control and intervention groups (20.2% vs 22.3%). The Chi-square shows no significant difference in LBW in infants between groups.

Table 7.1: Characteristics of 269 infants during 1st EPI visit

Characteristics	Control (n=124) freq. (%)	Intervention (n=145) freq. (%)	p value
Gender			
Male	64 (51.6%)	78 (53.8%)	
Female	60 (48.4%)	67 (46.2%)	
Mode and place of delivery			
Home delivery with a TBA	40 (32.3%)	72 (49.7%)	
C/S at govt. hospital or UHC	3 (2.4%)	2 (1.4%)	
NVD at private clinic	10 (8.1%)	10 (6.9%)	
C/S at private clinic	71 (57.3%)	61 (42.1%)	
Birth weight (kg)	(n=89)	(n=130)	
Birth weight (Mean±SD)	2.80 ± 0.41	2.75± 0.37	p=NS
<2.5 (LBW)	18 (20.2%)	29 (22.3%)	
2.5 and over	71 (79.7%)	101 (77.7%)	

EPI= Expanded programme on immunization; NVD= Normal vaginal delivery; C/S= Caesarean section; UHC= Upazila health complex; TBA= Traditional birth attendant; LBW= Low birth weight; NS= Not significant

Table 7.2 shows that mean weight in the control group during 1st EPI visit was significantly higher ($p<0.001$) than the intervention group. Mean weight during 2nd, 3rd and 4th EPI visits were greater in the intervention group compared to the control but did not reach statistical significance on any occasion. Mean length in the control group during 1st EPI was significantly higher ($p<0.05$) than in the intervention group. At the 2nd, 3rd and 4th EPI visits, length in the intervention group was consistently higher than the control group, but again, no statistically

significant difference was seen. During the 1st EPI, mean BMI for the control group was significantly higher than the intervention group ($p<0.05$). However, from the 2nd EPI onwards, BMI was greater in the intervention group, but this did not reach statistical significance.

Table 7.2: Weight, length and BMI of the infants from birth to 4th EPI visit (Mean±SD)

		1st EPI	2nd EPI	3rd EPI	4th EPI	p value
Birth weight			**Weight in kg**			
C	2.80±0.40 (n=89)	3.37±0.54* (n=124)	5.07±0.90 (n=124)	5.72±0.72 (n=124)	6.21±0.71 (n=120)	*p<0.001
I	2.75±0.37 (n=130)	3.09±0.41 (n=145)	5.12±0.68 (n=145)	5.81±0.65 (n=145)	6.38±0.76 (n=145)	
			Length in cm			
C		49.63±2.71** (n=124)	53.74±2.04 (n=124)	56.29±1.81 (n=124)	58.42±2.18 (n=120)	**p<0.05
I		48.89±1.64 (n=145)	53.85 ±2.16 (n=145)	56.43±2.58 (n=145)	58.68±3.10 (n=145)	
			BMI in kg/m^2			
C		13.69±2.07*** (n=124)	17.50±2.71 (n=124)	18.01±1.88 (n=124)	18.16±1.40 (n=120)	***p<0.05
I		12.93±1.64 (n=145)	17.63±1.89 (n=145)	18.23±1.65 (n=145)	18.50±1.38 (n=145)	

C=control, I=Intervention; BMI= Body mass index; EPI= Expanded programme on immunization

Table 7.3 shows the changes in weight, length and BMI of the infants during the 1st, 2nd, 3rd and 4th EPI visits. Weight gain of the infants in the control group was significantly greater compared to the intervention group (p<0.0001) at the 1st EPI visit. However, at the 2nd EPI visit, weight gain of the infants in the intervention group was significantly greater compared to the control group (p<0.0001). During the 3rd and 4th EPI visits, the infants in the intervention group gained more weight compared to the control group but this did not reach statistical significance. In the 2nd EPI visit, the gain in length in the intervention group was significantly greater (p<0.0001) compared to the control group. Similarly, for gain in BMI, this was also greater in the intervention group during the 2nd EPI visit compared to the control (p<0.05).

Table 7.3: Changes in weight, length and BMI in the study infants (Mean±SD)

	1st EPI	2nd EPI	3rd EPI	4th EPI	p value
Changes in weight (kg)	**C** 0.66±0.50* (n=89)	**C** 1.70±0.74 (n=124)	**C** 0.64±0.49 (n=124)	**C** 0.49±0.44 (n=120)	*p<0.0001
	I 0.34±0.32 (n=130)	**I** 2.03±0.70** (n=145)	**I** 0.68±0.55 (n=145)	**I** 0.57±0.51 (n=145)	**p<0.0001
Changes in length (cm)		**C** 4.10±1.58 (n=124)	**C** 2.54±1.30 (n=124)	**C** 2.17±1.11 (n=120)	
		I 4.96±1.48*** (n=145)	**I** 2.57±1.27 (n=145)	**I** 2.25±1.22 (n=145)	***p<0.0001
Changes in BMI (kg/m^2)		**C** 3.80±2.56 (n=124)	**C** 0.51±1.84 (n=124)	**C** 0.14±1.43 (n=120)	
		I 4.69±2.33**** (n=145)	**I** 0.60±2.02 (n=145)	**I** 0.27±1.54 (n=145)	****p<0.05

C=control, I=Intervention; EPI= Expanded programme on immunization

Table 7.4 shows the changes in weight and length of the infants across the duration of the intervention. By the end of the study, Infants in the intervention group were significantly ($p<0.0001$) heavier than the infants in the control group. In addition, final length was significantly greater in the intervention group compared with the control ($p<0.05$).

Table 7.4: Changes in weight and length in 4th EPI from 1st EPI (Mean±SD)

	Control (n=120)	**Intervention** (n=145)	**p value**
Changes in weight (kg) in 4th EPI from 1st EPI	2.84±0.73	3.29±0.85	p<0.0001
Changes in length (cm) in 4th EPI from 1st EPI	8.82±2.66	9.79±3.44	p<0.05

EPI= Expanded programme on immunization

Table 7.5 refer to age-corrected z-scores for the variables, weight, length and BMI. Firstly, it should be noted that for both weight and length, mean z-scores were negative indicating that the population were on average lighter and shorter for age than the reference population. However, infants in the intervention group had significantly ($p=0.05$) higher z-weight than the control group during the 1st EPI visit. Despite z-weight in the intervention group at 2nd, 3rd and 4th visits being higher than the control, this did not reach statistical significance ($p>0.05$). Infants in the intervention group had slightly better z-length compared to the control group, but this was significantly higher only at the 1st EPI visit ($p<0.05$). For z-BMI, during the 1st EPI visit, the control group had a slightly higher mean z-BMI than the intervention group, but from the 2nd EPI and onwards, z-BMI was greater in the intervention group than the control and reached statistical significance ($p<0.05$) during the 4th EPI visit.

Table 7.5: z-weight, z-length and z- BMI between 1st and 4th EPI in the study infants (Mean±SD)

	Control	Intervention	p value
	z-weight		
1st EPI	-1.59±1.07 (n=124)	-1.35±0.97 (n=145)*	*p=0.05
2nd EPI	-1.79±1.64 (n=124)	-1.66±1.19 (n=145)	
3rd EPI	-1.56±1.20 (n=124)	-1.40±1.07 (n=145)	
4th EPI	-1.54±1.06 (n=120)	-1.34±1.02 (n=145)	
	z-length		
1st EPI	-2.08±1.40 (124)	-1.64±1.05 (145)**	**p<0.05
2nd EPI	-3.50±1.06 (124)	-3.46±1.03 (145)	
3rd EPI	-3.36±0.91 (124)	-3.27±1.26 (145)	
4th EPI	-3.33±1.10 (120)	-3.26±1.30 (145)	
	z-BMI		
1st EPI	-0.67±1.51 (124)	-0.69±1.26 (145)	
2nd EPI	0.38±1.92 (124)	0.55±1.28 (145)	
3rd EPI	0.61±1.27 (124)	0.78±1.10 (145)	
4th EPI	0.64±0.92 (120)	0.85±0.88 (145)***	***p<0.05

EPI= Expanded programme on immunization; BMI= Body mass index

In table 7.6, despite infants in both groups gaining weight, when expressed as z-weight, infants in both groups actually presented with lower z-scores in the 1st and 2nd EPI. This changed from the 3rd EPI where it can be seen that the change in z-weight became positive. Although infants in the intervention group appeared to grow better, this did not reach statistical significance. Similarly, length expressed in z-length increased positively from the 3rd EPI but this did not reach the significance. When expressed as z-BMI, there was a positive trend in both groups but no significant difference between groups was observed.

Table 7.6: Changes in z-weight, z-length and z-BMI of the infants between 1st and 4th EPI visit (Mean±SD)

	Control	Intervention	p value
	z-weight		
1st EPI	-0.35±0.95 (n=89)	-0.10±0.79 (n=130)*	*p<0.05
2nd EPI	-0.20±1.51 (n=124)	-0.32±1.35 (n=145)	
3rd EPI	0.23±0.87 (n=124)	0.27±0.94 (n=145)	
4th EPI	0.05±0.66 (n=120)	0.06±1.65 (n=145)	
	z-length		
2nd EPI	-1.41±1.02 (n=124)	-1.82±1.17 (n=145)**	**p<0.05
3rd EPI	0.14±0.61 (n=124)	0.20±1.68 (n=145)	
4th EPI	0.05±0.59 (n=120)	0.00±0.81 (n=145)	
	z-BMI		
2nd EPI	1.05±1.61 (n=124)	1.24±1.61 (n=145)	NS
3rd EPI	0.23±1.27 (n=124)	0.23±1.80 (n=145)	NS
4th EPI	0.04±0.94 (n=120)	0.08±0.98 (n=145)	NS

EPI= Expanded programme on immunization; BMI= Body mass index; NS= Not significant

In table 7.7, the infants' nutritional status was categorized using z-score cut-offs. Nutritional status divided into four groups showed similarity in birth weight in the infants of the control and intervention groups. The percentage of normal weight infants was higher in the intervention group compared to the control except at the 2nd EPI visit where the percentage in weight of the infants within the normal range was slightly higher in the control (66.9%) than the intervention (63.4%). More infants in the intervention group were undernourished (<-2D) during the 2nd (Intervention 23.4% vs control 11.3%), and 3rd EPI visit (Intervention 18.6% vs control 14.5%) before going down (control 20.8% vs intervention 19.3%) in the final visit. The percentage of severely undernourished (<-3D) infants continued to be high in the control group compared to the intervention throughout the four EPI visits.

Table 7.7: Nutritional status according to z-score

Nutritional Status	Control	Intervention
	freq. (%)	freq. (%)
Birth weight	(n=89)	(n=130)
Normal weight	73 (82%)	106 (81.5%)
Moderate undernourished	12 (13.5%)	18 (13.8%)
Severe undernourished	4 (4.5%)	6 (4.6%)
Over weight	0	0
1st EPI	(n=124)	(n=145)
Normal weight	82 (66.1%)	108 (74.5%)
Moderate undernourished	28 (22.6%)	30 (20.7%)
Severe undernourished	14 (11.3%)	7 (4.8%)
Over weight	0	0
2nd EPI	(n=124)	(n=145)
Normal weight	83 (66.9%)	92 (63.4%)
Under weight	14 (11.3%)	34 (23.4%)
Severe underweight	27 (21.8%)	18 (12.4%)
Over weight	0	1 (0.7%)
3rd EPI	(n=124)	(n=145)
Normal weight	90 (72.6%)	107 (73.8%)
Under weight	18 (14.5%)	27 (18.6%)
Severe underweight	16 (12.9%)	10 (6.9%)
Over weight	0	1 (0.7%)
4th EPI	(n=120)	(n=145)
Normal weight	83 (69.2%)	108 (74.5%)
Under weight	25 (20.8%)	28 (19.3%)
Severe underweight	12 (10%)	9 (6.2%)
Over weight	0	0

EPI= Expanded programme on immunization

7.4 Discussion

This chapter of the TBA-led Intervention study set out to compare anthropometric measures and growth between infants from two groups from similar backgrounds, the control group whose mothers did not receive breastfeeding advice and the intervention group where mothers had received the breastfeeding advice.

In this study, effectively it was found that the intervention tended to result in better outcomes for the infants with respect of weight, length and BMI. A number of possible explanations can be proposed for the better markers of growth in the intervention group, including fewer infections and illnesses (see chapter six). However, the fundamental difference between groups was the breastfeeding advice and education which translated into better breastfeeding practices in mothers in the intervention group. Unintended, but beneficial consequences of the intervention may also have occurred such as better hygiene practices, infant sleep patterns, maternal-infant interactions and bonding, which all could have contributed to the better markers of growth. However, this is purely speculation as these parameters were not evaluated in this study.

Whilst this study did not set out to specifically determine the prevalence of low birth weight (LBW) infants, findings showed that the prevalence (21.4%) was similar to another study carried out in an urban tertiary level hospital (25.5%) in Dhaka (Yasmeen and Azim, 2011). The only national survey on LBW in rural and urban areas of Bangladesh conducted in 2004 by BBS in collaboration with UNICEF showed the percentage higher (36%) than the TBA-led study (BBS and UNICEF, 2005). In Bangladesh, LBW is an important public health concern that needs to be addressed to reduce childhood mortality and morbidity (Lawn,

Cousens and Zupan, 2005; Yasmeen and Azim, 2011). According to UNICEF and WHO estimates, more than 95 percent of low birth weight children are born in developing countries and half of these children are born in South-central Asia. Among these countries, Bangladesh and India have the highest prevalence of LBW (30%) (UNICEF and WHO, 2004). It is difficult to determine the actual percentage of LBW infants in Bangladesh as the majority of deliveries occur at home (BBS, 2005) and newborn babies are not weighed at birth. In the most recent BDHS conducted in 2014, LBW was assessed based on mothers' perception: child's birth size was categorized into average, larger, small or very small and perceived birth size is used as a proxy for determining birth weight. In newborns who were perceived as small or very small, 43 percent were stunted (NIPORT *et al.,* 2016). In this study, birth weights of infants within 24 hours were included only based on measured birth weight either by the TBAs who conducted home deliveries or by health institutes where deliveries took place. Mothers' assumption was not counted here. This chapter showed that though the percentage of LBW infants was similar in both group, exclusive breastfeeding practice enable the infants having a better growth in the five months period monitoring.

In the TBA-led study, Infants in the intervention group were longer, heavier and less likely to be stunted than the infants in the control group. This effect was equally high at the z-weight and z-length percentiles tested against WHO growth references. Initially, infants in the control group were heavier than the intervention group. This may be due to these infants receiving additional formula, initially gaining weight and length more rapidly than the exclusively breast-fed infants. Indeed, a higher protein intake has been associated with rapid catch-up

growth (increased weight gain and higher adiposity) in formula fed infants (Rolland-Cachera *et al.*, 1995; Koletzko *et al.,* 2009; Ohlund *et al.,* 2010; Butte *et al.,* 2010; Singhal *et al.,* 2010). Whilst dietary protein content is essential to promote growth and development, the protein intake of formula-fed infants tends to exceed requirements after the first 1-2 months of life and differences in protein intake are mainly responsible for the rapidly increased weight in formula-fed infants (Ziegler, 2006; Martin *et al.,* 2014). High-protein rich formula intake in the first month of life has been associated with higher body fat mass and increased risk of obesity in the future (Koletzko, 2006). In contrast, the protein content in breastmilk is generally lower and may relate to a lower risk of obesity in later life (Arenz *et al.,* 2004; Harder *et al.,* 2005; Weng *et al.,* 2012). In this context, it is now recommended that it is even more important for LBW infants to be breastfed as their weight gain is not as rapid as when fed on formula milk, resulting in a slower growth rate and lower rate of catch-up growth.

Despite the fact that in the 1st EPI, mean weight and length were lower in the intervention group, these absolute varies were based on measurements conducted at any time between 0 and 1.5 months postnatally. Hence, it is difficult to make comparisons between groups where there is such a high variance in the timing of the visit. Hence, it is better to compare to z-scores as they are age-corrected. Indeed, the opposite was seen when weight and length were expressed as z-scores indicating a better rate of growth in the intervention group. Of particular note is the change from a negative to a positive z-score for BMI between the 1st and 2nd EPI. These changes are indicative of catch-up growth, although as can be seen in Table 7.6, there was no significant difference between control and intervention groups. Nothing is known about the further trajectories of

growth in these children beyond the 6 months, 4th EPI, although one could speculate that this difference in growth rate between groups was maintained or even enhanced, assuming that later infection rate was no different between the groups.

When the infants' illnesses were evaluated over the EPI visits (see chapter six), it might be possible that due to infants in the intervention group suffering fewer and less severe illnesses, morbidity may have less severe in the intervention group and this might explain their better growth. In the first week after birth, infants in the intervention group were less exposed to PF which likely enabled them to establish exclusive breastfeeding more quickly (see chapter six). Mothers who use cultural practices such as ENF and PF are more likely to practice delayed breastfeeding between one and four days (Sharma and Byrne, 2016; Osman *et al.*, 2018). Infants who received PF have been shown to develop more chances of expose to neonatal infections, which ultimately could hamper the neonate's health outcome in the first few weeks (Bililign *et al.*, 2016; Chea and Asefa, 2018). However, the greatest and most obvious benefits of early initiation are for the immediate health and survival of the infant. Save the Children estimated that 830,000 newborn deaths could be prevented every year if all infants were given breast milk in the first hour of life (Save the Children, 2013). Mothers also likely benefitted from the early suckling which stimulates production of breastmilk and facilitates the release of oxytocin. This oxytocin hormone acts on the uterus to contract and facilitates the expulsion of the placenta which inhibits postpartum blood loss. The sooner the mother settles down, the better the production of breastmilk and this encourages bonding between the mother and the new-born ((Afshariani, 2014).

The fact that the prevalence of morbidity in the infants of the intervention group was lower than the control group, might have impacted on growth patterns. These findings are similar to an intervention study where there was better weight gain and length in the intervention group compared to the control group during the first 5 months (Haider *et al.,* 2000). Better z-weight, z-length and z-BMI in the infants of the intervention group more clearly showed the impact of intervention compared to the control group. A previous study has shown that higher energy intake by consistent breastfeeds at regular intervals might explain in part the better growth of infants (Haider *et al.,* 2000). A systematic review on several studies to find out the effectiveness of community-based nutrition education on ideal breastfeeding and complementary feeding practices has also suggested an improvement in nutritional status of children under-5 in developing countries (Majamanda *et al.*, 2014). In this study, a better knowledge of breastfeeding in the intervention group most likely was the main driver of better weight gain and gain in length (see chapter six). Infants were monitored until 4th EPI visit (aged between 5 to 6 months) and it was not possible to predict the growth of the infants in the first year of life and compare the growth in the two groups. It should be remembered that these outcomes all depended on accurate measurements of weight and length during the EPI visits as well as the correct recording of age at each visit. As previously indicated, training was delivered to ensure an acceptable degree of consistency and accuracy of measurements. It is also assumed that any measurement and data collection error was equally distributed between the control and intervention groups, but it cannot be ruled out that they may have been bias in data collection. Nevertheless, on face value, the findings are sufficient to disprove the null hypothesis and indicate that a TBA-led

breastfeeding intervention can lead to better infant growth outcomes, likely the result of better breastfeeding practice in the mothers.

In conclusion, small but significant improvements in gains in weight, length and BMI were observed in the intervention group whose mothers received the breastfeeding advice from the TBAs. Future studies could extend the period of measurements beyond the 6 months limit in this study, but these findings are sufficiently encouraging to warrant further studies and interventions of this nature, to the extent that a recommendation concerning TBA-led breastfeeding advice in rural settings could be implemented.

Chapter Eight: General discussion

Chapter 8: General discussion

The aim of the TBA-led intervention was to deliver breastfeeding messages to the mothers with infants between birth to 5-6 months through locally living and practicing TBAs. In Bangladesh where the majority of births takes place at home by a dai or a TBA, whether skilled or unskilled, little research has been conducted focusing on these TBAs who have an impact on infant feeding practices in rural areas. Data from 2014 DHS showed that 62% births took place at home where more than one-third of births (43%) were assisted by untrained TBAs, relatives and friends (NIPORT *et al.,* 2016). Very few studies have explored the influence of TBAs in infant feeding practices among mothers whose deliveries were assisted by the TBAs (Talukder *et al.,* 2017). These TBAs were mentioned as dai in local language, unskilled birth attendant, traditional mid-wife, untrained or unqualified personnel, community volunteer, relatives or neighbour in different studies (Bolam *et al.,* 1998; Tarannum and Hayder, 1998; Bell *et al.,* 2014; De Allegri *et al.,* 2015; Sarker *et al.,* 2016; Talukder *et al.,* 2017; Dayyabu *et al.*, 2018; Ara *et al.,* 2018).

The impact of breastfeeding advice provided by the TBAs in the intervention group clearly showed noticeable improvement in this TBA-led intervention. There was significant improvement in early feeding practices, more mothers in the intervention group started breastfeeding earlier than the control group ($p<0.0001$) in the first hour. In addition, a delaying of adding fluid and or semisolid or solid feed was seen in the intervention group compared to the control group where significantly more infants in the control group received ADF ($p<0.0001$ in fluid and $p<0.001$ in semisolid or solid). Factors such as mode of delivery, maternal age,

PF were associated with EIBF in this study. Previous studies have found an association between birth size and EIBF (Ndirangu *et al.*, 2018) although this study could not find any.

The 2014 BDHS data showed that early initiation within one hour of birth was more common in rural children compared to urban children (53% and 45% respectively), higher (59%) when birth took place at home and when delivery assisted by a TBA (67%) (NIPORT *et al.,* 2016). In addition, poorer (56.9%) and uneducated mothers (55.6%) initiated breastfeeding in the first hour (NIPORT *et al.,* 2016) and studies showed that poorer mothers from a rural community have tended to seek help from the TBAs for home deliveries (Jokhio, Winter and Cheng, 2005; Talukder *et al.,* 2017). The TBAs in the TBA-led intervention study were known and trustworthy faces in the community. Any advice provided by them was well accepted by the mothers and their families. Noticeably fewer illnesses were reported for the infants in the intervention group throughout the four EPI visits, which might have been associated with lower morbidity as well as better growth. ENF and PF especially traditionally practiced PF such as honey, water sweetened with sugar or crystalline sugar were less common in the intervention group, who were likely to establish the first hour initiation of breastfeeding. The low prevalence of ENF and PF in the intervention group and high prevalence of ENF and PF in the control group confirm the TBAs' support can promote ideal breastfeeding in rural areas. A TBA's support was found to be an effective strategy and led to much higher rates of EIBF and exclusive breastfeeding in the first 5-6 months in the intervention group compared with control group.

Maternal characteristics including mean age, percentage of teenage mothers, educational backgrounds in this study were comparable between the groups. Almost a quarter from the control and intervention groups were teenage mothers aged between 15-19 years. The recent demographic survey found the prevalence of adolescent motherhood (between 15-19 years) was 30.8% (NIPORT *et al.,* 2016). In South Asia, Bangladesh is in the top listed for the highest adolescent fertility rate. One in ten girls in Bangladesh becomes a mother before the age of 15 and one in three adolescent becomes mother or pregnant before the age of 19 (Islam *et al.,* 2017). This study found that significantly ($p < 0.05$) more adolescent mothers engaged in PF than adult mothers. Additionally, teenage mothers in the intervention group were less likely to practice EIBF. Evidence from another study has shown similar results, where a delayed initiation was more likely for infants of adolescent mothers (Senarath *et al.*, 2012). This could be due to the fact that younger mothers may be less likely to have awareness and knowledge of ideal breastfeeding practices (Hackett *et al.*, 2015).

Factors such as education, a minimum of one antenatal visit, family structure, and parity appeared to have no influence on the introduction of PF in this study. In contrast, other studies have found positive associations between education and avoidance of PF and practice of exclusive breastfeeding (Khanal e*t al.,* 2013; Tariku *et al.,* 2017). Although the majority of mothers in this study were regarded as educated as opposed to uneducated, and had completed their primary education, many of them were unable to read or write their name in Bengali. This study could not determine whether factors such as maternal age, education or parity had any effect on the duration of future breastfeeding as infants were only monitored until 5-6 months of age. Evidence from previous studies conducted in

Bangladesh showed a shorter duration of breastfeeding amongst educated mothers (Giashuddin and Kabir, 2004); higher duration amongst younger mothers (<25 years) and shorter duration amongst multipara mothers (Akter and Rahman, 2010). This study also found that parity of mothers had no influence on EIBF. However, multipara mothers who introduced PF to their previous baby, acted as a predictor of ($p<0.05$) introducing PF to their following baby who was born during the study period.

In this study, the rate of breastfeeding within the first hour in the intervention group was 86.8%, which was higher than the recent demographic data (51%) (NIPORT *et al.,* 2016) but close to another study conducted in an urban slum (89.1%) (Ara *et al.,* 2018) and lower than the values reported in another study (96%) (Talukder *et al.,* 2017) conducted in rural areas. Studies from India, Nepal and Pakistan showed lower rates of early initiation of breastfeeding compared to TBA-led intervention (UNICEF, 2014; Adhikari *et al.,* 2014; Patel *et al.,* 2015; Veeranki *et al.,* 2017). PF was more common in the control group which was more likely to delay breastfeeding establishment in first hour. Many previous studies found the association between PF and delayed initiation of breastfeeding (Moore *et al.,* 2012; Sundaram *et al.,* 2016). Some traditionally practiced PF in the study were honey, sweetened water and cow's or goat's milk. Similar traditionally practiced PF have been found in other studies (Tarannum and Hyder, 1998; Sundaram *et al.,* 2013; Joshi *et al.,* 2014). The main reasons for adding ENF or PF other than tradition, were milk insufficiency and difficulty suckling. ENF or PF likely acted as aggravating factors for adding fluid or semisolid or solid earlier than recommended time.

In many rural and urban areas of Bangladesh, PF is practiced by family members as a part of tradition and culture. Healthcare professionals also sometimes advise to introduce PF, especially infant formula (Tang *et al.,* 2014; Raheem *et al.,* 2014; Pries *et al.,* 2016). In this study, 29% of PF advice came from health professionals and mainly infant formula was advised. Differences in advice might distract mothers from breastfeeding practice and may conflict the advice provided by the TBAs. For mothers who had deliveries other than assisted by TBAs, it was difficult for them to convince the mothers to practice exclusive breastfeeding after introducing PF. Despite this, The TBAs in the study managed to significantly reduce the ENF, PF and early ADF. In this context, a recent study conducted in a rural part of Bangladesh also provided evidence that TBAs can potentially improve breastfeeding practice (Talukder *et al.,* 2017). The rate of breastfeeding in the first hour in the control group of this study was considerably lower than the national average. The BDHSs have revealed a significant positive increase in the establishment of breastfeeding in the first hour (26% in 2004 to 51% in 2014) (NIPORT *et al.,* 2005, NIPORT *et al.,* 2016). Early initiation has been shown to have a positive effect on reducing mortality and morbidity in infants (Debes *et al.,* 2013; Adhikari *et al.,* 2014; Sankar *et al.,* 2015; NEOVITA, 2016). This study also showed a lower prevalence of morbidity among the infants in the intervention group throughout the study period. However, the high prevalence of breastfeeding initiation and continuation up to the 4th EPI visit convince the universal practice of breastfeeding in Bangladesh. It might also reflect that breastfeeding was the only option for many mothers in poorer communities to feed their babies. Indeed, studies in the many disadvantaged communities from

other countries have shown similar findings (Adhikari *et al.,* 2014; Exavery *et al.,* 2015).

Approximately half of the mothers (50.9%) from both groups had caesarean delivery and results shows that those who had a caesarean delivery were less likely to initiate breastfeeding in the first hour. Evidence from previous studies shows that an operational delivery was a barrier to initiating breastfeeding immediately after birth as well as a lower duration of exclusive breastfeeding (Rowe-Murray and Fisher, 2002; Patel, Banaerjee and Kaletwad, 2013; Exavery *et al.,* 2015; Kavle *et al.,* 2017; Ndirangu *et al.*, 2018; Ara *et al.,* 2018). The possible reasons for doing so could be the anaesthesia effect which takes time to reverse mother's alertness and the onset of lactation, transferring from the post-operative room, associated possible respiratory distress among infants delivered by CS, weighing the infant and other hospital formalities to be completed, healthcare professionals' engagement with assisting mothers and less interest on breastfeeding initiation (Raheem *et al.,* 2014; Khanal *et al.,* 2015; Patel *et al.,* 2015; Tilahun *et al.,* 2016; Hobbs *et al.,* 2016). Conversely, this study reported that mothers who had NVD initiated breastfeeding immediately after birth. Several studies have demonstrated the association between the NVD and early initiation of breastfeeding (Exavery *et al.,* 2015; Målqvist, Pun and Kc, 2017; Ara *et al.,* 2018; Ndirangu *et al.,* 2018). However, contrasting results have also been seen in some studies where home deliveries have acted as a barrier to early initiation of breastfeeding, suggesting integrated and targeted interventions could achieve ideal infant feeding practice (Rahman *et al.,* 2011; Gultie and Sebsibie, 2016).

Other findings from TBA-led intervention suggest that targeting the mode of delivery could have some influence on breastfeeding and the majority of the mothers who prefer home deliveries can practice early initiation of breastfeeding. An intervention that trains TBAs can establish immediate breastfeeding practice among mothers who deliver at home. This could potentially improve the national early initiation rate as more than 60% deliveries are still conducted at home in Bangladesh.

The maximum benefits of breastfeeding can be achieved by practicing exclusive breastfeeding for the first 6 months of life and many developing countries are slowly improving the rate of exclusive breastfeeding in the first six-month period (Khanal, Sauer and Zhao, 2013; Chandhiok *et al.*, 2015). Although the proportion of exclusive breastfeeding infants aged between 0 and 6 months declined from 64% in 2011 to 55% in 2014 in Bangladesh, the rate is still higher than the recent global rate of 40% (NIPORT *et al.,* 2016; UNICEF, 2018b), but still below the recommended WHO target of 90%. In this study, the intervention had a substantial impact on improving exclusive practice.

Very few previous studies have investigated the effect of training and providing breastfeeding messages and support by the TBAs in rural settings where home delivery is common. A recent study conducted in a rural setting showed a positive impact on breastfeeding initiation, duration and avoidance of PF by training and supervising the TBAs, although rates of excluisve breastfeeding were not significantly different among the control and intervention (67% in control, 76% and 83% in two intervention group respectively (Talukder *et al.,* 2017). A similar approach was used in this study and a higher rate of exclusive breastfeeding at the age of 5-6 months was seen in the intervention group compared to the control

group (78.6% vs 29.2%, p<0.0001). A similar rate of exclusive breastfeeding among the control group in the TBA-led intervention study was seen in another study where the rate was 27% in the control group at 5 months. Apart from Talukder *et al.* study (67%), the rate of exclusive breastfeeding has ranged between 6% and 36% at 5 months (Haider *et al.,* 2000; Akhtar *et al.,* 2012; Joshi *et al.,* 2014; Ara *et al.,* 2018) in studies conducted in rural and urban areas in Bangladesh.

This study effectively showed better outcomes with respect to z-weight, z-length and z-BMI in the infants of the intervention group. Although differences were not major, small but significant improvements clearly showed the impact of the intervention in weight, length and BMI in the intervention group who received breastfeeding messages and support from the TBAs. It is difficult to determine whether exclusive breastfeeding had the impact on better growth of the infants in the intervention group or not, but one possible explanation could be the infants in the intervention group suffered less illnesses throughout the intervention period (which can negatively impact growth). In addition, less exposure to any kind of PF might also have impacted on the growth of the infant. In support of this suggestion, Haider *et al.* has shown highly significant better weight-for-length z score and less morbidity among exclusively breastfed infants at aged 5 months (Haider *et al.,* 2000).

In conclusion, small but significant improvements in gains in weight, length and BMI were observed in the infants from the intervention group who received the breastfeeding advice from the TBAs, as well as effective strategy to establish EIBF, avoidance of ENF and PF and exclusive breastfeeding at age 5-6 months. Training the TBAs who serve in their locality could be a comparatively cost-

effective and sustainable way to improve ideal breastfeeding practice and avoidance of long standing, harmful traditional infant feeding practices which were previously practiced. Findings from this study highlight a target where a major intervention could be provided to improve the rate of EIBF, avoidance of ENF, PF and practice of exclusive breastfeeding for the first 6 months after birth.

8.1 Limitations of the study

The accuracy during weighing and length measurements of the infants are explained in detailed in chapter four of this thesis. Repeated measurements of the same subject were practiced to limit measurement errors. Although HAs and CHCPs who acted as volunteers in this study have been trained and initially supervised and monitored for weighing and measuring the length of the infants several times, the HAs and CHCPs were not monitored for the entire study period.

Mothers were interviewed in their respective CCs during their visits for their infants' vaccinations and it was possible that self-reported data could be biased. Like all questionnaire-based studies, this study also entirely depended on respondent's memories and the quality of data based on recalling memories may not strong. It might be possible that the responses were desired rather than what really they were practicing. The intervention questionnaires were amended based on respondents' outcomes, possibilities of missing anything important may not be entirely avoidable. None of the TBAs had completed primary education. The questionnaire developed to examine the TBAs' knowledge and beliefs on breastfeeding could not be completed individually, thus their knowledge was judged by a group discussion. Although comparatively lower in prevalence, cases of diarrhoeal morbidity were seen even in exclusively breastfed infants. It might

be possible that poor hygiene practices in mothers was responsible for diarrhoeal incidence in exclusively breastfed infants. However, hygiene practices were similar in both the groups in the study. TBAs were not trained to instruct mothers on basic cleanliness such as washing hands after changing the baby or cleaning the nipple before putting the baby on breast.

The study focused entirely on breastfeeding practices. Whether the delivery was conducted at home or in a health institute, the TBAs attended the mother-infant pair at the earliest possible time to ensure that the infant was put on the breast in the first hour or as soon after as possible. Additionally, TBAs also discouraged any kind of ENF or PF. However, other newborn care practices such as umbilical cord clamping, wrapping of the newborn with warm clothes, delaying bathing of the newborn were not advised, although some of the TBAs expectedly practiced those. TBAs were not instructed on safe home deliveries, cleanliness and hygiene practice during deliveries - it was decided not to interfere with what they practiced as a norm. In many cases, where mothers delivered at hospital by CS, they stayed in hospital typically between 3-7 days and early postnatal visit by TBAs were not possible in those cases. In case of home deliveries, TBAs or HAs took the newborn infant to the CC to weigh the child on the day of delivery to obtain birth weight, but in some cases, mothers and their relatives did not allow them to take the infant out of the house to avoid “evil eyes”.

This study found that in rural parts of Dohar where TBA assisted home delivery was common, private clinic-based delivery was also common among the mothers who could afford this type of care. Although mothers had the option of going to a health institute for their delivery, many mothers made the choice of home delivery with a TBA. This study could be conducted in more rural and poorer areas of

Bangladesh, where access to government or private healthcare facilities were difficult or not affordable to most mothers and TBA-assisted delivery would be even more common. However, the researcher's limitations, limited funding, difficulty in obtaining approval for the study from the institute, few chances of getting volunteers for the duration of intervention period, made the decision to conduct the study in Dohar.

8.2 Recommendations

The main question of this study was how it could be possible to find a sustainable and acceptable way to deliver ideal breastfeeding practices among mothers in rural areas who do not receive services from health institutes or from health professionals either due to unavailability or for cultural/religious reasons or dissatisfaction of the services provided by the public or private health facilities, including fear of caesarean delivery.

The TBA-led intervention has been able to show that this high impact improved breastfeeding practice can be achieved by delivering the breastfeeding message by locally practiced TBAs. Training of these TBAs and their liaison with grass root level health professionals such as CHCP and HA in the CC can have a great long-term impact on mothers' breastfeeding practices. The government could enlist local TBAs and undertake initiatives to teach them on home delivery and breastfeeding practices and to avoid traditionally practiced and potentially harmful infant feeding practices. Although the government has started to train birth attendants in rural areas, the number is as few as 1% of total births. It would be a good idea for TBAs who are already practicing locally could train and monitor

new recruits. Training and support from government for practice would secure their good practice rather than malpractice.

8.2.1 Recommendations for further research

Further research from this study could follow-up the infants until two years to see how the infants continue to grow, in order to:

a) Compare infants who were exclusively breastfed against non-exclusively breastfed infants in the study.
b) Compare the LBW infants who were exclusively breastfed against optimal weight infants.
c) Compare the exclusively breastfed infants against the WHO growth reference.

8.2.2 Recommendations for new research

Variances in ENF and PF were influenced by factors such as individual choices, tradition, religion, mode and place of delivery. In targeting these issues, health education programmes should be designed for individual groups to get receive the best outcomes from the programmes. This TBA-led intervention discovered that Islamic religious leaders such as the mosque imam had a great influence on people especially on husbands amongst the Muslim families. Further interventions involving the mosque imam and other religious leaders in the community to promote exclusive breastfeeding via mosque, temple, church is recommended.

References

References

Adhikari, M., Khanal, V., Karkee, R. and Gavidia, T. (2014) 'Factors associated with early initiation of breastfeeding among Nepalese mothers: further analysis of Nepal Demographic and Health Survey, 2011', *International Breastfeeding Journal*, 9(1), p. 21. doi: 10.1186/s13006-014-0021-6.

Afshariani, R. (2014) 'Maternal Benefits of Breastfeeding', *Womens Health Bulletin*, 1(3): e23645. doi: 10.17795/whb-23645

Agampodi, S. B., Agampodi, T. C. and Piyaseeli, U. K. D. (2007) 'Breastfeeding practices in a public health field practice area in Sri Lanka: a survival analysis', *International Breastfeeding Journal*, 2(1), p. 13. doi: 10.1186/1746-4358-2-13.

Ahamed, M. M. (1986) 'Breast-feeding in Bangladesh', *Journal of Biosocial Science*, 18(4), pp. 425–434. doi: 10.1017/S0021932000016448.

Ahmed, F. U., Rahman, M. E. and Alam, M. S. (1996) 'Prelacteal feeding: influencing factors and relation to establishment of lactation', *Bangladesh Medical Research Council Bulletin*, 22(2), pp. 60–64. Available at: https://www.ncbi.nlm.nih.gov/pubmed/9103657

Ahmed, S., Parveen, S. D. and Islam, A. (1999) 'Infant feeding practices in rural Bangladesh: policy implications', *Journal of Tropical Pediatrics*, 45(1), pp. 37–41. doi: 10.1093/tropej/45.1.37. Available at: https://academic.oup.com/tropej/article/45/1/37/1734594.

Ahmed, S. M., Alam, B. B., Anwar, I., Begum, T., Huque, R., Khan., J. AM., Nababan, H. and Osman, F. A. (2015) *Bangladesh Health System Review*. Vol. 5 No. 3. Available at: http://apps.who.int/iris/bitstream/handle/10665/208214/9789290617051_eng.pdf;jsessionid=43D4A89E25A2AE008CD826DAC6AE8DFE?sequence=1 (Accessed: 6 June 2017)

Ahmed, S. M., Hossain, M. A., Rajachowdhury, A. M. and Bhuiya, A. U. (2011) 'The health workforce crisis in Bangladesh: shortage, inappropriate skill-mix and inequitable distribution', *Human Resources for Health*, 9, p. 3. doi: 10.1186/1478-4491-9-3.

Akter, S. and Rahman, M. M. (2010) 'Duration of breastfeeding and its correlates in Bangladesh', *Journal of Health, Population, and Nutrition*, 28(6), pp. 595–601. Available at: https://www.ncbi.nlm.nih.gov/pubmed/21261205

Akhtar, K., Haque, M., Islam, M., Yusuf, M., Sharif, A. and Ahsan, A. (2012) 'Feeding Pattern and Nutritional Status of Under Two Years Slum Children', *Journal of Shaheed Suhrawardy Medical College*, 4(1). doi: 10.3329/jssmc.v4i1.11994.

Al-Jawaldeh, A. and Abul-Fadl, A. (2018) 'Assessment of the Baby Friendly Hospital Initiative Implementation in the Eastern Mediterranean Region', *Children*, 5(3), p. 41. doi: 10.3390/children5030041.

Allen, L. H. (1994) 'Maternal micronutrient malnutrition: effects on breast milk and infant nutrition, and priorities for intervention', *SCN news*, (11), pp. 21–24. Available at: https://www.ncbi.nlm.nih.gov/pubmed/12288231

Alzaheb, R. A. (2017) 'A Review of the Factors Associated with the Timely Initiation of Breastfeeding and Exclusive Breastfeeding in the Middle East', *Clinical Medicine Insights. Pediatrics*, 11, p. 1179556517748912. doi: 10.1177/1179556517748912.

Andaleeb, S. S., Siddiqui, N. and Khandakar, S. (2007) 'Patient satisfaction with health services in Bangladesh', *Health Policy and Planning*, 22(4), pp. 263–273. doi: 10.1093/heapol/czm017.

Andreas, N. J., Kampmann, B. and Mehring Le-Doare, K. (2015) 'Human breast milk: A review on its composition and bioactivity', *Early Human Development*, 91(11), pp. 629–635. doi: 10.1016/j.earlhumdev.2015.08.013.

Antonakou, A., Skenderi, K. P., Chiou, A., Anastasiou, C. A., Bakoula, C. and Matalas, A.-L. (2013) 'Breast milk fat concentration and fatty acid pattern during the first six months in exclusively breastfeeding Greek women', *European Journal of Nutrition*, 52(3), pp. 963–973. doi: 10.1007/s00394-012-0403-8.

Ara, G., Khanam, M., Papri, N., Nahar, B., Haque, M. A., Kabir, I. and Dibley, M. J. (2018) 'Peer counselling improves breastfeeding practices: A cluster randomized controlled trial in urban Bangladesh', *Maternal & Child Nutrition*, 14(3), p. e12605. doi: 10.1111/mcn.12605.

Araújo, C. L., Victora, C. G., Hallal, P. C. and Gigante, D. P. (2006) 'Breastfeeding and overweight in childhood: evidence from the Pelotas 1993 birth cohort study', *International Journal of Obesity (2005)*, 30(3), pp. 500–506. doi: 10.1038/sj.ijo.0803160.

Arenz, S., Rückerl, R., Koletzko, B. and von Kries, R. (2004) 'Breast-feeding and childhood obesity--a systematic review', *International Journal of Obesity and Related Metabolic Disorders: Journal of the International Association for the Study of Obesity*, 28(10), pp. 1247–1256. doi: 10.1038/sj.ijo.0802758.

Arifeen, S., Black, R. E., Antelman, G., Baqui, A., Caulfield, L. and Becker, S. (2001) 'Exclusive breastfeeding reduces acute respiratory infection and diarrhea deaths among infants in Dhaka slums', *Pediatrics*, 108(4), p. E67. Available at: https://www.ncbi.nlm.nih.gov/pubmed/11581475

Asfaw, M., Wondaferash, M., Taha, M. and Dube, L. (2015) 'Prevalence of undernutrition and associated factors among children aged between six to fifty nine months in Bule Hora district, South Ethiopia', *BMC public health*, 15, p. 41. doi: 10.1186/s12889-015-1370-9.

Australian Institute of Health and Welfare (2011) *2010 Australian National Feeding Survey: Indicator Results.* ISBN:978-1-74249-2698, Cat.no.PHE 156,p-69. (Accessed: June 206)

Awi, D. D. and Alikor, E. a. D. (2006) 'Barriers to timely initiation of breastfeeding among mothers of healthy full-term babies who deliver at the University of Port Harcourt Teaching Hospital', *Nigerian Journal of Clinical Practice*, 9(1), pp. 57–64. Available at: https://www.ncbi.nlm.nih.gov/pubmed/16986292

Baldeón, M. E., Mennella, J. A., Flores, N., Fornasini, M. and San Gabriel, A. (2014) 'Free amino acid content in breast milk of adolescent and adult mothers in Ecuador', *SpringerPlus*, 3. doi: 10.1186/2193-1801-3-104.

Bangladesh Breastfeeding Foundation (BBF) (2006) *Inception Report on Breastfeeding Programs in Bangladesh.* Available at: https://ibfanasia.org/e-newsletter/BBF%20rep%20Jan_Jun_%2006.pdf (Accessed: May 2013)

Bangladesh Breastfeeding Foundation (BBF) (2016) *Annual Report 2015-2016.* (Accessed: 3 March 2018).

Bangladesh Bureau of Statistics (BBS) and UNICEF (2005) *National low birth weight survey of Bangladesh, 2003-2004*. (Accessed: July 2015).

Bangladesh Bureau of Statistics (BBS) (2017) Report on Bangladesh Sample Vital Statistics 2016. *Reproduction, Documentation and Publication Section, BBS.* ISBN-978-984-519-094- . Available at: http://bbs.portal.gov.bd/sites/default/files/files/bbs.portal.gov.bd/page/6a40a397_6ef7_48a3_80b3_78b8d1223e3f/SVRS_REPORT_2016.pdf (Accessed: January 2018)

Department of Census and Statistics (2016) *Sri Lanka Demographic and Health Survey*. Available at: http://www.statistics.gov.lk/social/DHS_2016a/DHS_presentations/Key%20Findings.pdf (Accessed: May 2018).

Bandyopadhyay, M. (2009) 'Impact of ritual pollution on lactation and breastfeeding practices in rural West Bengal, India', *International Breastfeeding Journal*, 4, p. 2. doi: 10.1186/1746-4358-4-2.

Bang, A. T., Bang, R. A., Baitule, S. B., Reddy, M. H. and Deshmukh, M. D. (1999) 'Effect of home-based neonatal care and management of sepsis on neonatal mortality: field trial in rural India', *Lancet (London, England)*, 354(9194), pp. 1955–1961. doi: 10.1016/S0140-6736(99)03046-9.

Barnett, S., Azad, K., Barua, S., Mridha, M., Abrar, M., Rego, A., Khan, A., Flatman, D. and Costello, A. (2006) 'Maternal and newborn-care practices during pregnancy, childbirth, and the postnatal period: a comparison in three rural districts in Bangladesh', *Journal of Health, Population, and Nutrition*, 24(4), pp. 394–402. Available at: https://www.ncbi.nlm.nih.gov/pubmed/17591336 (Accessed: May 2017).

Barkat-E-Khuda (1985) 'The Nuclearization of Joint Family Households in a Rural Area of Bangladesh', *Journal of Comparative Family Studies*, 16(3), pp. 387–400.

Begum, T., Hoque, S. A., Islam, M. R., Katoon, S. and Shah, A. R. (2013) 'Infant Feeding Practice of Mother attending Pediatric out Patients Department in A Tertiary Care Center', *Bangladesh Journal of Child Health*, 37(3) 138-141. doi: 10.3329/bjch.v37i3.18616.

Belachew, A. B., Kahsay, A. B. and Abebe, Y. G. (2016) 'Individual and community-level factors associated with introduction of prelacteal feeding in Ethiopia', *Archives of Public Health = Archives Belges De Sante Publique*, 74, p. 6. doi: 10.1186/s13690-016-0117-0.

Bell, S., Yew, S. S. Y., Devenish, G., Ha, D., Do, L. and Scott, J. (2018) 'Duration of Breastfeeding, but Not Timing of Solid Food, Reduces the Risk of Overweight and Obesity in Children Aged 24 to 36 Months: Findings from an Australian Cohort Study', *International Journal of Environmental Research and Public Health*, 15(4). doi: 10.3390/ijerph15040599

Bell, S., Passano, P., Bohl, D. D., Islam, A. and Prata, N. (2014) 'Training traditional birth attendants on the use of misoprostol and a blood measurement tool to prevent postpartum haemorrhage: lessons learnt from Bangladesh', *Journal of Health, Population, and Nutrition*, 32(1), pp. 118–129. Available at: https://www.ncbi.nlm.nih.gov/pubmed/24847601 (Accessed: June 2016).

Bener, A., Ehlayel, M. S., Alsowaidi, S. and Sabbah, A. (2007) 'Role of breast feeding in primary prevention of asthma and allergic diseases in a traditional society', *European Annals of Allergy and Clinical Immunology*, 39(10), pp. 337–343. Available at: https://www.ncbi.nlm.nih.gov/pubmed/18386435 (Accessed: August 2014).

Bernard, J.Y., Cohen, E. and Kramer, M.S. (2016) 'Breast feeding initiation rate across Western countries: does religion matter? An ecological study', *BMJ Global Health*, 1: e000151. doi:10.1136/ bmjgh-2016-000151.

Bhagowalia, P., Chen, S. E. and Masters, W. A. (2011) 'Effects and determinants of mild underweight among preschool children across countries and over time', *Economics and Human Biology*, 9(1), pp. 66–77. doi: 10.1016/j.ehb.2010.05.002.

Bhandari, N., Mazumder, S., Bahl, R., Martines, J., Black, R. E., Bhan, M. K. and Infant Feeding Study Group (2004) 'An educational intervention to promote appropriate complementary feeding practices and physical growth in infants and young children in rural Haryana, India', *The Journal of Nutrition*, 134(9), pp. 2342–2348. doi: 10.1093/jn/134.9.2342.

Bhishagratna, KL (translator). An English Translation of The Sushruta Samhita. Chaukhamba Orientalia, Varanasi, India, (1916). Available at: https://archive.org/stream/b24758619_0003#page/n5/mode/2up (Accessed: September 2018)

Bililign, N., Kumsa, H., Mulugeta, M. and Sisay, Y. (2016) 'Factors associated with prelacteal feeding in North Eastern Ethiopia: A community based cross-sectional study', *International Breastfeeding Journal*, 11, p. 13. doi: 10.1186/s13006-016-0073-x.

Bjørset, V. K., Helle, C., Hillesund, E. R. and Øverby, N. C. (2018) 'Socio-economic status and maternal BMI are associated with duration of breast-feeding of Norwegian infants', *Public Health Nutrition*, 21(8), pp. 1465–1473. doi: 10.1017/S1368980017003925.

Black, R. E., Morris, S. S. and Bryce, J. (2003) 'Where and why are 10 million children dying every year?', *Lancet (London, England)*, 361(9376), pp. 2226–2234. doi: 10.1016/S0140-6736(03)13779-8.

Black, R. E., Victora, C. G., Walker, S. P., Bhutta, Z. A., Christian, P., de Onis, M., Ezzati, M., Grantham-McGregor, S., Katz, J., Martorell, R., Uauy, R. and Maternal and Child Nutrition Study Group (2013) 'Maternal and child undernutrition and overweight in low-income and middle-income countries', *Lancet (London, England)*, 382(9890), pp. 427–451. doi: 10.1016/S0140-6736(13)60937-X.

Bolam, A., Manandhar, D. S., Shrestha, P., Ellis, M., Malla, K. and Costello, A. M. (1998) 'Factors affecting home delivery in the Kathmandu Valley, Nepal', *Health Policy and Planning*, 13(2), pp. 152–158. Available at: https://www.ncbi.nlm.nih.gov/pubmed/10180403 (Accessed: June 2015).

Boniglia, C., Carratù, B., Chiarotti, F., Giammarioli, S. and Sanzini, E. (2003) 'Influence of maternal protein intake on nitrogen fractions of human milk', *International Journal for Vitamin and Nutrition Research.* 73(6), pp. 447–452. doi: 10.1024/0300-9831.73.6.447.

Bravi, F., Wiens, F., Decarli, A., Dal Pont, A., Agostoni, C. and Ferraroni, M. (2016) 'Impact of maternal nutrition on breast-milk composition: a systematic review', *The American Journal of Clinical Nutrition*, 104(3), pp. 646–662. doi: 10.3945/ajcn.115.120881.

Briend, A., Wojtyniak, B. and Rowland, M. G. M. (1988) 'Breast feeding, nutritional state, and child survival in rural Bangladesh', *British Medical Journal (Clinical research ed.)*, 296(6626), pp. 879–882. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2546281/ (Accessed: June 2015)

Britton, C., McCormick, F. M., Renfrew, M. J., Wade, A. and King, S. E. (2007) 'Support for breastfeeding mothers', *The Cochrane Database of Systematic Reviews*, (1), p. CD001141. doi: 10.1002/14651858.CD001141.pub3.

Brockway, M., Benzies, K. M., Carr, E. and Aziz, K. (2018) 'Breastfeeding self-efficacy and breastmilk feeding for moderate and late preterm infants in the Family Integrated Care trial: a mixed methods protocol', *International Breastfeeding Journal*, 13, p. 29. doi: 10.1186/s13006-018-0168-7.

Brown, L. V., Zeitlin, M. F., Peterson, K. E., Chowdhury, A. M., Rogers, B. L., Weld, L. H. and Gershoff, S. N. (1992) 'Evaluation of the impact of weaning food messages on infant feeding practices and child growth in rural Bangladesh', *The American Journal of Clinical Nutrition*, 56(6), pp. 994–1003. doi: 10.1093/ajcn/56.6.994.

Bulterys, M., Fowler, M. G., Shaffer, N., Tih, P. M., Greenberg, A. E., Karita, E., Coovadia, H. and De Cock, K. M. (2002) 'Role of traditional birth attendants in preventing perinatal transmission of HIV', *British Medical Journal*, 324(7331), pp. 222–225. Available at:https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1122135/ (Accessed: June 2015)

Butte, N. F., Fox, M. K., Briefel, R. R., Siega-Riz, A. M., Dwyer, J. T., Deming, D. M. and Reidy, K. C. (2010) 'Nutrient intakes of US infants, toddlers, and preschoolers meet or exceed dietary reference intakes', *Journal of the American Dietetic Association*, 110(12 Suppl), pp. S27-37. doi: 10.1016/j.jada.2010.09.004.

Cantrill, R. M., Creedy, D. K. and Cooke, M. (2003a) 'An Australian study of midwives' breast-feeding knowledge', *Midwifery*, 19(4), pp. 310–317. Available at: https://www.ncbi.nlm.nih.gov/pubmed/14623510 (Accessed on December 2017).

Cantrill, R. M., Creedy, D. K. and Cooke, M. (2003b) 'How midwives learn about breastfeeding', *Australian Journal of Midwifery: Professional Journal of the Australian College of Midwives Incorporated*, 16(2), pp. 11–16. Available at: https://www.ncbi.nlm.nih.gov/pubmed/15553425 (Accessed on December 2017).

Carter, C. S. and Altemus, M. (1997) 'Integrative functions of lactational hormones in social behavior and stress management', *Annals of the New York Academy of Sciences*, 807, pp. 164–174. Available at: https://www.ncbi.nlm.nih.gov/pubmed/9071349 (Accessed on December 2017).

Chalmers, B. (2013) 'Breastfeeding unfriendly in Canada?', *CMAJ : Canadian Medical Association Journal*, 185(5), pp. 375–376. doi: 10.1503/cmaj.121309.

Chandhiok, N., Singh, K. J., Sahu, D., Singh, L. and Pandey, A. (2015) 'Changes in exclusive breastfeeding practices and its determinants in India, 1992–2006: analysis of national survey data', *International Breastfeeding Journal*, 10. doi: 10.1186/s13006-015-0059-0.

Chea, N. and Asefa, A. (2018) 'Prelacteal feeding and associated factors among newborns in rural Sidama, south Ethiopia: a community based cross-sectional survey', *International Breastfeeding Journal*, 13, p. 7. doi: 10.1186/s13006-018-0149-x.

Checkley, W., Epstein, L. D., Gilman, R. H., Figueroa, D., Cama, R. I., Patz, J. A. and Black, R. E. (2000) 'Effect of El Niño and ambient temperature on hospital admissions for diarrhoeal diseases in Peruvian children', *Lancet (London, England)*, 355(9202), pp. 442–450. Available at: https://www.ncbi.nlm.nih.gov/pubmed/10841124 (Accessed: June 2016)

Cheikh Ismail, L., Knight, H. E., Bhutta, Z., Chumlea, W. C. and International Fetal and Newborn Growth Consortium for the 21st Century (2013) 'Anthropometric protocols for

the construction of new international fetal and newborn growth standards: the INTERGROWTH-21st Project', *BJOG: an international journal of obstetrics and gynaecology*, 120 Suppl 2, pp. 42–47, v. doi: 10.1111/1471-0528.12125.

Chisti, M. J., Salam, M. A., Smith, J. H., Ahmed, T., Ashraf, H., Bardhan, P. K. and Pietroni, M. A. C. (2011) 'Impact of lack of breast feeding during neonatal age on the development of clinical signs of pneumonia and hypoxemia in young infants with diarrhea', *PloS One*, 6(10), p. e25817. doi: 10.1371/journal.pone.0025817.

Chopra, M., Daviaud, E., Pattinson, R., Fonn, S. and Lawn, J. E. (2009) 'Saving the lives of South Africa's mothers, babies, and children: can the health system deliver?', *Lancet (London, England)*, 374(9692), pp. 835–846. doi: 10.1016/S0140-6736(09)61123-5.

Cole, T. J., Paul, A. A. and Whitehead, R. G. (2002) 'Weight reference charts for British long-term breastfed infants', *Acta Paediatrica (Oslo, Norway: 1992)*, 91(12), pp. 1296–1300. Available at: https://www.ncbi.nlm.nih.gov/pubmed/12578284 (Accessed: June 2017).

Crenshaw, J. T. (2014) 'Healthy Birth Practice #6: Keep Mother and Baby Together- It's Best for Mother, Baby, and Breastfeeding', *The Journal of Perinatal Education*, 23(4), pp. 211–217. doi: 10.1891/1058-1243.23.4.211.

Crowther, S. M., Reynolds, L. A., Tansey, E. M. and Wellcome Trust Centre for the History of Medicine at UCL (2009) 'The resurgence of breastfeeding, 1975-2000: the transcript of a Witness Seminar', *Wellcome Trust Centre for the History of Medicine*, UCL, London. Available at: http://www.ucl.ac.uk/histmed/publications/wellcome_witnesses_c20th_med/vol_35 (Accessed: 26 July 2018).

Darmstadt, G. L. and Saha, S. K. (2002) 'Traditional practice of oil massage of neonates in Bangladesh', *Journal of Health, Population, and Nutrition*, 20(2), pp. 184–188. Available at: https://www.ncbi.nlm.nih.gov/pubmed/12186200/ (Accessed: 26 July 2018).

Das, D. K., Talukder, M. Q.-K. and Sella, G. E. (1992) 'Infant feeding practices in rural Bangladesh', *The Indian Journal of Pediatrics*, 59(5), pp. 573–577. doi: 10.1007/BF02832993. (Accessed: 26 July 2018).

Das, D. K. and Ahmed, S. (1995) 'Knowledge and attitude of the Bangladeshi rural mothers regarding breastfeeding and weaning', *The Indian Journal of Pediatrics*, 62(2), pp. 213–217. doi: 10.1007/BF02752329 (Accessed: 2 July 2018).

Das, P., Ghosh, S., Ghosh, M. and Mandal, A. (2008) 'A study on delivery and newborn care practices in a rural block of West Bengal', *Indian Journal of Public Health*, 52(3), pp. 159–160. Available at: https://www.ncbi.nlm.nih.gov/pubmed/19189841 (Accessed: 6 July 2018).

Daud, A. Z., Mohd-Esa, N., Azlan, A. and Chan, Y. M. (2013) 'The trans fatty acid content in human milk and its association with maternal diet among lactating mothers in Malaysia', *Asia Pacific Journal of Clinical Nutrition*, 22(3), pp. 431–442. Available at: https://www.ncbi.nlm.nih.gov/pubmed/23945414 (Accessed: 6 July 2017).

Dayyabu, A. L., Murtala, Y., Grünebaum, A., McCullough, L. B., Arabin, B., Levene, M. I., Brent, R. L., Monni, G., Sen, C., Makatsariya, A., Chervenak, F. A. and International Study Group on Planned Home Birth, International Academy of Perinatal Medicine and World Association of Perinatal Medicine (2018) 'Midwife-assisted planned home birth: an essential component of improving the safety of childbirth in Sub-Saharan Africa', *Journal of Perinatal Medicine*. doi: 10.1515/jpm-2018-0066. (Accessed: 26 July 2017).

Davies-Adetugbo, A. A. (1997) 'Sociocultural factors and the promotion of exclusive breastfeeding in rural Yoruba communities of Osun State, Nigeria', *Social Science & Medicine (1982)*, 45(1), pp. 113–125. Available at: https://www.ncbi.nlm.nih.gov/pubmed/9203276 (Accessed: May 2017).

De Allegri, M., Tiendrebéogo, J., Müller, O., Yé, M., Jahn, A. and Ridde, V. (2015) 'Understanding home delivery in a context of user fee reduction: a cross-sectional mixed methods study in rural Burkina Faso', *BMC pregnancy and childbirth*, 15, p. 330. doi: 10.1186/s12884-015-0764-0.

Debes, A. K., Kohli, A., Walker, N., Edmond, K. and Mullany, L. C. (2013) 'Time to initiation of breastfeeding and neonatal mortality and morbidity: a systematic review', *BMC public health*, 13 Suppl 3, p. S19. doi: 10.1186/1471-2458-13-S3-S19.

Dewey, K. G., Heinig, M. J. and Nommsen, L. A. (1993) 'Maternal weight-loss patterns during prolonged lactation', *The American Journal of Clinical Nutrition*, 58(2), pp. 162–166. doi: 10.1093/ajcn/58.2.162.

de Onis, M., Onyango, A. W., Van den Broeck, J., Chumlea, W. C. and Martorell, R. (2004) 'Measurement and standardization protocols for anthropometry used in the construction of a new international growth reference', *Food and Nutrition Bulletin*, 25(1 Suppl), pp. S27-36. doi: 10.1177/15648265040251S104.

Dogaru, C. M., Nyffenegger, D., Pescatore, A. M., Spycher, B. D. and Kuehni, C. E. (2014) 'Breastfeeding and Childhood Asthma: Systematic Review and Meta-Analysis', *American Journal of Epidemiology*, 179(10), pp. 1153–1167. doi: 10.1093/aje/kwu072.

Doherty, T., Sanders, D., Jackson, D., Swanevelder, S., Lombard, C., Zembe, W., Chopra, M., Goga, A., Colvin, M., Fadnes, L. T., Engebretsen, I. M., Ekström, E.-C. and Tylleskär, T. (2012) 'Early cessation of breastfeeding amongst women in South Africa: an area needing urgent attention to improve child health', *BMC Pediatrics*, 12(1), p. 105. doi: 10.1186/1471-2431-12-105.

Donohoe, D. R., Garge, N., Zhang, X., Sun, W., O'Connell, T. M., Bunger, M. K. and Bultman, S. J. (2011) 'The microbiome and butyrate regulate energy metabolism and autophagy in the mammalian colon', *Cell Metabolism*, 13(5), pp. 517–526. doi: 10.1016/j.cmet.2011.02.018.

Duijts, L., Ramadhani, M. K. and Moll, H. A. (2009) 'Breastfeeding protects against infectious diseases during infancy in industrialized countries. A systematic review', *Maternal & Child Nutrition*, 5(3), pp. 199–210. doi: 10.1111/j.1740-8709.2008.00176.x.

Dvorak, B. (2010) 'Milk Epidermal Growth Factor and Gut Protection', *The Journal of pediatrics*, 156(2 Suppl), pp. S31–S35. doi: 10.1016/j.jpeds.2009.11.018.

Dyson, L., McCormick, F. and Renfrew, M. J. (2005) 'Interventions for promoting the initiation of breastfeeding', *The Cochrane Database of Systematic Reviews*, (2), p. CD001688. doi: 10.1002/14651858.CD001688.pub2.

Echeverría, F., Valenzuela, R., Catalina Hernandez-Rodas, M. and Valenzuela, A. (2017) 'Docosahexaenoic acid (DHA), a fundamental fatty acid for the brain: New dietary sources', *Prostaglandins, Leukotrienes, and Essential Fatty Acids*, 124, pp. 1–10. doi: 10.1016/j.plefa.2017.08.001.

Eidelman A.I., Schanler R.J., Johnston M., Landers S., Noble L., Szucs K., Viehmann L. (2012) Breastfeeding and the use of human milk. *Pediatrics*. 2;129:e827–e841.

Ekambaram, M., Bhat, V.B. and Ahamed, M.A. (2010) 'Knowledge, attitude and practice of breastfeeding among postnatal mothers', *Curr Pediatr Res.* 14 (2): 119-124.

Eny, K. M., Chen, S., Anderson, L. N., Chen, Y., Lebovic, G., Pullenayegum, E., Parkin, P. C., Maguire, J. L., Birken, C. S. and TARGet Kids! Collaboration (2018) 'Breastfeeding duration, maternal body mass index, and birth weight are associated with differences in body mass index growth trajectories in early childhood', *The American Journal of Clinical Nutrition*, 107(4), pp. 584–592. doi: 10.1093/ajcn/nqx081.

Ericson, J., Flacking, R., Hellström-Westas, L. and Eriksson, M. (2016) 'Changes in the prevalence of breast feeding in preterm infants discharged from neonatal units: a register study over 10 years', *BMJ open*, 6(12), p. e012900. doi: 10.1136/bmjopen-2016-012900.

Esteves, T. M. B., Daumas, R. P., de Oliveira, M. I. C., de Andrade, C. A. de F. and Leite, I. C. (2014) 'Factors associated to breastfeeding in the first hour of life: systematic review', *Revista de Saúde Pública*, 48(4), pp. 697–708. doi: 10.1590/S0034-8910.2014048005278.

Exavery, A., Kanté, A. M., Hingora, A. and Phillips, J. F. (2015) 'Determinants of early initiation of breastfeeding in rural Tanzania', *International Breastfeeding Journal*, 10, p. 27. doi: 10.1186/s13006-015-0052-7.

Fatmi, Z., Gulzar, A. Z. and Kazi, A. (2005) 'Maternal and newborn care: practices and beliefs of traditional birth attendants in Sindh, Pakistan', *Eastern Mediterranean Health Journal*, 11(1–2), pp. 226–234. Available at: https://www.ncbi.nlm.nih.gov/pubmed/16532692 (Accessed: 23 May 2016).

Food and Agriculture Organization (2012) *State of Food Insecurity in the World*. Available at: http://www.fao.org/docrep/016/i3027e/i3027e.pdf (Accessed: 12 March 2016)

Fatima, K. (2017) 'Breastfeeding Practices and Nutritional Assessment of Under - two Year Children: A Cross-cultural and Cross-national Comparative Study of Bangladesh and Germany', *Field Research in Bangladesh,* p. 7. Available at: https://www.uni-kassel.de/einrichtungen/fileadmin/datas/einrichtungen/icdd/ICDD_Field_research_report_Kaniz_2017.pdf (Accessed: 3 May 2016).

Fekadu, Y., Mesfin, A., Haile, D. and Stoecker, B. J. (2015) 'Factors associated with nutritional status of infants and young children in Somali Region, Ethiopia: a cross-sectional study', *BMC public health*, 15, p. 846. doi: 10.1186/s12889-015-2190-7.

Fidler, N. and Koletzko, B. (2000) 'The fatty acid composition of human colostrum', *European Journal of Nutrition*, 39(1), pp. 31–37. Available at: https://www.ncbi.nlm.nih.gov/pubmed/10900555 (Accessed: 23 May 2016).

Fikree, F. F., Ali, T. S., Durocher, J. M. and Rahbar, M. H. (2005) 'Newborn care practices in low socioeconomic settlements of Karachi, Pakistan', *Social Science & Medicine (1982)*, 60(5), pp. 911–921. doi: 10.1016/j.socscimed.2004.06.034 (Accessed: May 2016).

Fitzsimons, E. and Pongiglione, B. (2017) Prevalence and trends in overweight and obesity in childhood and adolescence: Findings from the Millennium Cohort Study, with a focus on age 14. *Centre for Longitudinal Studies Working paper,* UCL, London.

Foster, B. A., Escaname, E., Powell, T. L., Larsen, B., Siddiqui, S. K., Menchaca, J., Aquino, C., Ramamurthy, R. and Hale, D. E. (2017) 'Randomized Controlled Trial of DHA Supplementation during Pregnancy: Child Adiposity Outcomes', *Nutrients*, 9(6), p. 566. doi: 10.3390/nu9060566. (Accessed: 3 May 2018).

Friedman, N. J. and Zeiger, R. S. (2005) 'The role of breast-feeding in the development of allergies and asthma', *The Journal of Allergy and Clinical Immunology*, 115(6), pp. 1238–1248. doi: 10.1016/j.jaci.2005.01.069. (Accessed: 23 May 2016).

Ghuliani, A. and Kaul, M. (1995) 'Contamination of weaning foods and transmission of E. coli in causation of infantile diarrhea in low income group in Chandigarh', *Indian Pediatrics*, 32(5), pp. 539–542. Available at: https://www.ncbi.nlm.nih.gov/pubmed/8613311 (Accessed: 23 May 2016).

Gatti, L. (2008) 'Maternal Perceptions of Insufficient Milk Supply in Breastfeeding', *Journal of nursing scholarship: an official publication of Sigma Theta Tau International Honor Society of Nursing / Sigma Theta Tau*, 40(4), pp. 355–363. doi: 10.1111/j.1547-5069.2008.00234.x.

Giashuddin, M. S. and Kabir, M. (2004) 'Duration of breast-feeding in Bangladesh', *The Indian Journal of Medical Research*, 119(6), pp. 267–272. Available at: https://www.researchgate.net/publication/8466408_Duration_of_breast-feeding_in_Bangladesh (Accessed: 23 May 2016).

Godhia M. L. and Patel N. (2013) 'Colostrum - Its Composition, Benefits as a Nutraceutical: A Review', *Current Research in Nutrition and Food*, Vol. 1(1), 37-47. Available at: http://www.foodandnutritionjournal.org/volume1number1/colostrum-its-composition-benefits-as-a-nutraceutical-a-review/ (Accessed: 23 June 2016).

Goyle A, Jain P, Vyas S, Saraf H, Sekhawat N. (2004) 'Colostrum and prelacteal feeding practices followed by families of pavement and roadside squatter settlements'. *Indian J Prev Soc Med*, 25(1):58–62.

Goyal, M.K., Grover, N., Saroha, H., Garg, R. and Tomar, A. (2015) 'Study of knowledge, attitude and practice towards feeding of colostrum in a tertiary care center of Jaipur, Rajasthan', *Indian Journal of Basic and Applied Medical Research;* Vol.-5, Issue- 1, P. 651-656.

Goodburn, L. (1994) 'Bangladesh women report postpartum health problems', *Safe Motherhood*, (13), p. 3. Available at: https://www.ncbi.nlm.nih.gov/pubmed/12345456. (Accessed: 23 May 2016).

Grantham-McGregor, S., Cheung, Y. B., Cueto, S., Glewwe, P., Richter, L. and Strupp, B. (2007) 'Developmental potential in the first 5 years for children in developing countries', *The Lancet*, 369(9555), pp. 60–70. doi: 10.1016/S0140-6736(07)60032-4.

Greiner, T. (1994) 'Maternal protein-energy malnutrition and breastfeeding', *SCN news*, (11), pp. 28–30. Available at: https://www.ncbi.nlm.nih.gov/pubmed/12288233 (Accessed: 23 May 2016).

Greiner, T. (1997) 'Breastfeeding in Bangladesh: A Review of the Literature', *Bangladesh Journal of Nutrition,* vol. 10, Nos. 1 & 2.

Gultie, T. and Sebsibie, G. (2016) 'Determinants of Suboptimal breastfeeding practices in Debre Berhan town, Ethiopia: a cross sectional study', *Int Breastfeeding J.,* 11.5. https://doi.org/10.1186/s13006-016-0063-z.

Goudet, S. M., Griffiths, P. L., Bogin, B. A. and Selim, N. (2011) 'Impact of flooding on feeding practices of infants and young children in Dhaka, Bangladesh Slums: what are the coping strategies?', *Maternal & Child Nutrition*, 7(2), pp. 198–214. doi: 10.1111/j.1740-8709.2010.00250.x. (Accessed: 3 May 2018).

Government of People's Republic of Bangladesh, Ministry of Health and Family Welfare (2016) Health Bulletin. Management Information System, Directorate General of Health Services. Available at:

http://www.dghs.gov.bd/images/docs/Publicaations/HB%202016%20_2nd_edition_13_01_17.pdf (Accessed: 23 May 2018).

Gul, S., Khalil, R., Yousafzai, M. T. and Shoukat, F. (2014) 'Newborn care knowledge and practices among mothers attending pediatric outpatient clinic of a hospital in Karachi, Pakistan', *International Journal of Health Sciences*, 8(2), pp. 167–175. Available at: https://www.ncbi.nlm.nih.gov/pubmed/25246884 (Accessed: May 2018).

Gunderson, E. P., Greenspan, L. C., Faith, M. S., Hurston, S. R., Quesenberry, C. P. and SWIFT Offspring Study Investigators (2018) 'Breastfeeding and growth during infancy among offspring of mothers with gestational diabetes mellitus: a prospective cohort study', *Pediatric Obesity*. doi: 10.1111/ijpo.12277. (Accessed: September 2018).

Gupta, P., Srivastava, V., Kumar, V., Jain, S., Masood, J., Ahmad, N. and Srivastava, J. (2010) 'Newborn Care Practices in Urban Slums of Lucknow City, UP', *Indian Journal of Community Medicine: Official Publication of Indian Association of Preventive & Social Medicine*, 35(1), pp. 82–85. doi: 10.4103/0970-0218.62570.

Hackett, K. M., Mukta, U. S., Jalal, C. S. B. and Sellen, D. W. (2015.a) 'Knowledge, attitudes and perceptions on infant and young child nutrition and feeding among adolescent girls and young mothers in rural Bangladesh', *Maternal & Child Nutrition*, 11(2), pp. 173–189. doi: 10.1111/mcn.12007. (Accessed: 23 May 2018).

Hackett, K. M., Mukta, U. S., Jalal, C. S. B. and Sellen, D. W. (2015.b) 'A qualitative study exploring perceived barriers to infant feeding and caregiving among adolescent girls and young women in rural Bangladesh', *BMC public health*, 15, p. 771. doi: 10.1186/s12889-015-2115-5. (Accessed: 23 May 2018).

Haider, R. and Saha, K. K. (2016) 'Breastfeeding and infant growth outcomes in the context of intensive peer counselling support in two communities in Bangladesh', *International Breastfeeding Journal*, 11. doi: 10.1186/s13006-016-0077-6.

Haider, R., Kabir, I., Hamadani, J. D. and Habte, D. (1997) 'Reasons for failure of breast-feeding counselling: mothers' perspectives in Bangladesh', *Bulletin of the World Health Organization*, 75(3), pp. 191–196. Available at: https://www.ncbi.nlm.nih.gov/pubmed/9277005 (Accessed: May 2015).

Haider, R., Rasheed, S., Sanghvi, T. G., Hassan, N., Pachon, H., Islam, S. and Jalal, C. S. (2010) 'Breastfeeding in infancy: identifying the program-relevant issues in Bangladesh', *International Breastfeeding Journal*, 5(1), p. 21. doi: 10.1186/1746-4358-5-21. (Accessed: 23 May 2016).

Haider, R., Ashworth, A., Kabir, I. and Huttly, S. R. (2000) 'Effect of community-based peer counsellors on exclusive breastfeeding practices in Dhaka, Bangladesh: a randomised controlled trial', *Lancet (London, England)*, 356(9242), pp. 1643–1647. Available at: https://www.ncbi.nlm.nih.gov/pubmed/11089824?dopt=Abstract (Accessed: 2 June 2016).

Hanif, H. M. (2013) 'Trends in infant and young child feeding practices in Bangladesh, 1993-2011', *International Breastfeeding Journal,* 8:10.

Harder, T., Bergmann, R., Kallischnigg, G. and Plagemann, A. (2005) 'Duration of Breastfeeding and Risk of Overweight: A Meta-Analysis', *American Journal of Epidemiology*, 162(5), pp. 397–403. doi: 10.1093/aje/kwi222. (Accessed: 23 May 2016).

Haque, S. R., Ash, R. and McCarthy, H. D. (2015) 'An investigation into exclusive breast feeding practices in rural Bangladeshi women', *Proceedings of the Nutrition Society*, 74(OCE3). doi: 10.1017/S002966511500230X. (Accessed: 3 May 2018).

Haque, M. F., Hussain, M., Sarkar, A., Hoque, M. M., Ara, F. A. and Sultana, S. (2002) 'Breast-feeding counselling and its effect on the prevalence of exclusive breast-feeding', *Journal of Health, Population, and Nutrition*, 20(4), pp. 312–316. Available at: https://www.ncbi.nlm.nih.gov/pubmed/12659411 (Accessed: 3 May 2016).

Hashizume, M., Armstrong, B., Hajat, S., Wagatsuma, Y., Faruque, A. S., Hayashi, T. amd Sack, D. A. (2007) 'Association between climate variability and hospital visits for non-cholera diarrhoea in Bangladesh: effects and vulnerable groups', *International Journal of Epidemiology*, 36(5), pp. 1030–1037.doi:10.1093/ije/dym148.

Hassiotou, F., Hepworth, AR., Metzger, P., Lai, CT., Trengove, N., Hartmann, PE. and Filgueira L. (2013) Maternal and infant infections stimulate a rapid leukocyte response in breastmilk. *Clinical and Translational Immunology* 2 (4)**:**e3, doi: 10.1038/cti.2013.1

Hakansson, AP. (2015) Protective effects of human milk antimicrobial peptides against bacterial infection. *J Pediatr*. (Rio J); 91(1):4-5. Available at: https://www.ncbi.nlm.nih.gov/pubmed/25458872 (Accessed: 23 May 2018).

Hawwas, A. W. (1988) 'Breastfeeding as seen by Islam', *Population Sciences (Cairo, Egypt),* 8, pp.55-58. Available at: https://www.ncbi.nlm.nih.gov/pubmed/12315539 (Accessed:12 June 2015).

Hazir, T., Akram, D.-S., Nisar, Y. B., Kazmi, N., Agho, K. E., Abbasi, S., Khan, A. M. and Dibley, M. J. (2013) 'Determinants of suboptimal breast-feeding practices in Pakistan', *Public Health Nutrition*, 16(4), pp. 659–672. doi: 10.1017/S1368980012002935. (Accessed:12 June 2015).

Henry, F. J., Patwary, Y., Huttly, S. R. and Aziz, K. M. (1990) 'Bacterial contamination of weaning foods and drinking water in rural Bangladesh.', *Epidemiology and Infection*, 104(1), pp. 79–85. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2271730/pdf/epidinfect00019-0083.pdf (Accessed:12 June 2015).

Hirschman, C. and Butler, M. (1981) 'Trends and differentials in breast feeding: an update', *Demography*, 18(1), pp. 39–54. Available at: https://www.ncbi.nlm.nih.gov/pubmed/7202785 (Accessed:12 June 2015).

Hornstra, G. (2000) 'Essential fatty acids in mothers and their neonates', *The American Journal of Clinical Nutrition*, 71(5 Suppl), pp. 1262S–9S. doi: 10.1093/ajcn/71.5.1262s. (Accessed:12 June 2015).

Hobbs, A. J., Mannion, C. A., McDonald, S. W., Brockway, M. and Tough, S. C. (2016) 'The impact of caesarean section on breastfeeding initiation, duration and difficulties in the first four months postpartum', *BMC Pregnancy and Childbirth*, 16(1), p. 90. doi: 10.1186/s12884-016-0876-1. (Accessed:12 June 2018).

Holman, D. J. and Grimes, M. A. (2001) 'Colostrum Feeding Behaviour and Initiation of Breastfeeding in Rural Bangladesh', *Journal of Biosocial Science*, 33(1), pp. 139–154. doi: 10.1017/S0021932001001390. (Accessed:2 June 2018).

Horta, B. L., Mola, C. L. de and Victora, C. G. (2015) 'Long-term consequences of breastfeeding on cholesterol, obesity, systolic blood pressure and type 2 diabetes: a systematic review and meta-analysis', *Acta Paediatrica*, 104(S467), pp. 30–37. doi: 10.1111/apa.13133. (Accessed:2 June 2018).

Hossain, M. M., Radwan, M. M., Arafa, S. A., Habib, M. and DuPont, H. L. (1992) 'Prelacteal infant feeding practices in rural Egypt', *Journal of Tropical Pediatrics*, 38(6), pp. 317–322. doi: 10.1093/tropej/38.6.317. (Accessed:1 June 2015).

Holt L. E. (1957) ‘The good housekeeping book of baby and childcare’. New York, NY: Popular Library, Inc. (Accessed:2 June 2018).

Huffman, S. L., Chowdhury, A., Chakraborty, J. and Simpson, N. K. (1980) ‘Breast-feeding patterns in rural Bangladesh’, *The American Journal of Clinical Nutrition*, 33(1), pp. 144–154. doi: 10.1093/ajcn/33.1.144. (Accessed:12 June 2015).

Innis, S. M. (2014) ‘Impact of maternal diet on human milk composition and neurological development of infants’, *The American Journal of Clinical Nutrition*, 99(3), pp. 734S–41S. doi: 10.3945/ajcn.113.072595. (Accessed:12 July 2017).

Iqbal, Z. M. (2008) History of the Liberation War, Dhanmondi, Dhaka: Proteeti, Muktir Udyog. Available at: http://bangla2000.com/blog/sample-page/brief-history/ (Accessed:12 July 2017).

Islam, A., Biswas T. (2014) ‘Health System in Bangladesh: Challenges and Opportunities’, *American Journal of Health Research*, 2(6), p. 366. doi: 10.11648/j.ajhr.20140206.18. (Accessed:12 July 2017).

Islam, M. M., Islam, M. K., Hasan, M. S. and Hossain, M. B. (2017) ‘Adolescent motherhood in Bangladesh: Trends and determinants’, *PLoS ONE*, 12(11). doi: 10.1371/journal.pone.0188294. (Accessed:12 September 2018).

Islam, M. T., Islam, N., Yoshimura, Y., Nisha, M. K. and Yasmin, N. (2015) ‘Newborn care practices in rural Bangladesh’, Research and Reports in Neonatology, (5) 65-72, doi: 10.2147/RRN.S87122. (Accessed:12 September 2018).

Issaka, A. I., Agho, K. E. and Renzaho, A. M. (2017) ‘Prevalence of key breastfeeding indicators in 29 sub-Saharan African countries: a meta-analysis of demographic and health surveys (2010–2015)’, *BMJ Open*, 7(10), p. e014145. doi: 10.1136/bmjopen-2016-014145. (Accessed:2 September 2018).

Jäger, S., Jacobs, S., Kröger, J., Fritsche, A., Schienkiewitz, A., Rubin, D., Boeing, H. and Schulze, M. B. (2014) ‘Breast-feeding and maternal risk of type 2 diabetes: a prospective study and meta-analysis’, *Diabetologia*, 57(7), pp. 1355–1365. doi: 10.1007/s00125-014-3247-3. (Accessed: 2 September 2018).

Jamil, K., Bhuiya, A., Streatfield, K. and Chakrabarty, N. (1999) ‘The Immunization Programme in Bangladesh: Impressive Gains in Coverage, But Gaps Remain’, *Health Policy and Planning*, 14(1), pp. 49–58. doi: 10.1093/heapol/14.1.49. (Accessed:12 September 2016).

Jenness, R. (1979) ‘The composition of human milk’, *Seminars in Perinatology*, 3(3), pp. 225–239. Available at: https://www.ncbi.nlm.nih.gov/pubmed/392766 (Accessed:12 September 2016).

Joseph, N., Unnikrishnan, B., Naik, V. A., Mahantshetti, N. S., Mallapur, M. D., Kotian, S. M. and Nelliyanil, M. (2013) ‘Infant Rearing Practices in South India: A Longitudinal Study’, *Journal of Family Medicine and Primary Care*, 2(1), pp. 37–43. doi: 10.4103/2249-4863.109942. (Accessed:12 September 2018).

Jokhio, A. H., Winter, H. R. and Cheng, K. K. (2005) ‘An intervention involving traditional birth attendants and perinatal and maternal mortality in Pakistan’, *The New England Journal of Medicine*, 352(20), pp. 2091–2099. doi: 10.1056/NEJMsa042830. (Accessed:12 September 2018).

Joshi, P. C., Angdembe, M. R., Das, S. K., Ahmed, S., Faruque, A. S. G. and Ahmed, T. (2014) ‘Prevalence of exclusive breastfeeding and associated factors among

mothers in rural Bangladesh: a cross-sectional study', *International Breastfeeding Journal*, 9(1), p. 7. doi: 10.1186/1746-4358-9-7. (Accessed:2 September 2017).

Kabir, I., Khanam, M., Agho, K. E., Mihrshahi, S., Dibley, M. J. and Roy, S. K. (2012) 'Determinants of inappropriate complementary feeding practices in infant and young children in Bangladesh: secondary data analysis of Demographic Health Survey 2007', *Maternal & Child Nutrition*, 8 Suppl 1, pp. 11–27. doi: 10.1111/j.1740-8709.2011.00379.x. (Accessed:1 September 2016).

Karas, D. J., Mullany, L. C., Katz, J., Khatry, S. K., LeClerq, S. C., Darmstadt, G. L. and Tielsch, J. M. (2012) 'Home Care Practices for Newborns in Rural Southern Nepal During the First 2 weeks of Life', *Journal of Tropical Pediatrics*, 58(3), pp. 200–207. doi: 10.1093/tropej/fmr057. (Accessed:1 May 2017).

Karkee, R.; Lee, A.H.; Khanal, V.; Binns, C.W. (2014) Initiation of breastfeeding and factors associated with prelacteal feeds in central Nepal*. J. Hum. Lact*., 30, 353–357. (Accessed:1 May 2017).

Kavle, J. A., LaCroix, E., Dau, H. and Engmann, C. (2017) 'Addressing barriers to exclusive breast-feeding in low- and middle-income countries: a systematic review and programmatic implications', *Public Health Nutrition*, 20(17), pp. 3120–3134. doi: 10.1017/S1368980017002531. (Accessed:1 Semtember 2018).

Khadduri, R., Marsh, D. R., Rasmussen, B., Bari, A., Nazir, R. and Darmstadt, G. L. (2008) 'Household knowledge and practices of newborn and maternal health in Haripur district, Pakistan', *Journal of Perinatology: Official Journal of the California Perinatal Association*, 28(3), pp. 182–187. doi: 10.1038/sj.jp.7211903. (Accessed:15 May 2017).

Khan, J., Vesel, L., Bhal, R. and Martines, J. (2014) 'Timing of Breastfeeding Initiation and Exclusivity of Breastfeeding During the First Month of Life: Effects on Neonatal Mortality and Morbidity—A Systematic Review and Meta-analysis', Maternal and Child Health Journal. Doi:10.1007/s10995-014-1526-8. (Accessed:1 May 2017).

Khan, M. (1980) 'Infant feeding practices in rural Meheran, Comilla, Bangladesh', *The American Journal of Clinical Nutrition*, 33(11), pp. 2356–2364. doi: 10.1093/ajcn/33.11.2356. (Accessed:1 May 2017).

Khanal, V., Adhikari, M., Sauer, K. and Zhao, Y. (2013) 'Factors associated with the introduction of prelacteal feeds in Nepal: findings from the Nepal Demographic and Health Survey 2011', *International Breastfeeding Journal*, 8(1), p. 9. doi: 10.1186/1746-4358-8-9. (Accessed:1 May 2017).

Khanal, V., Sauer, K. and Zhao, Y. (2013) 'Exclusive breastfeeding practices in relation to social and health determinants: a comparison of the 2006 and 2011 Nepal Demographic and Health Surveys', *BMC Public Health*, 13, p. 958. doi: 10.1186/1471-2458-13-958. (Accessed:12 June 2017).

Khanal, V., Scott, J. A., Lee, A. H., Karkee, R. and Binns, C. W. (2015) 'Factors associated with Early Initiation of Breastfeeding in Western Nepal', *International Journal of Environmental Research and Public Health*, 12(8), pp. 9562–9574. doi: 10.3390/ijerph120809562. (Accessed:1 May 2017).

Klopp, A., Vehling, L., Becker, A. B., Subbarao, P., Mandhane, P. J., Turvey, S. E., Lefebvre, D. L., Sears, M. R., CHILD Study Investigators and Azad, M. B. (2017) 'Modes of Infant Feeding and the Risk of Childhood Asthma: A Prospective Birth Cohort Study', *The Journal of Pediatrics*, 190, pp. 192-199.e2. doi: 10.1016/j.jpeds.2017.07.012. (Accessed: 18 September 2018).

Koletzko, B., Rodriguez-Palmero, M., Demmelmair, H., Fidler, N., Jensen, R. and Sauerwald, T. (2001) 'Physiological aspects of human milk lipids', *Early Human Development*, 65 Suppl, pp. S3–S18. Available at: https://www.ncbi.nlm.nih.gov/pubmed/11755031 (Accessed: 18 September 2017).

Koletzko B, von Kries R, Closa R, European Childhood Obesity Trial Study Group (2009) Lower protein in infant formula is associated with lower weight up to age 2 y: a randomized clinical trial. *Am J Clin Nutr*;89:1836–45. (Accessed: 18 September 2017).

Koletzko, B. (2006) 'Long-term consequences of early feeding on later obesity risk', *Nestle Nutr Workshop Ser Pediatr Program*;58:1–18. (Accessed: 18 September 2017).

Kent, J. C., Mitoulas, L. R., Cregan, M. D., Ramsay, D. T., Doherty, D. A. and Hartmann, P. E. (2006) Volume and frequency of breastfeedings and fat content of breast milk throughout the day. *Pediatrics* 117:e387-395. (Accessed: 18 September 2017).

Kesterton, A. J. and Cleland, J. (2009) 'Neonatal care in rural Karnataka: healthy and harmful practices, the potential for change', *BMC pregnancy and childbirth*, 9, p. 20. doi: 10.1186/1471-2393-9-20. (Accessed: 18 September 2017).

Kelishadi, R., Hadi, B., Iranpour, R., Khosravi-Darani, K., Mirmoghtadaee, P., Farajian, S. and Poursafa, P. (2012) 'A study on lipid content and fatty acid of breast milk and its association with mother's diet composition', *Journal of Research in Medical Sciences : The Official Journal of Isfahan University of Medical Sciences*, 17(9), pp. 824–827. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3697205/ (Accessed: 18 September 2017).

Khan, M. N. and Islam, M. M. (2017) 'Effect of exclusive breastfeeding on selected adverse health and nutritional outcomes: a nationally representative study', *BMC public health*, 17(1), p. 889. doi: 10.1186/s12889-017-4913-4. (Accessed: 8 September 2018).

Khan, S. (2012) 'Short-term variations in breastmilk composition: associations with feeding patterns and gastric emptying in term infants', *Doctor of Philosophy*. Available at: https://api.research-repository.uwa.edu.au/portalfiles/portal/4582875/Khan_Sadaf_2012.pdf (Accessed: 18 September 2017).

Khan, M. A. S., Hussain., M. M. Razzak, A., Amin, R. (2008) 'Factors of weaning practices by mothers on children: A hospital based study', *The Orion Medical Journal,* vol (30):561-564. (Accessed: 18 September 2017).

Khan, J., Vesel, L., Bahl, R. and Martines, J. C. (2015) 'Timing of breastfeeding initiation and exclusivity of breastfeeding during the first month of life: effects on neonatal mortality and morbidity--a systematic review and meta-analysis', *Maternal and Child Health Journal*, 19(3), pp. 468–479. doi: 10.1007/s10995-014-1526-8. (Accessed: 18 September 2017).

Khatun, M. and Siddiqua, S. A. (2012) 'Infant Feeding Practices Among Mothers Of High And Low Socio-Economic Group In Selected Areas of Dhaka City', *Journal of Shaheed Suhrawardy Medical College*, 2(1), pp. 17–21. doi: 10.3329/jssmc.v2i1.12346. (Accessed: 1 September 2016).

Kishore, M. S. S., Kumar, P. and Aggarwal, A. K. (2009) 'Breastfeeding Knowledge and Practices amongst Mothers in a Rural Population of North India: A Community-based Study', *Journal of Tropical Pediatrics*, 55(3), pp. 183–188. doi: 10.1093/tropej/fmn110. (Accessed: 18 September 2017).

Koniak-Griffin, D. and Turner-Pluta, C. (2001) 'Health risks and psychosocial outcomes of early childbearing: a review of the literature', *The Journal of Perinatal & Neonatal Nursing*, 15(2), pp. 1–17. Available at: https://www.ncbi.nlm.nih.gov/pubmed/12095025 (Accessed: 18 September 2017).

Kramer, M. S., Aboud, F., Mironova, E., Vanilovich, I., Platt, R. W., Matush, L., Igumnov, S., Fombonne, E., Bogdanovich, N., Ducruet, T., Collet, J.-P., Chalmers, B., Hodnett, E., Davidovsky, S., Skugarevsky, O., Trofimovich, O., Kozlova, L., Shapiro, S. and Promotion of Breastfeeding Intervention Trial (PROBIT) Study Group (2008) 'Breastfeeding and child cognitive development: new evidence from a large randomized trial', *Archives of General Psychiatry*, 65(5), pp. 578–584. doi: 10.1001/archpsyc.65.5.578. (Accessed: 18 September 2017).

Kumar, N., Unnikrishnan, B., Rekha, T., Mithra, P. P., Kulkarni, V., Kumar M. P., Holla, R., and Jain, A. (2012) Infant feeding and rearing practices adapted by mothers in Coastal South India. *International Journal of Collaborative Research on Internal Medicine & Public Health,* 4 (12). pp. 1988-1999. Available at: http://eprints.manipal.edu/78406/ (Accessed: 18 September 2017).

Kørvel-Hanquist, A., Djurhuus, B. D. and Homøe, P. (2017) 'The Effect of Breastfeeding on Childhood Otitis Media', *Current Allergy and Asthma Reports*, 17(7), p. 45. doi: 10.1007/s11882-017-0712-3. (Accessed: 8 September 2018).

Labbok, M. H. (1999) 'Health Sequelae of Breastfeeding for the Mother', *Clinics in Perinatology*, 26(2), pp. 491–503. doi: 10.1016/S0095-5108(18)30063-0. (Accessed: 18 June 2017).

Laroia, N and Sharma, D. (2006) 'The Religious and Cultural Bases for Breastfeeding Practices Among the Hindus', *Breastfeeding Medicine*, 1(2), pp. 94–98. doi: 10.1089/bfm.2006.1.94. (Accessed: 18 June 2017).

Latha, S., Kamala, S., Prabu, V. and Srikanth, S. (2016) 'Newborn Feeding Practices in India: A Review', *International Journal of Scientific Research*, vol. 5(12). Available at: https://wwjournals.com/index.php/ijsr/article/view/1084. (Accessed: 1 September 2018).

Lauritzen, L., Jørgensen, M. H., Hansen, H. S. and Michaelsen, K. F. (2002) 'Fluctuations in human milk long-chain PUFA levels in relation to dietary fish intake', *Lipids*, 37(3), pp. 237–244. Available at: https://www.ncbi.nlm.nih.gov/pubmed/11942473 (Accessed: 18 March 2017).

Lawn, J. E., Cousens, S. and Zupan, J. (2005) 'Four million neonatal deaths: When? Where? Why?', *Lancet;* 365:891-900. (Accessed: 18 September 2017).

Legesse, M., Demena, M., Mesfin, F. and Haile, D. (2015) 'Prelacteal feeding practices and associated factors among mothers of children aged less than 24 months in Raya Kobo district, North Eastern Ethiopia: a cross-sectional study', *International Breastfeeding Journal*, 9(1), p. 189. doi: 10.1186/s13006-014-0025-2. (Accessed: 18 September 2017).

León-Cava, N., Lutter, C., Ross, J. and Martin, L. (2002) *Quantifying the benefits of breastfeeding: a summary of the evidence*, *Food and Nutrition Program, Pan American Health Organization,* Washington DC. Available at: http://s3.ennonline.net/attachments/421/bobcontents-and-introduction-summary.pdf (Accessed: 18 July 2017).

Lei, J., Feng, D., Zhang, Y., Zhao, F.-Q., Wu, Z., San Gabriel, A., Fujishima, Y., Uneyama, H. and Wu, G. (2012) 'Nutritional and regulatory role of branched-chain amino acids in lactation', *Frontiers in Bioscience (Landmark Edition)*, 17, pp. 2725–

2739. Available at: https://www.ncbi.nlm.nih.gov/pubmed/22652809/ (Accessed: 18 September 2017).

Leotsinidis, M., Alexopoulos, A. and Kostopoulou-Farri, E. (2005) 'Toxic and essential trace elements in human milk from Greek lactating women: association with dietary habits and other factors', *Chemosphere*, 61(2), pp. 238–247. doi: 10.1016/j.chemosphere.2005.01.084. (Accessed: 2 September 2016).

Lochfeld, James G. (2002). The Illustrated Encyclopedia of Hinduism: A-M. *The Rosen Publishing Group.* pp. 43–44. ISBN 9780823931798. (Accessed: 2 September 2016).

Lönnerdal, B. (1985) 'Biochemistry and physiological function of human milk proteins', *The American Journal of Clinical Nutrition*, 42(6), pp. 1299–1317. doi: 10.1093/ajcn/42.6.1299. (Accessed: 12 July 2017).

Lönnerdal, B. (1994) Nutritional Importance of Non-protein nitrogen, *Nestle nutrition workshop series*. Vol: 33. (Accessed: 12 July 2017).

Lönnerdal, B. (2003) 'Nutritional and physiologic significance of human milk proteins', *The American Journal of Clinical Nutrition*, 77(6), pp. 1537S-1543S. doi: 10.1093/ajcn/77.6.1537S. (Accessed: 12 July 2017).

Littler, C. (1997) 'Beliefs about colostrum among women from Bangladesh and their reasons for not giving it to the newborn', *POPLINE.org.* 110 (1308):3-7, Available at: https://www.popline.org/node/267924 (Accessed: 23 July 2018)

Madhu, K., Chowdary, S. and Masthi, R. (2009) 'Breast Feeding Practices and Newborn Care in Rural Areas: A Descriptive Cross-Sectional Study', *Indian Journal of Community Medicine: Official Publication of Indian Association of Preventive & Social Medicine*, 34(3), pp. 243–246. doi: 10.4103/0970-0218.55292. (Accessed: 12 July 2017).

Mahmood, S. A. I. (2012) Health Systems in Bangladesh, *iMedPub Journals*, vol. 1 No. 1:1, doi: 10.3823/1100. (Accessed: 12 July 2017).

Manikam, L., Robinson, A., Kuah, J. Y., Vaidya, H. J., Alexander, E. C., Miller, G. W., Singh, K. K., Dawe, V., Ahmed, S., Lingam, R. and Lakhanpaul, M. (2017) 'A systematic review of complementary feeding practices in South Asian infants and young children: the Bangladesh perspective', *BMC Nutrition*, 3(1), p. 56. doi: 10.1186/s40795-017-0176-9. (Accessed: 12 July 2017).

Mäkelä, J., Linderborg, K., Niinikoski, H., Yang, B. and Lagström, H. (2013) 'Breast milk fatty acid composition differs between overweight and normal weight women: the STEPS Study', *European Journal of Nutrition*, 52(2), pp. 727–735. doi: 10.1007/s00394-012-0378-5. (Accessed: 12 July 2017).

Mansour, L. and Mansour, A. (1993) 'Breast feeding protects infants against urinary tract infection', *New Egyptian Journal of Medicine*, 8(2), pp. 463–464. Available at: https://www.ncbi.nlm.nih.gov/pubmed/12320842 (Accessed: 5 August 2017).

Mårild, S., Hansson, S., Jodal, U., Odén, A. and Svedberg, K. (2007) 'Protective effect of breastfeeding against urinary tract infection', *Acta Pædiatrica*, 93(2), pp. 164–167. doi: 10.1111/j.1651-2227.2004.tb00699.x. (Accessed: 12 July 2017).

Martin-Du Pan, R. C. (2012) '[Oxytocin: the hormone of love, trust and social bond. Clinical use in autism and social phobia]', *Revue Medicale Suisse*, 8(333), pp. 627–630. Available at: https://www.ncbi.nlm.nih.gov/pubmed/22506444 (Accessed: 12 July 2017).

Martin, J. C., Bougnoux, P., Antoine, J. M., Lanson, M. and Couet, C. (1993) 'Triacylglycerol structure of human colostrum and mature milk', *Lipids*, 28(7), pp. 637–643. Available at: https://www.ncbi.nlm.nih.gov/pubmed/8355593 (Accessed: 12 July 2017).

Martin, F.-P. J., Moco, S., Montoliu, I., Collino, S., Da Silva, L., Rezzi, S., Prieto, R., Kussmann, M., Inostroza, J. and Steenhout, P. (2014) 'Impact of breast-feeding and high- and low-protein formula on the metabolism and growth of infants from overweight and obese mothers', *Pediatric Research*, 75(4), pp. 535–543. doi: 10.1038/pr.2013.250. (Accessed: 12 July 2017).

Martin, C. R., Ling, P.-R. and Blackburn, G. L. (2016) 'Review of Infant Feeding: Key Features of Breast Milk and Infant Formula', *Nutrients*, 8(5). doi: 10.3390/nu8050279. (Accessed: 12 July 2017).

Marphatia, A. A., Ambale, G. S. and Reid, A. M. (2017) 'Women's Marriage Age Matters for Public Health: A Review of the Broader Health and Social Implications in South Asia', *Frontiers in Public Health*, 5, p. 269. doi: 10.3389/fpubh.2017.00269. (Accessed: 12 July 2017).

Målqvist, M., Pun, A. and Kc, A. (2017) 'Essential newborn care after home delivery in Nepal', *Scandinavian Journal of Public Health*, 45(2), pp. 202–207. doi: 10.1177/1403494816683572. (Accessed: 12 July 2017).

Majamanda, J., Maureen, D., Munkhondia, T. M. and Carrier, J. (2014) 'The Effectiveness of Community-Based Nutrition Education on the Nutrition Status of Under-five Children in Developing Countries. A Systematic Review', *Malawi Medical Journal*, 26(4), pp. 115–118. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4325345/ (Accessed: 12 July 2017).

Mangasaryan, N., Martin, L., Brownlee, A., Ogunlade, A., Rudert, C. and Cai, X. (2012) 'Breastfeeding promotion, support and protection: review of six country programmes', *Nutrients*, 4(8), pp. 990–1014. doi: 10.3390/nu4080990. (Accessed: 22 July 2017).

Ma, X., Liu, J. and Smith, M. (2014) 'WIC participation and breastfeeding in South Carolina: updates from PRAMS 2009-2010', *Maternal and Child Health Journal*, 18(5), pp. 1271–1279. doi: 10.1007/s10995-013-1362-2. (Accessed: 12 July 2017).

McAndrew, F., Thompson, J., Fellows, L., Large, A., Speed, M., and Renfrew, M. J. (2012) Infant Feeding Survey 2010: Summary. *Health and Social Care Information Centre, IFF Research*. Available at: https://files.digital.nhs.uk/publicationimport/pub08xxx/pub08694/ifs-uk-2010-sum.pdf (Accessed: 7 April 2018).

McCrory, C. and Murray, A. (2013) 'The effect of breastfeeding on neuro-development in infancy', *Maternal and Child Health Journal*, 17(9), pp. 1680–1688. doi: 10.1007/s10995-012-1182-9. (Accessed: 12 July 2017).

McCrory, C. and Layte, R. (2011) 'The effect of breastfeeding on children's educational test scores at nine years of age: results of an Irish cohort study', *Social Science & Medicine (1982)*, 72(9), pp. 1515–1521. doi: 10.1016/j.socscimed.2011.03.002. (Accessed: 12 July 2017).

Mehriban, N. and Sayed, S. (2015) 'Knowledge On Breastfeeding And Weaning Among Mothers Of Infants In ICDDR,B', *Journal of Allied Health Sciences*. Volume 2, Issue 1 & 2, PP 71–78, January –July 2015. (Accessed: 1 January 2017).

Mekonen, L., Seifu, W. and Shiferaw, Z. (2018) 'Timely initiation of breastfeeding and associated factors among mothers of infants under 12 months in South Gondar zone,

Amhara regional state, Ethiopia; 2013', *International Breastfeeding Journal*, 13, p. 17. doi: 10.1186/s13006-018-0160-2. (Accessed: 22 September 2018).

Mezzacappa, E. S., Kelsey, R. M. and Katkin, E. S. (2005) 'Breast feeding, bottle feeding, and maternal autonomic responses to stress', *Journal of Psychosomatic Research*, 58(4), pp. 351–365. doi: 10.1016/j.jpsychores.2004.11.004. (Accessed: 12 July 2017).

The Millennium Development Goals (2013) *Bangladesh Progress Report 2012, Government of the People's Republic of Bangladesh*. Available at: http://www.undp.org/content/dam/undp/library/MDG/english/MDG%20Country%20Reports/Bangladesh/MDG%20Report_2012_Final_11_06_2013.pdf (Accessed: June 2015).

Mihrshahi, S., Ichikawa, N., Shuaib, M., Oddy, W., Ampon, R., Dibley, M. J., Kabir, A. K. M. I. and Peat, J. K. (2007) 'Prevalence of Exclusive Breastfeeding in Bangladesh and Its Association with Diarrhoea and Acute Respiratory Infection: Results of the Multiple Indicator Cluster Survey 2003', *Journal of Health, Population, and Nutrition*, 25(2), pp. 195–204. Available at: https://www.researchgate.net/publication/5860583_Prevalence_of_Exclusive_Breastfeeding_in_Bangladesh_and_Its_Association_with_Diarrhoea_and_Acute_Respiratory_Infection_Results_of_the_Multiple_Indicator_Cluster_Survey_2003 (Accessed: 12 July 2017).

Mihrshahi, S., Kabir, I., Roy, S. K., Agho, K. E., Senarath, U., Dibley, M. J. and South Asia Infant Feeding Research Network (2010) 'Determinants of infant and young child feeding practices in Bangladesh: secondary data analysis of Demographic and Health Survey 2004', *Food and Nutrition Bulletin*, 31(2), pp. 295–313. doi: 10.1177/156482651003100220. (Accessed: 12 July 2017).

Millat, MH., Jahan, MU., Hasan, M., Alam, K., Hossian, MM., Miah, MS. (2011) Letter to the editor: Status and prospect of Community Clinic in rural areas of Bangladesh: An overview of health workers. *Bangladesh Medical Research Council Bull,* Dhaka; 37: 76-77

Ministry of Health and Family Welfare (MOHFW) Bangladesh (2012). *Bangladesh Population Policy 2012*. *Dhaka, Bangladesh, Government of the People's Republic of Bangladesh*. (Accessed: June 2014).

Ministry of Health and Family Welfare (MOHFW) Bangladesh (2014) *Health, Population and Nutrition Sector Development Program: 2011-2016.* Volume I. (Accessed: 18 September 2017).

Ministry of Health and Family Welfare (MOHFW) Bangladesh (2014) *Health Bulletin 2014, Management Information System, Directorate general of health services*. Available at: http://www.dghs.gov.bd/images/docs/Publicaations/HB%202016%20_pdf (Accessed: December 2016).

Ministry of Health and Family Welfare (MOHFW) Bangladesh, Partnership for Maternal, Newborn & Child Health, WHO, World Bank and Alliance for Health Policy and Systems Research. (2015*). Success Factors for Women's and Children's Health: Bangladesh*. (Accessed: May 2017).

Ministry of Health and Family Welfare (MOHFW) (2016) *Health Bulletin 2016, Management Information System, Directorate general of health services*. Available at: http://www.dghs.gov.bd/images/docs/Publicaations/HB%202016%20_2nd_edition_13_01_17.pdf (Accessed: September 2017).

Ministry of Housing and Public Works (MOHPW) (2015) Mobilization report: Preparation of development plan for fourteen Upazila Project Package-1: Nawabganj, Dohar & Shibchar Upazila. Available at: http://udd.portal.gov.bd/sites/default/files/files/udd.portal.gov.bd/page/6b37869f_4443_4b03_a091_f0becd7e0d43/Mobilization%20Report%20(2).pdf (Accessed: August 2017).

Ministry of Women and Children Affairs (MOWCA) (2007) *Upazila profile of Dohar*. Accessed: May 2014).

Mitoulas, L. R., Kent, J. C., Cox, D. B., Owens, R. A., Sherriff, J. L. and Hartmann, P. E. (2002) Variation in fat, lactose and protein in human milk over 24 h and throughout the first year of lactation. *Br J Nutr* 88:29-37

Mohammad, M. A., Sunehag, A. L. and Haymond, M. W. (2009) 'Effect of dietary macronutrient composition under moderate hypocaloric intake on maternal adaptation during lactation', *The American Journal of Clinical Nutrition*, 89(6), pp. 1821–1827. doi: 10.3945/ajcn.2008.26877. (Accessed: 2 November 2017).

Molinari, C. E., Casadio, Y. S., Hartmann, B. T., Livk, A., Bringans, S., Arthur, P. G. and Hartmann, P. E. (2012) 'Proteome mapping of human skim milk proteins in term and preterm milk', *Journal of Proteome Research*, 11(3), pp. 1696–1714. doi: 10.1021/pr2008797. (Accessed: 2 November 2017).

Moore, E. R., Anderson, G. C., Bergman, N. and Dowswell, T. (2012) 'Early skin-to-skin contact for mothers and their healthy newborn infants', *The Cochrane Database of Systematic Reviews*, (5), p. CD003519. doi: 10.1002/14651858.CD003519.pub3. (Accessed: 2 November 2017).

Morley, R., Fewtrell, M. S., Abbott, R. A., Stephenson, T., MacFadyen, U. and Lucas, A. (2004) 'Neurodevelopment in children born small for gestational age: a randomized trial of nutrient-enriched versus standard formula and comparison with a reference breastfed group', *Pediatrics*, 113(3 Pt 1), pp. 515–521. Available at: https://www.ncbi.nlm.nih.gov/pubmed/14993543 (Accessed: 2 November 2017).

Moran, A. C., Choudhury, N., Uz Zaman Khan, N., Ahsan Karar, Z., Wahed, T., Faiz Rashid, S. and Alam, M. A. (2009) 'Newborn care practices among slum dwellers in Dhaka, Bangladesh: a quantitative and qualitative exploratory study', *BMC pregnancy and childbirth*, 9, p. 54. doi: 10.1186/1471-2393-9-54. (Accessed: 2 November 2017).

Mosca, F., Giannì M. L. (2017) Human milk: composition and health benefits. Neonatal Intensive Care Unit, Department of Clinical Science and Community Health, University of Milan, Italy, *La Pediatria Medica e Chirurgica* ; volume 39:155. (Accessed: 2 September 2018).

Muelbert, M. and Giugliani, E. R. J. (2018) 'Factors associated with the maintenance of breastfeeding for 6, 12, and 24 months in adolescent mothers', *BMC public health*, 18(1), p. 675. doi: 10.1186/s12889-018-5585-4. (Accessed: 2 September 2018).

Mullany, L. C., Katz, J., Li, Y. M., Khatry, S. K., LeClerq, S. C., Darmstadt, G. L. and Tielsch, J. M. (2008) 'Breast-feeding patterns, time to initiation, and mortality risk among newborns in southern Nepal', *The Journal of Nutrition*, 138(3), pp. 599–603. doi: 10.1093/jn/138.3.599. (Accessed: 2 November 2017).

Ministry of Woman and Child affairs (2007) *Multi-Sectoral Progamme on Violence Against Women: Upazila Profile of Dohar*. Accessed: 1 March 2014.

Nahlen, B. L. (2000) ‘Rolling back malaria in pregnancy’, *The New England Journal of Medicine*, 343(9), pp. 651–652. doi: 10.1056/NEJM200008313430909. (Accessed: 2 November 2017).

Nasser, R., Stephen, A. M., Goh, Y. K. and Clandinin, M. T. (2010) ‘The effect of a controlled manipulation of maternal dietary fat intake on medium and long chain fatty acids in human breast milk in Saskatoon, Canada’, *International Breastfeeding Journal*, 5, p. 3. doi: 10.1186/1746-4358-5-3. (Accessed: 2 November 2017).

National Institute of Population Research and Training (NIPORT), Mitra and Associates, and Macro International (1994) *Bangladesh Demographic and Health Survey 1993-1994*. NIPORT, Mitra and Associates, and Macro International. Available at: https://dhsprogram.com/pubs/pdf/FR60/FR60.pdf (Accessed: 10 September 2014).

National Institute of Population Research and Training (NIPORT), Mitra and Associates, and Macro International (1997) *Bangladesh Demographic and Health Survey 1996-1997*. NIPORT, Mitra and Associates, and Macro International. Available at: https://dhsprogram.com/pubs/pdf/FR88/FR88.pdf (Accessed: 10 September 2014).

National Institute of Population Research and Training (NIPORT), Mitra and Associates, and ORC Macro (2005) *Bangladesh Demographic and Health Survey 2004*. NIPORT, Mitra and Associates, and ORC Macro. Available at: https://dhsprogram.com/pubs/pdf/fr165/fr-bd04[fr165].pdf (Accessed: 10 September 2014).

National Institute of Population Research and Training (NIPORT), Mitra and Associates, and Macro International (2009) *Bangladesh Demographic and Health Survey 2007*. NIPORT, Mitra and Associates, and Macro International. Available at: https://dhsprogram.com/pubs/pdf/FR207/FR207[April-10-2009].pdf (Accessed: 10 September 2014).

National Institute of Population Research and Training (NIPORT), Mitra and Associates, and ICF International (2013) *Bangladesh Demographic and Health Survey 2011*. NIPORT, Mitra and Associates, and ICF International. Available at: https://dhsprogram.com/pubs/pdf/fr265/fr265.pdf (Accessed: 12 September 2017).

National Institute of Population Research and Training (NIPORT), Mitra and Associates, and ICF International (2016) *Bangladesh Demographic and Health Survey 2014*. NIPORT, Mitra and Associates, and ICF International. Available at: https://dhsprogram.com/pubs/pdf/FR311/FR311.pdf (Accessed: 12 September 2017).

Ndirangu, M. N., Gatimu, S. M., Mwinyi, H. M. and Kibiwott, D. C. (2018) ‘Trends and factors associated with early initiation of breastfeeding in Namibia: analysis of the Demographic and Health Surveys 2000-2013’, *BMC pregnancy and childbirth*, 18(1), p. 171. doi: 10.1186/s12884-018-1811-4. (Accessed: 5 September 2018).

Negin, J., Coffman, J., Vizintin, P. and Raynes-Greenow, C. (2016) ‘The influence of grandmothers on breastfeeding rates: a systematic review’, *BMC pregnancy and childbirth*, 16, p. 91. doi: 10.1186/s12884-016-0880-5. (Accessed: 2 November 2017).

NEOVITA Study Group (2016) ‘Timing of initiation, patterns of breastfeeding, and infant survival: prospective analysis of pooled data from three randomised trials’, *The Lancet. Global Health*, 4(4), pp. e266-275. doi: 10.1016/S2214-109X(16)00040-1. (Accessed: 2 November 2017).

Newburg, D. S., Ruiz-Palacios, G. M., Altaye, M., Chaturvedi, P., Meinzen-Derr, J., Guerrero, M. de L. and Morrow, A. L. (2004) 'Innate protection conferred by fucosylated oligosaccharides of human milk against diarrhea in breastfed infants', *Glycobiology*, 14(3), pp. 253–263. doi: 10.1093/glycob/cwh020. (Accessed: 2 November 2017).

Niger, T., Khatun, S., Sultana, M., Islam, N. and Kazuhiro, O. (2010) 'Determinants of Malnutrition among the Children under 2 years of Age', *Pakistani Journal of Nutrition*, 9(1): 27-34.

Normand, C., Iftekar, M. H. and Rahman, S. A. (2002) Assessment of the community clinics: effects on service delivery, quality and utilization of services. WHO, Health Systems Development Programme

Nwankwo, B. O. and Brieger, W. R. (2002) 'Exclusive breastfeeding is undermined by use of other liquids in rural southwestern Nigeria', *Journal of Tropical Pediatrics*, 48(2), pp. 109–112. doi: 10.1093/tropej/48.2.109. (Accessed: 2 November 2017).

Obermeyer, C. M. and Castle, S. (1996) 'Back to nature? Historical and cross-cultural perspectives on barriers to optimal breastfeeding', *Medical Anthropology*, 17(1), pp. 39–63. doi: 10.1080/01459740.1996.9966127. (Accessed: 2 November 2017).

Oddy, W. H. (2017) 'Breastfeeding, Childhood Asthma, and Allergic Disease', *Annals of Nutrition and Metabolism*, 70(Suppl. 2), pp. 26–36. doi: 10.1159/000457920. (Accessed: 2 May 2018).

Oddy, W. H., Scott, J. A., Graham, K. I. and Binns, C. W. (2006) 'Breastfeeding influences on growth and health at one year of age', *Breastfeeding Review: Professional Publication of the Nursing Mothers' Association of Australia*, 14(1), pp. 15–23. Available at: https://www.ncbi.nlm.nih.gov/pubmed/16800062 (Accessed: 20 November 2017).

Ogechi, U. P. and Irene, I. I. (2013) 'Protein and amino acid composition of breast milk of mothers in Umuahia, Urban Nigeria', p. 4. (Accessed: 2 November 2017).

Ohlund, I., Hernell, O., Hörnell, A., Stenlund, H. and Lind, T. (2010) 'BMI at 4 years of age is associated with previous and current protein intake and with paternal BMI', *European Journal of Clinical Nutrition*, 64(2), pp. 138–145. doi: 10.1038/ejcn.2009.132. (Accessed: 2 November 2017).

Osman, A., Gaffer, Y., Sharkawy, A. and Brandon, D. (2018) 'Maternal cultural practices for neonates' care in upper Egypt', *Women and Birth: Journal of the Australian College of Midwives*, 31(4), pp. e278–e285. doi: 10.1016/j.wombi.2017.09.022. (Accessed: 2 September 2018).

Otoo, G. E., Lartey, A. A. and Pérez-Escamilla, R. (2009) 'Perceived incentives and barriers to exclusive breastfeeding among periurban Ghanaian women', *Journal of Human Lactation: Official Journal of International Lactation Consultant Association*, 25(1), pp. 34–41. doi: 10.1177/0890334408325072. (Accessed: 2 November 2017).

Owen, C. G., Martin, R. M., Whincup, P. H., Smith, G. D. and Cook, D. G. (2006) 'Does breastfeeding influence risk of type 2 diabetes in later life? A quantitative analysis of published evidence', *The American Journal of Clinical Nutrition*, 84(5), pp. 1043–1054. doi: 10.1093/ajcn/84.5.1043. (Accessed: 2 November 2017).

Parlato, R. P., Darmstadt, G. L. and Tinker, A. (2004) 'Saving Newborn Lives Tools For Newborn Health, Qualitative Research to Improve Newborn Care Practices', *Saving Newborn Lives Initiatives of Save the Children.* Available at: https://resourcecentre.savethechildren.net/sites/default/files/documents/1945.pdf (Accessed: 23 October 2016).

Patel, A., Banerjee, A. and Kaletwad, A. (2013) 'Factors associated with prelacteal feeding and timely initiation of breastfeeding in hospital-delivered infants in India', *Journal of Human Lactation: Official Journal of International Lactation Consultant Association*, 29(4), pp. 572–578. doi: 10.1177/0890334412474718. (Accessed: 3 October 2016).

Patel, A., Bucher, S., Pusdekar, Y., Esamai, F., Krebs, N. F., Goudar, S. S., Chomba, E., Garces, A., Pasha, O., Saleem, S., Kodkany, B. S., Liechty, E. A., Kodkany, B., Derman, R. J., Carlo, W. A., Hambidge, K., Goldenberg, R. L., Althabe, F., Berrueta, M., Moore, J. L., McClure, E. M., Koso-Thomas, M. and Hibberd, P. L. (2015) 'Rates and determinants of early initiation of breastfeeding and exclusive breast feeding at 42 days postnatal in six low and middle-income countries: A prospective cohort study', *Reproductive Health*, 12 Suppl 2, p. S10. doi: 10.1186/1742-4755-12-S2-S10. (Accessed: 23 October 2016).

Patro-Gołąb, B., Zalewski, B. M., Kołodziej, M., Kouwenhoven, S., Poston, L., Godfrey, K. M., Koletzko, B., van Goudoever, J. B. and Szajewska, H. (2016) 'Nutritional interventions or exposures in infants and children aged up to 3 years and their effects on subsequent risk of overweight, obesity and body fat: a systematic review of systematic reviews', *Obesity Reviews: An Official Journal of the International Association for the Study of Obesity*, 17(12), pp. 1245–1257. doi: 10.1111/obr.12476. (Accessed: 3 October 2016).

Paul, S. K., Islam, Q. R., Roy, S. and Rudra, P. K. (2014) 'Complimentary Feeding Practices in Under-2 Children', *Chattagram Maa-O-Shishu Hospital Medical College Journal*, 13(3), pp. 35–41. doi: 10.3329/cmoshmcj.v13i3.21020. (Accessed: 23 October 2016).

Pedersen, L., Lauritzen, L., Brasholt, M., Buhl, T. and Bisgaard, H. (2012) 'Polyunsaturated fatty acid content of mother's milk is associated with childhood body composition', *Pediatric Research*, 72(6), pp. 631–636. doi: 10.1038/pr.2012.127. (Accessed: 2 October 2016).

Peng, L., Li, Z.-R., Green, R. S., Holzman, I. R. and Lin, J. (2009) 'Butyrate enhances the intestinal barrier by facilitating tight junction assembly via activation of AMP-activated protein kinase in Caco- 2 cell monolayers', *The Journal of Nutrition*, 139(9), pp. 1619–1625. doi: 10.3945/jn.109.104638. (Accessed: 2 October 2016).

Piechulek, H., Aldana, J. M. and Hasan, M. N. (1999) 'Feeding Practices and Malnutrition in Children in Rural Bangladesh', *Food and Nutrition Bulletin*, 20(4), pp. 395–400. doi: 10.1177/156482659902000402. (Accessed: 23 October 2016).

Pisacane, A., Graziano, L., Mazzarella, G., Scarpellino, B. and Zona, G. (1992) 'Breast-feeding and urinary tract infection', *The Journal of Pediatrics*, 120(1), pp. 87–89. Available at: https://www.ncbi.nlm.nih.gov/pubmed/1731031 (Accessed: 2 October 2017).

Pongiglione, B. and Fitzsimons, E. (2017) 'Prevalence and trends in overweight and obesity in childhood and adolescence-Findings from the Millennium Cohort Study, with a focus on age 14', *Centre for Longitudinal Studies Working paper,* UCL Institute of Education. (Accessed 8 July 2018).

Pries, A. M., Huffman, S. L., Adhikary, I., Upreti, S. R., Dhungel, S., Champeny, M. and Zehner, E. (2005) 'Promotion and prelacteal feeding of breastmilk substitutes among mothers in Kathmandu Valley, Nepal', *Maternal & Child Nutrition*, 12(S2), pp. 8–21. doi: 10.1111/mcn.12205. (Accessed 8 July 2018).

Public Health Agency of Canada (2009) *Mothers' Voices: what women say about pregnancy, child birth and early motherhood, maternity experiences survey*. Available at: https://www.canada.ca/content/dam/phac-aspc/migration/phac-aspc/rhs-ssg/pdf/voices-eng.pdf (Accessed: June 2015).

Rahman, M. J., Nizame, F. A., Nuruzzaman, M., Akand, F., Islam, M. A., Parvez, S. M., Stewart, C. P., Unicomb, L., Luby, S. P. and Winch, P. J. (2016) 'Toward a Scalable and Sustainable Intervention for Complementary Food Safety', *Food and Nutrition Bulletin*, 37(2), pp. 186–201. doi: 10.1177/0379572116631641. (Accessed 8 July 2018).

Raheem, R. A., Binns, C. W., Chih, H. J. and Sauer, K. (2014) 'Determinants of the introduction of prelacteal feeds in the Maldives', *Breastfeeding Medicine: The Official Journal of the Academy of Breastfeeding Medicine*, 9(9), pp. 473–478. doi: 10.1089/bfm.2014.0028. (Accessed 18 July 2017).

Rahman, M., Haque, S. E., Zahan, S. and Islam, O. (2011) 'Noninstitutional Births and Newborn Care Practices Among Adolescent Mothers in Bangladesh', *Journal of Obstetric, Gynecologic & Neonatal Nursing*, 40(3), pp. 262–273. doi: 10.1111/j.1552-6909.2011.01240.x. (Accessed 8 July 2017).

Raina, S. K., Mengi, V. and Singh, G. (2012) 'Differentials in colostrum feeding among lactating women of block RS Pura of J and K: A lesson for nursing practice', *Iranian Journal of Nursing and Midwifery Research*, 17(5), pp. 386–389. Available at https://www.ncbi.nlm.nih.gov/pubmed/23853653 (Accessed 28 July 2016).

Rao, M. R., Hediger, M. L., Levine, R. J., Naficy, A. B. and Vik, T. (2007) 'Effect of breastfeeding on cognitive development of infants born small for gestational age', *Acta Pædiatrica*, 91(3), pp. 267–274. doi: 10.1111/j.1651-2227.2002.tb01713.x. (Accessed 9 July 2016).

Ricardo, B., Hussmann, K., Munoz, R. and Zaman, S. (2004) Comparative advantages of public and private providers in health care service in terms of cost, pricing, quality, and accessibility, Dhaka, Health Economics Unit, Ministry of Health and Family Welfare, Government of Bangladesh

Rist, L., Mueller, A., Barthel, C., Snijders, B., Jansen, M., Simões-Wüst, A. P., Huber, M., Kummeling, I., von Mandach, U., Steinhart, H. and Thijs, C. (2007) 'Influence of organic diet on the amount of conjugated linoleic acids in breast milk of lactating women in the Netherlands', *The British Journal of Nutrition*, 97(4), pp. 735–743. doi: 10.1017/S0007114507433074. (Accessed 8 July 2018).

Rizvi, N. (1993) 'Issues surrounding the promotion of colostrum feeding in rural Bangladesh', *Ecology of Food and Nutrition*, 30(1), pp. 27–38. doi: 10.1080/03670244.1993.9991320. (Accessed 8 July 2018).

Rolland-Cachera, M. F., Deheeger, M., Akrout, M. and Bellisle, F. (1995) 'Influence of macronutrients on adiposity development: a follow up study of nutrition and growth from 10 months to 8 years of age', *International Journal of Obesity and Related Metabolic Disorders: Journal of the International Association for the Study of Obesity*, 19(8), pp. 573–578. Available at: https://www.ncbi.nlm.nih.gov/pubmed/7489029 (Accessed 8 July 2016).

Roy, S. K., de Groot, S., Shafique, S. and Afroz, A. (2002) 'Perceptions of mothers and use of breastmilk substitutes in Dhaka, Bangladesh', *Journal of Health, Population, and Nutrition*, 20(3), pp. 264–270. Available at: https://www.ncbi.nlm.nih.gov/pubmed/12430764 (Accessed 18 July 2017).

Rowe-Murray, H. J. and Fisher, J. R. W. (2002) 'Baby friendly hospital practices: cesarean section is a persistent barrier to early initiation of breastfeeding', *Birth (Berkeley, Calif.)*, 29(2), pp. 124–131. Available at: https://www.ncbi.nlm.nih.gov/pubmed/12000413 (Accessed 5 July 2017).

Ruhul, A. M., Fukuda, H.,Nakajima, K., Takatorige, T. and Tatara, K. (1999) Public Health Services in Bangladesh with Special Reference to Systems and Trends of Vital Statistics. Department of Public Health, Osaka University Medical School, Osaka. *Environmental Health and Preventive Medicine*, 4, 65-70. (Accessed 8 February 2017).

Sachdev, H. P. and Mehrotra, S. (1995) 'Predictors of exclusive breastfeeding in early infancy: operational implications', *Indian Pediatrics*, 32(12), pp. 1287–1296. Available at: https://www.ncbi.nlm.nih.gov/pubmed/8772886 (Accessed 3 February 2017).

Saha, K. K., Frongillo, E. A., Alam, D. S., Arifeen, S. E., Persson, L. Å. and Rasmussen, K. M. (2009) 'Appropriate infant feeding practices result in better growth of infants and young children in rural Bangladesh', *The American journal of clinical nutrition*, 87(6), pp. 1852–1859. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2518656/ (Accessed 3 March 2018).

Sakib, M. S. (2017) 'Newborn care and breastfeeding practices in Bangladesh.', *Insights in Nutrition and Metabolism*, 1(2). (Accessed 3 March 2018).

Samad, M. (2015) 'Marriage in Changing Family Pattern of Bangladesh: The Present Trends', *International Journal of Social Work and Human Services Practice*, p. 7. Available at: http://www.hrpub.org/download/20151130/IJRH4-19290354.pdf (Accessed 13 March 2018).

Sankar, M. J., Sinha, B., Chowdhury, R., Bhandari, N., Taneja, S., Martines, J. and Bahl, R. (2015) 'Optimal breastfeeding practices and infant and child mortality: a systematic review and meta-analysis', *Acta Paediatrica*, 104(S467), pp. 3–13. doi: 10.1111/apa.13147. (Accessed 3 March 2018).

Sarkar, P. K., Sarker, N. K., Doulah, S., Bari, T. I. A. (2015) Expanded Programme on Immunization in Bangladesh: A success Story, *Bangladesh J Child Health;* Vol 39 (2): 93-98. (Accessed 13 March 2016).

Sarker, B. K., Rahman, M., Rahman, T., Hossain, J., Reichenbach, L. and Mitra, D. K. (2016) 'Reasons for Preference of Home Delivery with Traditional Birth Attendants (TBAs) in Rural Bangladesh: A Qualitative Exploration', *PloS One*, 11(1), p. e0146161. doi: 10.1371/journal.pone.0146161. (Accessed 3 March 2018).

Saravanan, S., Turrell, G., Johnson, H. and Fraser, J. (2010) 'Birthing Practices of Traditional Birth Attendants in South Asia in the Context of Training Programmes', Jour. of health Management, Vol.12, issue: 2, p:93-121. Available at: http://journals.sagepub.com/doi/10.1177/097206341001200201 (Accessed 13 March 2018).

Save the Children (2013) *Superfood for babies: How overcoming barriers to breastfeeding will save children's lives*. Available at: https://www.savethechildren.org.uk/content/dam/global/reports/health-and-nutrition/superfood-for-babies-UK-version.pdf (Accessed: 5 June 2016)

Save the Children (2015) *Malnutrition in Bangladesh: Harnessing social protection for the most vulnerable*. Available at: https://www.savethechildren.org.uk/content/dam/global/reports/hunger-and-livelihoods/malnutrition-in-bangladesh.pdf (Accessed: March 2017).

Schuler, S. R., Bates, L. M., Islam, F. and Islam, M. K. (2006) 'The timing of marriage and childbearing among rural families in Bangladesh: choosing between competing risks', *Social Science & Medicine (1982)*, 62(11), pp. 2826–2837. doi: 10.1016/j.socscimed.2005.11.004. (Accessed 3 March 2018).

Schwartz, R., Vigo, Á., de Oliveira, L. D. and Justo Giugliani, E. R. (2015) 'The Effect of a Pro-Breastfeeding and Healthy Complementary Feeding Intervention Targeting Adolescent Mothers and Grandmothers on Growth and Prevalence of Overweight of Preschool Children', *PloS One*, 10(7), p. e0131884. doi: 10.1371/journal.pone.0131884. (Accessed 22 March 2017).

Scopesi, F., Ciangherotti, S., Lantieri, P. B., Risso, D., Bertini, I., Campone, F., Pedrotti, A., Bonacci, W. and Serra, G. (2001) 'Maternal dietary PUFAs intake and human milk content relationships during the first month of lactation', *Clinical Nutrition (Edinburgh, Scotland)*, 20(5), pp. 393–397. doi: 10.1054/clnu.2001.0464. (Accessed 3 April 2016).

Scientific Advisory Committee on Nutrition (2018) *Feeding in the first year of life*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/725530/SACN_report_on_Feeding_in_the_First_Year_of_Life.pdf (Accessed: 10 September 2018)

Segawa, M. (2008) 'Buddhism and Breastfeeding', *Breastfeeding Medicine*, vol.3, no.2; doi:10.1089/bfm.2008.0104. (Accessed 3 March 2018).

Semega-Janneh, I. J., Bøhler, E., Holm, H., Matheson, I. and Holmboe-Ottesen, G. (2001) 'Promoting breastfeeding in rural Gambia: combining traditional and modern knowledge', *Health Policy and Planning*, 16(2), pp. 199–205. Available at: https://www.ncbi.nlm.nih.gov/pubmed/11358922?dopt=Abstract (Accessed 3 March 2018).

Shahid, N. S., Steinhoff, M. C., Roy, E., Begum, T., Thompson, C. M. and Siber, G. R. (2002) 'Placental and breast transfer of antibodies after maternal immunization with polysaccharide meningococcal vaccine: a randomized, controlled evaluation', *Vaccine*, 20(17–18), pp. 2404–2409. Available at: https://www.ncbi.nlm.nih.gov/pubmed/12009297(Accessed 2 March 2015).

Shaikh, U. and Ahmed, O. (2006) 'Islam and Infant Feeding', *Breastfeeding Medicine,* 1 (3), pp. 164-7. Available at: https://www.ncbi.nlm.nih.gov/pubmed/17661593 (Accessed 22 May 2017).

Sharma, I. K. and Byrne, A. (2016) 'Early initiation of breastfeeding: a systematic literature review of factors and barriers in South Asia', *International Breastfeeding Journal*, 11, p. 17. doi: 10.1186/s13006-016-0076-7(Accessed 3 March 2018).

Siziba, L. P., Jerling, J., Hanekom, S. M. and Wentzel-Viljoen, E. (2015) 'Low rates of exclusive breastfeeding are still evident in four South African provinces', *South African Journal of Clinical Nutrition*, 28(4), pp. 170–179. Available at: http://www.sajcn.co.za/index.php/SAJCN/article/view/996 (Accessed 30 March 2018).

Singh, K., Khan, S. M., Carvajal–Aguirre, L., Brodish, P., Amouzou, A. and Moran, A. (2017) 'The importance of skin–to–skin contact for early initiation of breastfeeding in Nigeria and Bangladesh', *Journal of Global Health*, 7(2). doi: 10.7189/jogh.07.020505.

Singhal, A., Kennedy, K., Lanigan, J., Fewtrell, M., Cole, T. J., Stephenson, T., Elias-Jones, A., Weaver, L. T., Ibhanesebhor, S., MacDonald, P. D., Bindels, J. and Lucas, A. (2010) 'Nutrition in infancy and long-term risk of obesity: evidence from 2

randomized controlled trials', *The American Journal of Clinical Nutrition*, 92(5), pp. 1133–1144. doi: 10.3945/ajcn.2010.29302. (Accessed 3 March 2018).

Singhal, A., Macfarlane, G., Macfarlane, S., Lanigan, J., Kennedy, K., Elias-Jones, A., Stephenson, T., Dudek, P. and Lucas, A. (2008) 'Dietary nucleotides and fecal microbiota in formula-fed infants: a randomized controlled trial', *The American Journal of Clinical Nutrition*, 87(6), pp. 1785–1792. doi: 10.1093/ajcn/87.6.1785. (Accessed 13 May 2018).

Sobel, H. L., Silvestre, M. A. A., Mantaring, J. B. V., Oliveros, Y. E. and Nyunt-U, S. (2011) 'Immediate newborn care practices delay thermoregulation and breastfeeding initiation', *Acta Paediatrica (Oslo, Norway : 1992)*, 100(8), pp. 1127–1133. doi: 10.1111/j.1651-2227.2011.02215.x. (Accessed 3 May 2018).

Sundaram, M. E., Labrique, A. B., Mehra, S., Ali, H., Shamim, A. A., Klemm, R. D. W., West, K. P. and Christian, P. (2013) 'Early neonatal feeding is common and associated with subsequent breastfeeding behavior in rural Bangladesh', *The Journal of Nutrition*, 143(7), pp. 1161–1167. doi: 10.3945/jn.112.170803. (Accessed 3 May 2018).

Sundaram, M. E., Ali, H., Mehra, S., Shamim, A. A., Ullah, B., Rashid, M., Shaikh, S., Christian, P., Klemm, R. D. W., West, K. P. and Labrique, A. (2016) 'Early newborn ritual foods correlate with delayed breastfeeding initiation in rural Bangladesh', *International Breastfeeding Journal*, 11. doi: 10.1186/s13006-016-0090-9. (Accessed 27 May 2017).

Sharmin, L., Chowdhury, M. A. K. A., Khatun, S. and Ahmed, N. (2016) 'Exclusive Breastfeeding among Urban Mothers', *Journal of Enam Medical College*, Vol 6, No 2, 2016: 88-92. DOI: http://dx.doi.org/10.3329/jemc.v6i2.27763 (Accessed 13 May 2018).

Shirima, R., Gebre-Medhin, M. and Greiner, T. (2001) 'Information and socioeconomic factors associated with early breastfeeding practices in rural and urban Morogoro, Tanzania', *Acta Paediatrica (Oslo, Norway: 1992)*, 90(8), pp. 936–942. Available at: https://www.ncbi.nlm.nih.gov/pubmed/11529546?dopt=Abstract (Accessed 3 June 2016).

Singh, R. B., Hales, S., de Wet, N., Raj, R., Hearnden, M. and Weinstein, P. (2001) 'The influence of climate variation and change on diarrheal disease in the Pacific Islands', *Environmental Health Perspectives*, 109(2), pp. 155–159.

Smith, P. H., Coley, S. L., Labbok, M. H., Cupito, S. and Nwokah, E. (2012) 'Early breastfeeding experiences of adolescent mothers: a qualitative prospective study', *International Breastfeeding Journal*, 7, p. 13. doi: 10.1186/1746-4358-7-13. (Accessed 13 May 2018).

Sreeramareddy, C. T., Joshi, H. S., Sreekumaran, B. V., Giri, S. and Chuni, N. (2006) 'Home delivery and newborn care practices among urban women in western Nepal: a questionnaire survey', *BMC pregnancy and childbirth*, 6, p. 27. doi: 10.1186/1471-2393-6-27. (Accessed 5 April 2017).

Swigart, T. M., Bonvecchio, A., Théodore, F. L., Zamudio-Haas, S., Villanueva-Borbolla, M. A. and Thrasher, J. F. (2017) 'Breastfeeding practices, beliefs, and social norms in low-resource communities in Mexico: Insights for how to improve future promotion strategies', *PloS One*, 12(7), p. e0180185. doi: 10.1371/journal.pone.0180185. (Accessed 5 April 2018).

Tang, L., Lee, A. H., Binns, C. W., Yang, Y., Wu, Y., Li, Y. and Qiu, L. (2014) 'Widespread usage of infant formula in China: a major public health problem', *Birth (Berkeley, Calif.)*, 41(4), pp. 339–343. doi: 10.1111/birt.12132.

Talukder, S., Farhana, D., Vitta, B. and Greiner, T. (2017) 'In a rural area of Bangladesh, traditional birth attendant training improved early infant feeding practices: a pragmatic cluster randomized trial', *Maternal & Child Nutrition*, 13(1). doi: 10.1111/mcn.12237. (Accessed 5 April 2018).

Tanaka, K., Hosozawa, M., Kudo, N., Yoshikawa, N., Hisata, K., Shoji, H., Shinohara, K. and Shimizu, T. (2013) 'The pilot study: sphingomyelin-fortified milk has a positive association with the neurobehavioural development of very low birth weight infants during infancy, randomized control trial', *Brain & Development*, 35(1), pp. 45–52. doi: 10.1016/j.braindev.2012.03.004. (Accessed 5 April 2017).

Tarannum, S and Hyder, S. M. Z. (1998) 'Pre-lacteal Feeding Practices in a Rural Area of Bangladesh', *Working Paper No. 27*, BRAC-ICDDR,B Joint Research Project. Available at: http://research.brac.net/workingpapers/Working_Paper_27.pdf (Accessed 15 April 2017).

Tariku, A., Bikis, G. A., Woldie, H., Wassie, M. M. and Worku, A. G. (2017) 'Child wasting is a severe public health problem in the predominantly rural population of Ethiopia: A community based cross-sectional study', *Archives of Public Health*, 75, p. 26. doi: 10.1186/s13690-017-0194-8. (Accessed 15 April 2018).

Tariku, A., Alemu, K., Gizaw, Z., Muchie, K. F., Derso, T., Abebe, S. M., Yitayal, M., Fekadu, A., Ayele, T. A., Alemayehu, G. A., Tsegaye, A. T., Shimeka, A. and Biks, G. A. (2017) 'Mothers' education and ANC visit improved exclusive breastfeeding in Dabat Health and Demographic Surveillance System Site, northwest Ethiopia', *PLOS ONE*, 12(6), p. e0179056. doi: 10.1371/journal.pone.0179056. (Accessed 12 April 2018).

Tawiah-Agyemang, C., Kirkwood, B. R., Edmond, K., Bazzano, A. and Hill, Z. (2008) 'Early initiation of breast-feeding in Ghana: barriers and facilitators', *Journal of Perinatology: Official Journal of the California Perinatal Association*, 28 Suppl 2, pp. S46-52. doi: 10.1038/jp.2008.173. (Accessed 5 April 2017).

Thakur, S. K., Roy, S. K., Paul, K., Khanam, M., Khatun, W. and Sarker, D. (2012) 'Effect of nutrition education on exclusive breastfeeding for nutritional outcome of low birth weight babies', *European Journal of Clinical Nutrition*, 66(3), pp. 376–381. doi: 10.1038/ejcn.2011.182. (Accessed 25 April 2016).

The International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b) (2013) Child marriage in Bangladesh: findings from a national survey 2013. Available at: https://www.researchgate.net/publication/315691208_Child_marriage_in_Bangladesh_Findings_from_a_national_survey_2013 (Accessed: August 2016).

The World bank (2016a) *Bangladesh-Rural Population.* Available at: https://tradingeconomics.com/bangladesh/rural-population-percent-of-total-population-wb-data.html Accessed: December 2017.

The World Bank Group (2017a) *Bangladesh: GDP per capita*. Available at: https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations=BD (Accessed: January 2018).

The World Bank (2017b) *Household Income and Expenditure Survey 2016.* Available at:http://www.worldbank.org/en/news/feature/2017/10/24/bangladesh-continues-to-reduce-poverty-but-at-slower-pace (Accessed: October 2017).

The World Bank (2014) *Rural Population (% of total population).* Available at: https://data.worldbank.org/indicator/SP.RUR.TOTL.ZS (Accessed: January 2015).

The World Bank (2016b) *Bangladesh: Improving Water Supply and Sanitation.* Available at: http://www.worldbank.org/en/results/2016/10/07/bangladesh-improving-water-supply-and-sanitation (Accessed: October 2017).

Thomson, A. M. and Black, A. E. (1975) 'Nutritional aspects of human lactation', *Bulletin of the World Health Organization*, 52(2), pp. 163–177. Available at: https://www.ncbi.nlm.nih.gov/pubmed/816479 (Accessed 12 November 2017).

Tilahun, G., Degu, G., Azale, T. and Tigabu, A. (2016) 'Prevalence and associated factors of timely initiation of breastfeeding among mothers at Debre Berhan town, Ethiopia: a cross-sectional study', *International Breastfeeding Journal*, 11, p. 27. doi: 10.1186/s13006-016-0086-5. (Accessed 5 April 2017).

Tiwari, V. and Singh, A. (2007) 'Knowledge, Attitude and Practice of Mothers Regarding Breastfeeding in an Urban Area of Faizabad District (U.P.)', *Indian J. Prev. Soc. Med.* Vol. 38, No. 1 and 2. Available at: http://medind.nic.in/ibl/t07/i1/iblt07i1p18g.pdf (Accessed 5 April 2017).

Toschke, A. M., Martin, R. M., von Kries, R., Wells, J., Smith, G. D. and Ness, A. R. (2007) 'Infant feeding method and obesity: body mass index and dual-energy X-ray absorptiometry measurements at 9-10 y of age from the Avon Longitudinal Study of Parents and Children (ALSPAC)', *The American Journal of Clinical Nutrition*, 85(6), pp. 1578–1585. doi: 10.1093/ajcn/85.6.1578. (Accessed 12 November 2017).

Tromp, I., Jong, J. K., Raat, H., Jaddoe, V., Franco, O., Hofman, A., Jongste, J. de and Moll, H. (2017) 'Breastfeeding and the risk of respiratory tract infections after infancy: The Generation R Study', *PLOS ONE*, 12(2), p. e0172763. doi: 10.1371/journal.pone.0172763. (Accessed 5 February 2018).

Turab, A., Soofi, S. B., Ahmed, I., Bhatti, Z., Zaidi, A. K. M. and Bhutta, Z. A. (2014) 'Demographic, socioeconomic, and health characteristics of the MAL-ED network study site in rural Pakistan', *Clinical Infectious Diseases: An Official Publication of the Infectious Diseases Society of America*, 59 Suppl 4, pp. S304-309. doi: 10.1093/cid/ciu391. (Accessed 5 February 2018).

Turck, D., Vidailhet, M., Bocquet, A., Bresson, J.-L., Briend, A., Chouraqui, J.-P., Darmaun, D., Dupont, C., Frelut, M.-L., Girardet, J.-P., Goulet, O., Hankard, R., Rieu, D. and Simeoni, U. (2013) '[Breastfeeding: health benefits for child and mother]' , *Archives De Pediatrie: Organe Officiel De La Societe Francaise De Pediatrie*, 20 Suppl 2, pp. S29-48. doi: 10.1016/S0929-693X(13)72251-6. (Accessed 5 February 2018).

Tylleskär, T., Jackson, D., Meda, N., Engebretsen, I. M. S., Chopra, M., Diallo, A. H., Doherty, T., Ekström, E.-C., Fadnes, L. T., Goga, A., Kankasa, C., Klungsøyr, J. I., Lombard, C., Nankabirwa, V., Nankunda, J. K., Van de Perre, P., Sanders, D., Shanmugam, R., Sommerfelt, H., Wamani, H., Tumwine, J. K. and PROMISE-EBF Study Group (2011) 'Exclusive breastfeeding promotion by peer counsellors in sub-Saharan Africa (PROMISE-EBF): a cluster-randomised trial', *Lancet (London, England)*, 378(9789), pp. 420–427. doi: 10.1016/S0140-6736(11)60738-1. (Accessed 5 February 2018).

Uddin, M. J., Larson, C. P., Oliveras, E., Khan, A. I., Quaiyum, M. A. and Saha, N. C. (2010) 'Child immunization coverage in urban slums of Bangladesh: impact of an intervention package', *Health Policy and Planning*, 25(1), pp. 50–60. doi: 10.1093/heapol/czp041. (Accessed 12 February 2018).

Ulijaszek, S.J. and Kerr, D. A. (1999) 'Anthropometric measurement error and the assessment of nutritional status', *British Journal of Nutrition,* 82(3):p 165-177. (Accessed 25 February 2017).

Unesco Institute of Statistics (2016) *Bangladesh: Literacy rate 2016*. Accessed: 23 July 2017).

UNICEF Bangladesh (2018) *Health and Nutrition: Expanded Immunization.* Available at: https://www.unicef.org/bangladesh/health_nutrition_468.htm (Accessed: March 2018).

UNICEF (1990) *Innocenti Declaration on the Protection, Promotion and Support of Breastfeeding.* Available at: http://www.searo.who.int/entity/nutrition/innocenti_declaration_1990.pdf (Accessed: May 2013).

UNICEF & WHO (2004) *Low birth weight: country, regional and global estimates*. ISBN:92-806-3832-7. Available at: https://www.unicef.org/publications/index_24840.html (accessed: March 2013).

UNICEF (2005) '1990-2005 Celebrating The Innocenti Declaration on the Protection, Promotion and Support of Breastfeeding, Past Achievement, Present Challenges and the Way Forward for Infant and Young Child Feeding', *The UNICEF Innocenti Research Centre,* Italy. Available at: https://www.unicef.org/nutrition/files/Innocenti_plus15_BreastfeedingReport.pdf (Accessed: May 2013).

UNICEF South Africa (2012) UNICEF & WHO welcome South Africa's efforts to protect and support breastfeeding, *Government of South Africa of draft regulations.* Available at: https://www.unicef.org/southafrica/media_10469.htm (Accessed: 5 June 2018).

UNICEF (2014) Rapid Survey on Children (RSOC) 2013-2014 National report, *Ministry of Women and Child Development, Government of India.* Available at: http://wcd.nic.in/sites/default/files/RSOC%20National%20Report%202013-14%20Final.pdf (Accessed: June 2016)

UNICEF (2016) *The Lancet: Increasing breastfeeding worldwide could prevent over 800,000 child deaths every year*. Available at: https://www.unicef.org/media/media_92038.html (Accessed: 18 December 2017)

UNICEF (2018a) 'Infant and Young Child Feeding, *UNICEF DATA*, Available at: //data.unicef.org/topic/nutrition/infant-and-young-child-feeding/ (Accessed: August 2018)

UNICEF (2018b) *The challenge.* Available at: www.unicef.org/programme/breastfeeding/challenge.htm (Accessed: May 2018)

UNICEF and World Health Organization (2017) *Executive summary: Tracking progress for breastfeeding policies and programmes, global breastfeeding scorecard, 2017*. (Accessed: June 2018).

United Nations, Department of Economic and Social Affairs, Population Division (2018). *World Urbanization Prospects: The 2018 Revision*. Available at: https://esa.un.org/unpd/wup/country-profiles/ (Accessed: February 2018)

Veeranki, S. P., Nishimura, H., Krupp, K., Gowda, S., Arun, A. and Madhivanan, P. (2017) 'Suboptimal Breastfeeding Practices among Women in Rural and Low-Resource Settings: a Study of Women in Rural Mysore, India', *Annals of Global Health*, 83(3–4), pp. 577–583. doi: 10.1016/j.aogh.2017.10.012. (Accessed 23 July 2018).

Victoria, C. G., Bahl, R., Barros, A. J. D., França, G. V. A., Horton, S., Krasevec, J., Murch, S., Sankar, M. J., Walker, N., Rollins, N. C. and Lancet Breastfeeding Series Group (2016) 'Breastfeeding in the 21st century: epidemiology, mechanisms, and

lifelong effect', *Lancet (London, England)*, 387(10017), pp. 475–490. doi: 10.1016/S0140-6736(15)01024-7. (Accessed 5 February 2018).

Vijayalakshmi S, Patil, R. and Datta, S. S. (2014) 'Community-based Study on Newborn Care Practices and its Determinants in Rural Pondicherry, India', *Journal of Neonatal Biology*, 3(5), pp. 1–6. doi: 10.4172/2167-0897.1000158. (Accessed 5 February 2018).

Wallby, T., Lagerberg, D. and Magnusson, M. (2017) 'Relationship Between Breastfeeding and Early Childhood Obesity: Results of a Prospective Longitudinal Study from Birth to 4 Years', *Breastfeeding Medicine*, 12(1), pp. 48–53. doi: 10.1089/bfm.2016.0124. (Accessed 12 June 2018).

Watson, R., Zinyowera, M., Moss, R., Dokken, D. (1997) The Regional Impacts of Climate Change: An Assessment of Vulnerability. Special Report of IPCC Working group II., Intergovernmental Panel on Climate Change. *Cambridge University Press.* Available at: https://www.ipcc.ch/pdf/special-reports/spm/region-en.pdf (Accessed 12 June 2016)

Weng, S. F., Redsell, S. A., Swift, J. A., Yang, M. and Glazebrook, C. P. (2012) 'Systematic review and meta-analyses of risk factors for childhood overweight identifiable during infancy', *Archives of Disease in Childhood*, 97(12), pp. 1019–1026. doi: 10.1136/archdischild-2012-302263. (Accessed 12 June 2018)

Weyermann, M., Rothenbacher, D. and Brenner, H. (2006) 'Duration of breastfeeding and risk of overweight in childhood: a prospective birth cohort study from Germany', *International Journal of Obesity (2005)*, 30(8), pp. 1281–1287. doi: 10.1038/sj.ijo.0803260. (Accessed 22 July 2016).

Wood, N. K., Sanders, E. A., Lewis, F. M., Woods, N. F. and Blackburn, S. T. (2017) 'Pilot test of a home-based program to prevent perceived insufficient milk', *Women and Birth: Journal of the Australian College of Midwives*, 30(6), pp. 472–480. doi: 10.1016/j.wombi.2017.04.006. (Accessed 2 June 2018)

World Alliance for Breastfeeding Action (2000) *World Breastfeeding Week.* Available at: http://www.waba.org.my/whatwedo/wbw/wbw00/wbw2000.htm (Accessed: July 2014).

World Alliance for Breastfeeding Action (2018) *World breastfeeding week.* Available at: http://www.waba.org.my/whatwedo/wbw/wbw00/wbw2000.htm (Accessed:1 October 2018).

World Breastfeeding Trends Initiative (WBTi) (2016) *UK Report.* (Accessed: June 2017)

World Health Organization (2018a) *Bangladesh Statistics.* Available at: http://www.who.int/countries/bgd/en/ (Accessed: 2018)

World Health Organization (2017) *Expanded Programme on Immunization (EPI) Fact Sheet, Bangladesh, Ministry of Health and Family Welfare*. Available at: http://www.searo.who.int/immunization/data/bangladesh_2017.pdf (Accessed: January 2018).

World Health Organization (2007) *Indicators for assessing infant and young child feeding practices*. Available at: http://apps.who.int/iris/bitstream/handle/10665/43895/9789241596664_eng.pdf;jsessionid=E6C758B165A8170D6EE3ED0C8ED567B5?sequence=1 (Accessed on February 2014)

World Health Organization Collaborative Study Team on the Role of Breastfeeding on the Prevention of Infant Mortality (2000), 'Effect of breastfeeding on infant and child mortality due to infectious diseases in less developed countries: a pooled analysis'. *The Lancet*, 355(9202), pp. 451–455. doi: 10.1016/S0140-6736(00)82011-5.

World Health Organization (2018b) *Early initiation of breastfeeding to promote exclusive breastfeeding*. Available at: http://www.who.int/elena/titles/early_breastfeeding/en/ (Accessed: 23 July 2018).

World Health Organization Bangladesh (2018) *MNT elimination in Bangladesh: a journey towards success*. Available at: http://www.searo.who.int/bangladesh/mnteliminationbangladesh/en/ (Accessed on 12 February 2018)

WHO Sri Lanka (2016) *Annual report: a journey of commitment, passion and dedication.* Available at: http://www.searo.who.int/srilanka/documents/who_srl_annual_report_2016.pdf?ua=1 (Accessed: June 2017)

World Health Organization and UNICEF (2009) 'Baby Friendly Hospital Initiative: revised, updated and expanded for integrated care. Section 3: a 20-hour course for maternity staff'. *World Health Organization, UNICEF and Wellstart International. Available at: http://apps.who.int/iris/bitstream/handle/10665/43593/9789241594981_eng.pdf;jsessionid=0DDD6E733FB0ED0ED1BE786F3886DFDD?sequence=5* (Accessed: May 2015)

World Health Organization and UNICEF (2003) 'Global Strategy for Infant and Young Child Feeding', *World Health Organization,* Geneva. Available at: http://whqlibdoc.who.int/ publications/2003/9241562218.pdf (Accessed: June 2014).

World Health Organization (2002b) *The Optimal Duration of Exclusive Breastfeeding: A systematic review.* Available at: http://www.who.int/nutrition/topics/optimal_duration_of_exc_bfeeding_review_eng.pdf (Accessed: 18 June 2016).

World Health Organization (2002a) *Fifty-fifth world health assembly: Infant and young child nutrition, global strategy on infant and young child feeding*. Available at: http://apps.who.int/gb/archive/pdf_files/WHA55/ea5515.pdf (Accessed: 11 June 2015)

World Health Organization (2014) *Global Nutrition Targets 2025: Policy Brief Series*. Available at: http://www.who.int/nutrition/publications/globaltargets2025_policybrief_overview/en/ (Accessed: April 2017).

World Health Organization (2018c) *Infant feeding recommendation.* Available at: http://www.who.int/nutrition/topics/infantfeeding_recommendation/en/ (Accessed: 26 July 2018).

WHO and UNICEF (1993) *Breastfeeding Counselling: A Training Course*. Available at: http://www.who.int/maternal_child_adolescent/documents/who_cdr_93_3/en/ (Accessed 22 July 2016).

World Health Organization (2015) *Bangladesh Health System Review*. *WHO Library Cataloguing-in-Publication Data*. Vol. 5 No. 3. Available at: http://apps.who.int/iris/bitstream/handle/10665/208214/9789290617051_eng.pdf;jsessionid=43D4A89E25A2AE008CD826DAC6AE8DFE?sequence=1 (Accessed June 2017).

World Health Organization (2017) *Inter-agency Group for Child Mortality Estimation (IGME).* Available at: http://www.who.int/news-room/detail/19-10-2017-7-000-newborns-die-every-day-despite-steady-decrease-in-under-five-mortality-new-report-says (Accessed: 12 December 2017).

World Health Organization (1999) Implementations of resolutions and decisions, Infant and young child nutrition: the WHO multicentre growth reference study. Available at: http://apps.who.int/gb/archive/pdf_files/EB105/eeid1.pdf?ua=1 (Accessed: June 2013).

World Health Organization (2008) *Training Course on Child Growth and Assessment, WHO child growth standards, measuring a child's growth*. (Accessed: May 2013).

Wright, A. L. and Schanler, R. J. (2001) 'The Resurgence of Breastfeeding at the End of the Second Millennium', *The Journal of Nutrition*, 131(2), pp. 421S-425S. doi: 10.1093/jn/131.2.421S. (Accessed 22 July 2016).

Yamakawa, M., Yorifuji, T., Kato, T., Yamauchi, Y. and Doi, H. (2015) 'Breast-feeding and hospitalization for asthma in early childhood: a nationwide longitudinal survey in Japan', *Public Health Nutrition*, 18(10), pp. 1756–1761. doi: 10.1017/S1368980014002407. (Accessed 13 August 2017).

Yasmeen, S. and Azim, E. (2011) 'Status of low birth weight at a tertiary level hospital in Bangladesh for a selected period of time', *South East Asia Journal of Public Health*, 1:24-27. ISSN: 2220-9476. (Accessed 22 July 2016).

Ziegler, E. E. (2006) 'Growth of breast-fed and formula-fed infants', *Nestle Nutrition Workshop Series. Paediatric Programme*, 58, pp. 51–59; discussion 59-63. doi: 10.1159/000095010. (Accessed 15 August 2016).

Appendix

Appendix

Appendix A:

Table 1: Composition and functions of breastmilk

Breastmilk composition	Major functions
Lipid (4.2 g/100 ml), 40-55% of total energy Triglycerides: 98% of lipid fraction Diacylglycerides Monoacylglycerides Fatty acid: oleic acid, palmitic acid, linoleic acid linolenic acid, anachidonic acid Docosahexaenoic acid Phospholipids Cholesterol (Martin *et al.,* 1993; Food and Nutrition Bulletin, 1996; Koletzko *et al.,* 2001; Andreas, Kampmann and Mehring Le-Doare, 2015).	Lipid helps to transport fat-soluble vitamins such as A, D, E, K and prostaglandins. Triglycerides increase digestibility and absorption and balance minerals. Fatty acids are constituents of brain and neural tissue and required for cognitive and visual development, provides energy, helps in maturation of gastrointestinal tract (Food and Nutrition Bulletin, 1996; Peng *et al.,* 2009; Donohoe *et al.,* 2011; Tanaka *et al.,* 2013; Andreas, Kampmann and Mehring Le-Doare, 2015).
Protein (1.1g/100ml) (75% of nitrogen-containing components) Caseins- α-, β-, κ-caseins Whey- α-lactalbumin, lactoferrin, secretory IgA and serum albumin Mucin **Non-protein nitrogen** Urea, creatinine, nucleotides, free amino acids, peptides, DNA (Jenness, 1979; Lönnerdal, 1985; Lönnerdal, 2003).	Protein provides nutrition, possess antimicrobial activity, lactoferrin transports and stimulates iron absorption activity. Principle immunoglobulin IgA provides immunomodulatory activities (Krakauer, Zinneman and Hong, *et al.,* 1975; Lonnerdal, 1985; Shahid *et al.,* 2002; Lönnerdal, 2004; Molinari *et al.,* 2012; Andreas, Kampmann and Mehring Le-Doare, 2015) Nucleotide act as a metabolic mediator and alter enzymatic activity, role in development, maturation and repair of gastrointesitanl tract and helps in development of the microbiota (Gutiérrez-Castrellón *et al.*, 2007; Singhal *et al.,* 2008; Andreas, Kampmann and Mehring Le-Doare, 2015).
Carbohydrate Lactose (7g/100ml)	produce energy, oligosaccharide act as prebiotics encourages the growth of beneficial gut bacteria, helps to prevent

Oligosaccharide (0.5gm/100ml) (UNUC;	neonatal diarrhoea and respiratory tract infections (Newburg *et al.,* 2004; Andreas, Kampmann and Mehring Le-Doare, 2015).
Antibodies **I**gA IgG IgM	Immunological protection against neonatal infections & antimicrobial action (Andreas, Kampmann and Mehring Le-Doare, 2015).
Cytokines, anti-inflammatory substances, hormones, growth factor and digestive enzymes	Antimicrobial activity

Appendix B: Box shows Ten Steps of Successful Breastfeeding:

Ten Steps to Successful Breastfeeding

1. Have a written breastfeeding policy that is routinely communicated to all health-care staff.
2. Train all health-care staff in skills necessary to implement this policy.
3. Inform all pregnant women about the benefits and management of breastfeeding.
4. Help mothers initiate breastfeeding within one half-hour of birth.
5. Show mothers how to breastfeed and maintain lactation, even if they should be separated from their infants.
6. Give newborn infants no food or drink other than breastmilk, unless medically indicated.
7. Practice rooming-in - that is, allow mothers and infants to remain together 24 hours a day.
8. Encourage breastfeeding on demand.
9. Give no artificial teats or pacifiers (also called dummies or soothers) to breastfeeding infants.
10. Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital or clinic.

Source: (UNICEF, 2005; UNICEF and WHO, 2009)

Appendix C: Definitions and Terms

Exclusive breastfeeding: The Infant receives only breast milk (including expressed breast milk), but no other liquids or solids, not even water with the exception of ORS, drops or syrups consisting of vitamins, mineral supplements or medicines (WHO, 2002; WHO 2018).

Predominant breastfeeding: The Infant receives breast milk (including expressed breast milk), but the infant receives other liquids (water and water-based drinks, fruit juices, ritual fluids).

Mixed feeding: Breastfeeding a child while giving non-human milk or other foods and liquids (WHO, 2002).

Not breastfed: Not fed on breastmilk (WHO, 2002).

Complementary feeding: Any food to meet the nutritional requirements of an infant along with BM from 6-24 months of age (UNICEF and WHO, 1993).

Colostrum: Thick yellowish secretion from the breast within the first few days after delivery (Hassiotou *et al.,* 2013).

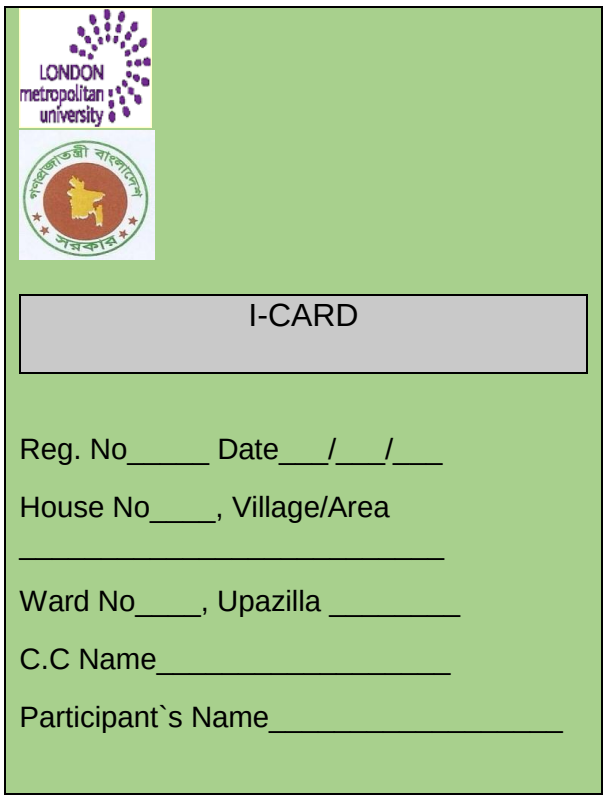
Pre-lacteal feeding: Giving the infant feeds or fluids before initiating breastfeeding after birth (WHO, 2002).

Initiation of breastfeeding: Whether the mother either puts the baby to the breast or the baby is given any of the mother's breast milk.

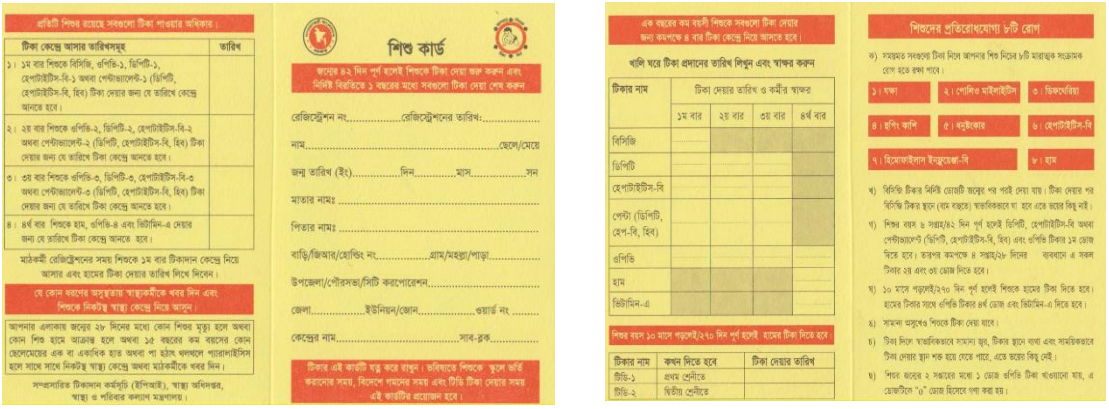
Early initiation of breastfeeding: Initiation of breastfeeding within one hour of birth (UNICEF and WHO, 2017).

Duration of breastfeeding: The length of time that infants who were initially breastfed continue to receive breastmilk, even if also receiving other foods (WHO, 2002).

Appendix D: Sample ID card for participant



Appendix E: Child Immunization card



শিশু কার্ড

প্রতিটি শিশুর রয়েছে সবগুলো টিকা পাওয়ার অধিকার।

টিকা কেন্দ্রে আসার তারিখসমূহ	তারিখ
১। ১ম বার শিশুকে বিসিজি, ওপিভি-১, ডিপিটি-১, হেপাটাইটিস-বি-১ অথবা পেন্টাভ্যালেন্ট-১ (ডিপিটি, হেপাটাইটিস-বি, হিব) টিকা দেয়ার জন্য যে তারিখে কেন্দ্রে আনতে হবে।	
২। ২য় বার শিশুকে ওপিভি-২, ডিপিটি-২, হেপাটাইটিস-বি-২ অথবা পেন্টাভ্যালেন্ট-২ (ডিপিটি, হেপাটাইটিস-বি, হিব) টিকা দেয়ার জন্য যে তারিখে টিকা কেন্দ্রে আনতে হবে।	
৩। ৩য় বার শিশুকে ওপিভি-৩, ডিপিটি-৩, হেপাটাইটিস-বি-৩ অথবা পেন্টাভ্যালেন্ট-৩ (ডিপিটি, হেপাটাইটিস-বি, হিব) টিকা দেয়ার জন্য যে তারিখে টিকা কেন্দ্রে আনতে হবে।	
৪। ৪র্থ বার শিশুকে হাম, ওপিভি-৪ এবং ভিটামিন-এ দেয়ার জন্য যে তারিখে টিকা কেন্দ্রে আনতে হবে।	

মাঠকর্মী রেজিস্ট্রেশনের সময় শিশুকে ১ম বার টিকাদান কেন্দ্রে নিয়ে আসার এবং হামের টিকা দেয়ার তারিখ দিখে দিবেন।

যে কোন ধরণের অসুস্থতায় স্বাস্থ্যকর্মীকে খবর দিন এবং শিশুকে নিকটস্থ স্বাস্থ্য কেন্দ্রে নিয়ে আসুন।

আপনার এলাকায় জন্মের ২৮ দিনের মধ্যে কোন শিশুর মৃত্যু হলে অথবা কোন শিশু হামে আক্রান্ত হলে অথবা ১৫ বছরের কম বয়সের কোন ছেলেমেয়ের এক বা একাধিক হাত অথবা পা হঠাৎ থলথলে প্যারালাইসিস হলে সাথে সাথে নিকটস্থ স্বাস্থ্য কেন্দ্রে অথবা মাঠকর্মীকে খবর দিন।

সম্প্রসারিত টিকাদান কর্মসূচি (ইপিআই), স্বাস্থ্য অধিদপ্তর, স্বাস্থ্য ও পরিবার কল্যাণ মন্ত্রণালয়।

জন্মের ৪২ দিন পূর্ণ হলেই শিশুকে টিকা দেয়া শুরু করুন এবং নির্দিষ্ট বিরতিতে ১ বছরের মধ্যে সবগুলো টিকা দেয়া শেষ করুন

রেজিস্ট্রেশন নং:.....রেজিস্ট্রেশনের তারিখ:.....

নাম:.....ছেলে/মেয়ে

জন্ম তারিখ (ইং).....দিন.....মাস.....সন

মাতার নাম:.....

পিতার নাম:.....

বাড়ি/জিআর/হোল্ডিং নং:.....গ্রাম/মহল্লা/পাড়া.....

উপজেলা/পৌরসভা/সিটি করপোরেশন.....

জেলা.....ইউনিয়ন/জোন.....ওয়ার্ড নং.....

কেন্দ্রের নাম.....সাব-ব্লক.....

টিকার এই কার্ডটি যত্ন করে রাখুন। ভবিষ্যতে শিশুকে স্কুলে ভর্তি করানোর সময়, বিদেশে গমনের সময় এবং টিটি টিকা দেয়ার সময় এই কার্ডটির প্রয়োজন হবে।

এক বছরের কম বয়সী শিশুকে সবগুলো টিকা দেয়ার জন্য কমপক্ষে ৪ বার টিকা কেন্দ্রে নিয়ে আসতে হবে।

খালি ঘরে টিকা প্রদানের তারিখ লিখুন এবং স্বাক্ষর করুন

টিকার নাম	টিকা দেয়ার তারিখ ও কর্মীর স্বাক্ষর			
	১ম বার	২য় বার	৩য় বার	৪র্থ বার
বিসিজি				
ডিপিটি				
হেপাটাইটিস-বি				
পেন্টা (ডিপিটি, হেপ-বি, হিব)				
ওপিভি				
হাম				
ভিটামিন-এ				

শিশুর বয়স ১০ মাস পড়লেই/২৭০ দিন পূর্ণ হলেই হামের টিকা দিতে হবে

টিকার নাম	কখন দিতে হবে	টিকা দেয়ার তারিখ
টিডি-১	প্রথম শ্রেণীতে	
টিডি-২	দ্বিতীয় শ্রেণীতে	

শিশুদের প্রতিরোধযোগ্য ৮টি রোগ

১। যক্ষা | ২। পোলিও মাইলাইটিস | ৩। ডিফথেরিয়া
৪। হুপিং কাশি | ৫। ধনুষ্টংকার | ৬। হেপাটাইটিস-বি
৭। হিমোফাইলাস ইনফ্লুয়েঞ্জা-বি | ৮। হাম

ক) সময়মত সবগুলো টিকা নিলে আপনার শিশু নিজে ৮টি মারাত্মক সংক্রামক রোগ হতে রক্ষা পাবে।

খ) বিসিজি টিকার স্কিনি ডোজটি অন্যের পর পরই দেয়া যায়। টিকা দেয়ার পর বিসিজি টিকার স্থানে (বাম বাহুতে) অস্বাভাবিকভাবে ঘা হলে এতে ভয়ের কিছু নাই।

গ) শিশুর বয়স ৬ সপ্তাহ/৪২ দিন পূর্ণ হলেই ডিপিটি, হেপাটাইটিস-বি অথবা পেন্টাভ্যালেন্ট (ডিপিটি, হেপাটাইটিস-বি, হিব) এবং ওপিভি টিকার ১ম ডোজ দিতে হবে। কমপক্ষে ৪ সপ্তাহ/২৮ দিনের ব্যবধানে এ সকল টিকার ২য় এবং ৩য় ডোজ দিতে হবে।

ঘ) ১০ মাস পড়লেই/২৭০ দিন পূর্ণ হলেই শিশুকে হামের টিকা দিতে হবে। হামের টিকার সাথে ওপিভি টিকার ৪র্থ ডোজ এবং ভিটামিন-এ দিতে হবে।

ঙ) সমস্যা অনুযায়ী শিশুকে টিকা দেয়া যাবে।

চ) টিকা দিলে স্বাভাবিকভাবে সামান্য জ্বর, টিকার স্থানে ব্যথা এবং সমস্যাকারে টিকা দেয়ার স্থান শক্ত হয়ে যেতে পারে, এতে ভয়ের কিছু নেই।

ছ) শিশুর বয়সের ২ সপ্তাহের মধ্যে ১ ডোজ ওপিভি টিকা খাওয়ানো যায়, এ ডোজটিকে "০" ডোজ হিসেবে গণ্য করা হয়।

Appendix F: Project photos (taken during field visits and data collection)

Photo one: Researcher SHR (left 3rd) with Health assistants and Community health care providers from Modhur Chor and West Moura CC in the training session held in Modhur Chor CC

Photo two: Meeting with Mosque Imams, TBAs and UH&FPO Dr. Jasim Uddin of Dohar Health complex held in Modhur Chor CC

Photo three: Meeting with UH&FPO (Dr Jasim Uddin), mosque imams and local influential community personnels and local religious and political leaders

Photo four: A training session participated by TBAs in Modhur Chor CC

Photo five: Researcher with the doctors in Dohar Upazilla Health Complex

Appendix G:

QUESTIONNAIRE FOR HEALTH STAFF

To be completed by the health assistant and community healthcare provider who volunteered in the study
All information provided in this questionnaire will be treated confidentially.
If you have any queries, please contact Dr. Sanjida Haque Rema

I Sanjida Haque Rema, kindly request your consent to participate in a small questionnaire that is aimed at assessing the knowledge and practices of breastfeeding towards breastfeeding counselling.

1. Gender: M / F
2. Education: Up to Class 8 / S.S.C completed / H.S.C completed / Graduated
3. What is your position in health complex?
   Health Assistant / Nurse / Community healthcare provider / Other_____
4. From which of the following sources did you obtain your knowledge about breastfeeding? *(Please circle all that apply)*
   Government training on breastfeeding Personal experience
   TV, Radio Friends & Family Other source (specify) _____
5. Did you undergo any training on breastfeeding counselling? Y / N
6. Do you counsel pregnant women regarding exclusive breastfeeding? Y/ N
7. Do you think counselling is effective in encouraging more women to breastfeed? Y / N
8. When should breastfeeding start?
   Immediately after birth Within 6 hours Within 24 hours Within 48 hours
9. Is any feeding can be given to the newborn immediately after birth in addition to breast milk? Y / N
10. If yes, what is that? *(please circle all that apply)*
    Water / sweetened water / Honey / Cow`s milk / Infant formula / None / Other___
11. How long a mother should continue breastfeeding?
    3 months / 6 months / 1year / 2 years & beyond / Do not know
12. How long do you usually recommend a mother to continue exclusive breastfeeding?
    3 months / 6 months / 1year / 2 years / Do not know
13. When a baby should be given solid food? 1months / 2-3months / 6months / 12months
14. What do you think about colostrum? *(please circle all that apply)*
    Dirty milk which hamper breast milk`s flow
    Yellowish thick milk which protects against neonatal infections and illness
    Should be discarded as it is not fresh
    Do not know
15. What do you suggest a mother when a breastfeeding baby become sick?
    (please circle all that apply)
    Stop breastfeeding and seek advice from health professional
    Continue breastfeeding and seek advice from health professional
    Stop breastfeeding and start bottle feeding
    Do not know

স্বাস্থ্যকর্মীরদের জন্য প্রশ্নাবলী

স্বাস্থ্যকর্মী এবং কমিউনিটি হেল্‌থকেয়ার প্রোভাইডার এই প্রশ্নোত্তর পর্বে অংশগ্রহন করবেন-
(এই তথ্যাবলী সংগ্রহে সম্পূর্ন গোপনীয়তা পালন করা হবে)
আপনার কিছু জানার থাকলে অনুগ্রহ করে ডা. সানজীদা হক রীমা-এর সাথে যোগাযোগ করুন-

আমি ডা. সানজীদা হক রীমা, স্বাস্থ্যকর্মী ও সি.এইচ.সি.পি, যারা বুকের দুধ খাওয়ানো সম্পর্কে পরামর্শ দেন তাদের জ্ঞান ও অভিজ্ঞতা সম্পর্কে জানতে এই প্রশ্নোত্তর পর্বে অংশগ্রহন করতে সবিনয়ে অনুরোধ জানাচ্ছি।

১। লিঙ্গঃ পুরুষ / মহিলা
২। শিক্ষ্যাগত যোগ্যতাঃ অষ্টমশ্রেনী পর্যন্ত / এস.এস.সি. / এইচ.এস.সি. / গ্র্যাজুয়েট।
৩। স্বাস্থ্য কমপ্লেক্স এ আপনার পদমর্যাদা কি?
স্বাস্থ্যকর্মী / নার্স / কমিউনিটি হেল্‌থকেয়ার প্রোভাইডার / অন্যান্য----------
৪। বুকের দুধ খাওয়ানো সম্পর্কে নিম্নের কোন কোন উৎস থেকে আপনি ধারনা পেয়েছেন?
বুকের দুধ খাওয়ানো সম্পর্কে সরকারী ট্রেইনিং / নিজস্ব অভিজ্ঞতা / টিভি, রেডিও / বন্ধু-বান্ধব ও পরিবার / অন্যান্য ----------
৫। বুকের দুধ খাওয়ানোর পরামর্শ দিতে আপনি কি কোন প্রশিক্ষন পেয়েছেন? হ্যাঁ / না
৬। আপনি কি গর্ভবতী মহিলাদের শুধু মাত্র বুকের দুধ খাওয়ানো সম্পর্কে পরামর্শ দিয়েছেন? হ্যাঁ / না
৭। আপনার কি মনে হয় এই পরামর্শ মায়েদেরকে বুকের দুধ খাওয়াতে উতসাহিত করতে পারে? হ্যাঁ / না
৮। কখন থেকে বুকের দুধ খাওয়ানো শুরু করা উচিত?
জন্মের সাথে সাথে / ৬ ঘন্টার মধ্যে / ২৪ ঘন্টার মধ্যে / ৪৮ ঘন্টার মধ্যে ।
৯। শিশুর জন্মের সাথে সাথে বুকের দুধের পাশাপাশি অন্য কোন খাবার কি দেয়া যেতে পারে? হ্যাঁ / না
১০। উত্তর যদি হ্যাঁ হয়, সেটি কি? পানি / চিনির পানি বা মিস্রিপানি / মধু / গরুর দুধ / কৃত্রিম দুধ / কিছুই না / অন্যান্য----------
১১। কতদিন শিশুকে বুকের দুধ খাওয়ানো উচিত? ৩ মাস / ৬ মাস / ১ বছর / ২ বছর / জানা নাই
১২। শিশুকে কতদিন পর্যন্ত শুধুমাত্র বুকের দুধ খাওয়াতে মায়েদের পরামর্শ দিয়ে থাকেন? ৩ মাস / ৬ মাস / ১ বছর / ২ বছর / জানা নাই ।
১৩। শিশুকে কখন শক্ত খাবার দিবেন? ১ মাস / ২-৩ মাস / ৬ মাস / ১২ মাস ।
১৪। শালদুধ সম্পর্কে আপনার ধারনা কি? (সঠিক উত্তরটি টিক দিন)
দূষিত এবং বুকের দুধ আসতে বাধা দেয়।
হলদে ঘন দুধ যা শিশুর রোগ প্রতিরোধ করে।
বাসী দুধ ফেলে দিতে হয়।
জানা নাই ।
১৫। বুকের দুধ খাওয়া শিশু অসুস্থ হলে আপনি মাকে কি পরামর্শ দেন? (সঠিক উত্তরগুলো টিক দিন)
বুকের দুধ খাওয়ানো বন্ধ করুন এবং ডাক্তারের পরামর্শ নিন।
বুকের দুধ খাওয়াতে থাকুন এবং ডাক্তারের পরামর্শ নিন।
বুকের দুধ খাওয়ানো বন্ধ করুন এবং শিশুকে কৃত্রিম দুধ খাওয়ান।
জানা নাই।

Appendix H: Participant information sheet and consent

Certificate of Consent

Project Title: A low cost, sustainable, locally delivered intervention to promote exclusive breastfeeding practices in rural Bangladeshi women.

I understand the participant information sheet and give consent to participate in this research and I am free to withdraw from the project at any time without giving any reason.

Printed Name of Participant _____

Signature of Participant _____ Date signed_____

Printed Name of the legal guardian _____

Signature of legal guardian _____ Date signed_____

PARTICIPANT INFORMATION SHEET

Title: A low cost, sustainable, locally delivered intervention to promote exclusive breastfeeding practices in rural Bangladeshi women.
You and your child are invited to take part in a research study into breastfeeding practices.
Why have I been chosen?
You have been invited to participate because you live in rural area of Dohar, Bangladesh and you are expecting a baby.
Do I have to take part?
Your participation in this study is entirely voluntary and you are free to withdraw from the study at any time without giving any explanation.

What will participation involve?
Completing questionnaire about breastfeeding and additional and feeding practices with the help of HA/CHCP and your baby's weight and length will be measured during first 4 immunization visit to the CC. Each questionnaire is expected to be completed between 5-7 minutes. The first session will be conducted at mother`s home during antenatal period. Remaining four sessions will take place during routine immunization schedule at nearest Community clinic, Dohar.
Will my taking part in the study be kept confidential?
All information which is collected about you or your baby during the course of the research will be kept strictly confidential. Your identity will be anonymised and cannot be recognizable from the data.
Who is organising and reviewing the research?
This study is being conducted by research group at London Metropolitan University and supported by Bangladesh science and ICT project. This research has been approved by Ministry of health, Bangladesh, Civil Surgeon of Dhaka district and the London Metropolitan University Research Ethics Review Panel, London, UK.

Contact for further advice and information:
Sanjida Haque Rema
Dohar Upazilla Health Complex
Contact no-

অংশগ্রহনকারীর জন্য তথ্যাবলী

প্রজেক্ট শিরোনাম : বাংলাদেশের গ্রামাঞ্চলে মায়েদের বুকের দুধ খাওয়াতে উৎসাহিত করার জন্য সুলভে, স্থানীয়ভাবে প্রতিষ্ঠিত পদ্ধতিতে পরামর্শ দেয়ার একটি প্রকল্প।

আপনি এবং আপনার অনাগত শিশুকে এই গবেষণায় অংশগ্রহনের জন্য আমন্ত্রন জানাচ্ছি।

কেন আমাকে আমন্ত্রন জানানো হলো?
আপনাকে আমন্ত্রন জানানো হয়েছে কেননা আপনি বাংলাদেশের দোহার উপজেলার একটি গ্রামে বসবাস করেন এবং আপনি সন্তান সম্ভবা।

আমাকেও কি অংশগ্রহন করতে হবে?
এই গবেষনায় আপনার অংশগ্রহন সম্পূর্ণরূপে ঐচ্ছিক; আপনি যে কোন সময় নিজেকে বা আপনার শিশুকে এই গবেষনা থেকে প্রত্যাহার করে নিতে পারেন কোন রূপ ব্যাখ্যা ছাড়াই।

অংশগ্রহন করলে আমার কি হতে পারে?
স্বাস্থ্যকর্মী বা সি.এইচ.সি.পির সহযোগীতায় বুকের দুধ এবং অন্যান্য খাবার খাওয়ানো সম্পর্কে প্রশ্নোত্তরের জবাব দেয়া এবং শিশুকে প্রথম চারটি টিকা দেয়ার জন্য কমিউনিটি ক্লিনিক পরিদর্শনের সময় শিশুর ওজন ও উচ্চতা মাপা হবে। স্বাক্ষাৎকারের সময় ৫ - ৭ মিনিট। ১ম স্বাক্ষাৎকারটি হবে ৭ মাস বা তার পরে গর্ভকালীন সময়ে অংশগ্রহনকারীর বাড়িতে। বাকী ৪টি স্বাক্ষাৎকার হবে শিশুর টিকা প্রদানকালে স্থানীয় কমিউনিটি ক্লিনিকে।

আমার ব্যাক্তিগত তথ্য কি গোপন রাখা হবে?
আপনি বা আপনার সন্তানের সংগৃহীত সমস্ত তথ্য কঠোরভাবে গোপন রাখা হবে। আপনার পরিচয় গবেষনার তথ্য থেকে আলাদা করা সম্ভব হবে না।

কারা এই গবেষনা সংগঠিত করেছেন?
এই প্রকল্পটি লন্ডন মোট্রোপলিটান ইউনিভারসিটির গবেষকরা পরিচালনা করছেন যা বাংলাদেশ সায়েন্স এন্ড আই.সি.টি প্রজেক্ট অর্থায়ন করেছেন। ঢাকার সিভিল সার্জন এবং লন্ডন মোট্রোপলিটান ইউনিভারসিটির রিসার্চ ইথিক্স রিভিউ প্যানেল গবেষনার জন্য অনুমোদন দিয়েছেন।

আরও জানতে যোগাযোগ করুন-
ডা. সানজীদা হক রীমা
দোহার উপজেলা হেলথ কমপ্লেক্স

অংশগ্রহনের পূর্ণ সম্মতিপত্র

প্রজেক্ট শিরোনাম : বাংলাদেশের গ্রামাঞ্চলে মায়েদের বুকের দুধ খাওয়াতে উৎসাহিত করার জন্য সুলভে, স্থানীয়ভাবে প্রতিষ্ঠিত পদ্ধতিতে পরামর্শ দেয়ার একটি প্রকল্প।

আমি নিশ্চিত করছি যে এই গবেষনায় অংশগ্রহনকারীর জন্য সরবরাহকৃত তথ্যসমূহ আমি পড়েছি এবং এই গবেষনায় অংশগ্রহনে আমার সম্মতি জানাচ্ছি। যে কোন সময় কোন রকম কারন-দর্শানো ছাড়াই গবেষনায় অংশগ্রহন থেকে আমি নিজেকে সরিয়ে নিতে পারবো।

অংশগ্রহনকারীর নাম----------

অংশগ্রহনকারীর স্বাক্ষর---------- তারিখ----------

অভিভাবকের নাম----------

অভিভাবকের স্বাক্ষর---------- তারিখ----------

Appendix I: Questionnaires Q1 to Q5 (One antenatal and four Postnatal)

Name of the interviewer_____ Interviewer's ID no_____
Date of the interview_____/_____/_____Participant's ID no_____
Name of the Community Clinic_____Interview- 1

Pregnant woman's information (Seven months and beyond)

1. House name / No._____2. Village_____3. Ward_____

4. Name_____ 5. Age____YRS.

6. Age of marriage____YRS 7. Age of first pregnancy_____YRS

Please tick the correct answer

8. Education: None / Primary School / S.S.C / H.S.C / Graduate or over

9. Occupation: Household work / Agriculture or livestock / Others_____

Family History

10. Husband's occupation: Farming / Rickshaw puller / Small business / Driver / Living in foreign country for earning / Day labour / Jobless / Other_____

11. Family structure: Joint family / Nuclear family

12. Source of drinking water: Tap water placed at house / Pond or river water / Tube-well / Others_____

13. Family expenditure per month: < 5,000 / 5,000 to 10,000 / > 10,000

History of current pregnancy

14. Duration of pregnancy: _____months or EDD_____/_____/_____

15. Type of pregnancy: Primi gravida / Multigravida

16. What kind of delivery would you prefer?

Home delivery with local TBA / Home delivery with govt. trained TBA / Govt. hospital or health complex / Private clinic

17. Have you had your antenatal check-up? Y / N; if Y, how often? 1 / 2 / 3 / 4 times

18. Have you heard any advice regarding breastfeeding? Y / N; if Y, what kind of advice you heard? _____

And, from whom you heard this advice? Doctor / Nurse / Health assistant / Mother or mother-in-law / Husband / older relatives / TBAs / Friends-neighbour / TV-Radio / Others___

19. How did you planned to feed your child after birth? Breastfeeding / Bottle feeding / Mixed / Don't know

20. How long you want to breastfeed your child? 3 months / 6 months / 1 year /

2 years / More than 2 years

21. Have you planned to feed anything other than breast milk in the first week of birth?

Y / N; if Y, what is your plan to feed? Water / Honey / Mustard oil / Mustard oil+honey / Water sweetened with sugar or crystalline sugar / Infant formula / Diluted cow's or goat's milk / Others

History of youngest child (For Multipara women)

(Direction for the interviewer- collect data if the child aged 5 years or younger)

22. Have you breastfed this child? Y / N; if Y, how long? 6mo / 1YR / 2YRS / More than 2YRS / Others_____

23. Did you feed colostrum? Y / N

24. Did you feed anything other than breast milk in first week of birth? Y / N

25. When did you start give complementary food (either fluid or semisolid or solid) ?_____days or____months

Name of the interviewer_____ Interviewer's ID no_____
Date of the interview_____/_____/_____Participant's ID no_____
Name of Community Clinic_____ Interview- 2

1st EPI VISIT (Mother with infant aged 0-1½ mo)

Child's birth information:

1. Date of birth: ____/_____/_____ 2. Gender: M / F

3. Birth WT:_____kg 4. Current WT:_____kg 5. Current LNTH:_____cm

6. Mode & place of delivery: Home delivery with TBA / Home delivery with govt. trained TBA / NVD at govt. hospital or UHC / CS at govt. hospital or UHC / NVD at private clinic / CS at private clinic

Breastfeeding initiation history

7. Are you breastfeeding this baby? Y / N

8. Did you feed colostrum to this baby? Y / N

9. When did you start breastfeeding: 1st hr after birth / Within 6 hrs / Within 24 hrs / In 2nd day / In 3rd day / After 3rd day / Others_____

10. If breastfed late in 24 hours or later, what you fed till then? Nothing / Water / Water sweetened with sugar or crystalline sugar / Infant formula / Diluted cow's or goat's milk / Powdered milk / Others_____

First week feeding history

11. Did you feed anything other than breast milk at 1st week of birth? Y / N; if Y, type of the feeding: Plain water / Honey / Honey+Mustard oil / / Water sweetened with sugar or crystalline sugar / Infant formula / Diluted cow's milk or goat`s milk / Powdered milk / Others_____

And, reasons for adding these feeding: Baby couldn`t suckle the breast / To satisfy hunger / Colostrum insufficient / To stop baby crying / Mother ill / Prevent cold & cough / Traditionally given / For sweet voice / To clear the gut / To strengthen baby / Family decision / Others_____

And, advised by: Health worker / Doctor/ Nurse / Husband / Mother / Mother-in-law / TBA / Friends / Neighbour / Radio-TV / Others_____

Additional feeding history (Fluid)

12. Are you continuing any additional fluid or water to your baby in association with breast milk? Y / N; If Y, from when? _____days OR _____months after birth;

And, name of the fluid: Plain water / / Water sweetened with sugar or crystalline sugar / Infant formula / Diluted cow`s or goat`s milk / Powdered milk / Others_____

And, reasons for adding fluid: Breast milk is not enough / To satisfy hunger-thirst / To stop baby crying / Baby couldn`t suckle the breast / Baby needed more / Mother ill / Working mother / Family decision / Household workload / To gain weight / Others____

Additional feeding history (Semisolid or solid)

13. Have you started to add semisolid or solid to your baby? Y / No; If Y, when did you start ? _____days OR _____months after birth;

And, types of semisolid or solid: Shuji / Khichri / Family food / Rice gruel / Biscuits / Banana / Fruits / Other_____

And, reasons for adding semisolid or solid: Family decision / Breast milk is not enough / Increased Need / Mother ill / Working mother / Household workload / To gain weight / Other_____

14. Have you noticed more or less illness after adding additional feeding (fluid, semisolid or solid) as opposed to the time he / she was breastfeeding? Same / More / Less

15. What has the baby eaten or drunk in last 24 hours other than breast milk?

None / Plain water / / Water sweetened with sugar or crystalline sugar / Infant formula / Diluted cow`s or goat`s milk / Powdered milk / Shuji / Family food / Khichri / Others _____

16. What illness has your child had since birth? None / Cold & cough / Breathlessness / Convulsion / Fever / Diarrhoea / Pneumonia / Other_____

17. Did you visit to the hospital or doctor for you or baby`s any illness after birth? Y / N; if Y, reason (in short) _____

18. Did you face any problem while breastfeeding? Y / N; if Y, what was that? _____

Name of the interviewer_____ Interviewer's ID no____
Date of the interview_____/_____/_____Participant's ID no____
Name of the Community Clinic_____ Interview- 3

EPI VISIT-2 (Mother with baby aged 2 mo & beyond)

Child information

1. DOB:___/____/_____ 2. Current WT:_____kg 3. Current LNTH: _____cm

Breastfeeding history

4. Are you breastfeeding this baby? Y / N

Additional feeding history (Fluid)

5. Are you continuing any additional fluid or water to your baby in association with breastmilk? Y / N; if Y, from when? _____days OR _____months after birth; **And**, name of the fluid: Plain water / Water sweetened with sugar or crystalline sugar / Infant formula / Diluted cow`s milk or goat`s milk / Powdered milk / Others_____

And, reasons for adding fluid: Breast milk is not enough / To satisfy hunger-thirst / To stop baby crying / Baby couldn't suckle breast / Baby needed more / Mother ill / Working mother / Family decision / Household workload / To gain weight / Others_____

Additional feeding history (semisolid or solid)

6. Have you started to add semisolid or solid to your baby? Y / No; If Y, when did you start? _____days OR _____months;

And, types of semisolid or solid: Shuji (semolina) / Khichri / Family food / Rice gruel / Biscuits / Banana or other fruits / Other_____

And, reasons for adding semisolid or solid: Family decision / Breast milk is not enough / Increased Need / Mother ill / Working mother / Household workload / To gain weight Other_____

7. Have you noticed more or less illness after adding additional feeding (fluid, semisolid or solid) as opposed to the time he / she was breastfeeding? Same / More / Less

8. What has the baby eaten or drunk in last 24 hours other than breast milk?

None / Plain water / Water sweetened with sugar or crystalline sugar / Infant formula / Diluted cow`s or goat`s milk / Shuji / Family food / Khichri / Others _____

9. What illness has your child had since birth? None / Cold & cough / Breathlessness / Convulsion / Fever / Diarrhoea / Pneumonia / Other_____

10. Did you visit to the hospital or doctor for you or baby`s any illness after birth? Y / N; if Y, reason (in short) _____

Name of the interviewer_____ Interviewer's ID no_____
Date of the interview_____/_____/_____ Participant's ID no_____
Name of the Community Clinic_____ Interview- 4

EPI VISIT-3 (Mother with baby aged 3½ mo & beyond)

Child information

1. DOB:___/____/_____ 2. Current WT:_____kg 3. Current LNTH: _____cm

Breastfeeding history

4. Are you breastfeeding this baby? Y / N

Additional feeding history (Fluid)

5. Are you continuing any additional fluid or water to your baby in association with breastmilk? Y / N; if Y, from when? _____days OR _____months after birth; **And**, types of the fluid: Plain water / Water sweetened with sugar or crystalline sugar / Infant formula / Diluted cow`s milk or goat`s milk / Powdered milk / Others_____

And, reasons for adding fluid: Breast milk is not enough / To satisfy hunger-thirst / To stop baby crying / Baby couldn't suckle breast / Baby needed more / Mother ill / Working mother / Family decision / Household workload / To gain weight / Others_____

Additional feeding history (semisolid or solid)

6. Have you started to add semisolid or solid to your baby? Y / No; If Y, when did you start? _____days OR _____months; **And**, types of semisolid or solid: Shuji / Khichri / Family food / Rice gruel / Biscuits / Banana or other fruits / Other_____

And, reasons for adding semisolid or solid: Family decision / Breast milk is not enough / Increased Need / Mother ill / Working mother / Household workload / To gain weight Other_____

7. Have you noticed more or less illness after adding additional feeding (fluid, semisolid or solid) as opposed to the time he / she was breastfeeding? Same / More / Less

8. What has the baby eaten or drunk in last 24 hours other than breast milk?

None / Plain water / Water sweetened with sugar or crystalline sugar / Infant formula / Diluted cow`s or goat`s milk / Powder milk / / Shuji / Family food / Khichri / Others _____

9. What illness has your child had since birth? None / Cold & cough / Breathlessness / Convulsion / Fever / Diarrhoea / Pneumonia / Other_____

10. Did you visit to the hospital or doctor for you or baby`s any illness after birth? Y / N; if Y, reason (in short) _____

Name of the interviewer_____ Interviewer's ID no_____
Date of the interview_____/_____/_____ Participant's ID no_____
Name of the Community Clinic_____ Interview- 5

EPI VISIT-4 (Mother with baby aged 5 mo & beyond)

Child information

1. DOB:___/____/_____ 2. Current WT:_____kg 3. Current LNTH: _____cm

Breastfeeding history

4. Are you breastfeeding this baby? Y / N

Additional feeding history (Fluid)

5. Are you continuing any additional fluid or water to your baby in association with breastmilk? Y / N; if Y, from when? _____days OR _____months after birth; **And**, types the fluid: Plain water / Water sweetened with sugar or crystalline sugar / Infant formula / Diluted cow`s milk or goat`s milk / Powdered milk / Others_____

And, reasons for adding fluid: Breast milk is not enough / To satisfy hunger-thirst / To stop baby crying / Baby couldn't suckle breast / Baby needed more / Mother ill / Working mother / Family decision / household workload / To gain weight / Others_____

Additional feeding history (Semisolid or solid)

6. Have you started to add semisolid or solid to your baby? Y / No; If Y, when did you start? _____days OR _____months; **And**, types of semisolid or solid: Shuji / Khichri / Family food / Rice gruel / Biscuits / Banana or other fruits / Other_____

And, reasons for adding semisolid or solid: Family decision / Breast milk is not enough / Increased Need / Mother ill / Working mother / Household workload / To gain weight Other_____

7. Have you noticed more or less illness after adding additional feeding (fluid, semisolid or solid) as opposed to the time he / she was breastfeeding? Same / More / Less

8. What has the baby eaten or drunk in last 24 hours other than breast milk?

None / Plain water / Water sweetened with sugar or crystalline sugar / Infant formula / Cow`s or goat`s milk / Powdered milk / / Shuji / Family food / Khichri / Others _____

9. What illness has your child had since birth? None / Cold & cough / Breathlessness / Convulsion / Fever / Diarrhoea / Pneumonia / Other_____

10. Did you visit to the hospital or doctor for you or baby`s any illness after birth? Y / N; if Y, reason (in short) _____

প্রশ্নকর্তার নাম: ---------- প্রশ্নকর্তার আইডি নং :----------

সাক্ষাৎকারের তারিখ:---------- অংশগ্রহণকারীর আইডি নং:----------

কমিউনিটি ক্লিনিকের নাম: ----------

সাক্ষাৎকার - ১

গর্ভবতী মহিলাদের তথ্য (৭ মাস ও পরবর্তী সময়)

১। বাড়ির নাম/নম্বর : ---------- ২। গ্রাম :----------
৩। ওয়ার্ড :---------- ৪। নাম: ---------- ৫। বছর ------
৬। বিয়ের বছর: -------- ৭। প্রথম গর্ভকালীন বছর:----------

সঠিক উত্তরটি বৃত্তাকার করুন
৮।শিক্ষাগত যোগ্যতা: কোনোটাই না / প্রাইমারি স্কুল / এস.এস.সি / এইচ.এস.সি / স্নাতক / স্নাতকোত্তর।
৯।পেশা : গৃহকর্ম /কৃষিকাজ বা হাঁসমুরগি পালন / অন্যান্য ----------

পরিবারের তথ্য
১০। স্বামীর পেশা: চাষাবাদ / রিকশাচালক / ছোটখাট ব্যবসা / ড্রাইভার / প্রবাসে জীবিকা নির্বাহ / দিনমজুর / বেকার / অন্যান্য ----
১১। পারিবারিক কাঠামো : যৌথ পরিবার / একক পরিবার।

১২। খাবার পানিয়র উৎস: ঘরে স্থাপিত কলের পানি / পুকুর বা নদীর পানি / চাপকল / অন্যান্য ----------

১৩। মাসিক খরচ: ৫,০০০ টাকার নিচে / ৫,০০০ থেকে ১০,০০০ টাকা / ১০,০০০ টাকার উপরে

বর্তমান গর্ভাবস্থার তথ্য

১৪। গর্ভকালীন সময় :------- মাস বা প্রসবের সম্ভাব্য তারিখ ----------

১৫। গর্ভাবস্থার প্রকারভেদ : প্রথমবারের মতো গর্ভবতী / পূর্বেও গর্ভধারন করেছেন, জীবিত সন্তানের সংখ্যা ----

১৬। কোন ধরনের প্রসবে আপনি আগ্রহী : বাড়িতে এলাকার দাইয়ের হাতে / বাড়িতে প্রশিক্ষনপ্রাপ্ত সরকারী দাইয়ের হাতে / সরকারী হাসপাতাল বা হেল্‌থ কমপ্লেক্স / প্রাইভেট ক্লিনিক।

১৭।আপনি কি বর্তমান গর্ভাবস্থায় গর্ভকালীন পরীক্ষা (ANC) করিয়েছেন। হ্যাঁ / না, যদি হ্যাঁ হয়, কতবার ? ১ /২ /৩/৪ বার।

১৮।আপনি কি মায়ের বুকের দুধ খাওয়ানো সম্পর্কে কখনও কোন উপদেশ শুনেছেন ? হ্যাঁ / না
যদি হ্যাঁ হয় তাহলে কি ধরনের উপদেশ শুনেছেন ----------
কার কাছ থেকে উপদেশ শুনেছেন, ডাক্তর / নার্স / স্বাস্থকর্মী / মা-শ্বাশুড়ি / স্বামী / বয়স্ক আত্নীয় / দাই / প্রতিবেশী-বন্ধু / টিভি-রেডিও / অন্যান্য ----------

১৯। জন্মের পর শিশুকে কি ভাবে দুধ খাওয়ানোর পরিকল্পনা করেছেন : বুকের দুধ / বোতলের দুধ / দুইটাই / জানা নাই

২০। শিশুকে কতদিন পর্যন্ত বুকের দুধ খাওয়াতে চান : ৩মাস / ৬মাস / ১বছর / ২বছর / ২বছরের বেশী।

২১। জন্মের প্রথম সপ্তাহে শিশুকে বুকের দুধ ছাড়াও অন্যকিছু খাওয়ানোর পরিকল্পনা করেছেন কি : হ্যাঁ / না

যদি হ্যাঁ হয়, তাহলে কি খাওয়ানোর পরিকল্পনা করেছেন : পানি / মধু / সরিষার তেল / সরিষার তেল + মধু / চিনির পানি বা মিশ্রির পানি /কৃত্রিম দুধ / পানিমিশ্রিত গরুর দুধ বা ছাগলের দুধ / অন্যান্য ------

বর্তমানে সবচেয়ে ছোট সন্তারে তথ্য (যদি আগে সন্তানের জন্ম দিয়ে থাকেন)
(প্রশ্নকর্তার জন্য নির্দেশনা- যদি কোন ছেলে অথনা মেয়ে ৫ বছর বা তার কম বয়সী হয়ে থাকে শুধু মাত্র সেই সন্তানের তথ্য সংগ্রহ করুন)

২২। আপনার এই সন্তানকে কি বুকের দুধ খাইয়েছেন? হ্যাঁ / না
যদি হ্যাঁ হয়, তাহলে কতদিন: ৬মাস / ১বছর / ২বছর / ২বছরের বেশী / অন্যান্য----

২৩। আপনি কি আপনার শিশুকে শালদুধ খাইয়েছেন: হ্যাঁ / না

২৪। আপনি কি আপনার শিশুকে জন্মের প্রথম সপ্তাহে বুকের দুধ ছাড়া অন্য কিছু খাইয়েছেন : হ্যাঁ / না

২৫। কখন থেকে আপনার শিশুকে আলগা খাবার দেওয়া শুরু করেছেন? ----- দিন অথনা ------ মাস।

প্রশ্নকর্তার নাম: ---------- প্রশ্নকর্তার আইডি নং :----------

সাক্ষাৎকারের তারিখ:---------- অংশগ্রহণকারীর আইডি নং:----------

কমিউনিটি ক্লিনিকের নাম: ----------

সাক্ষাৎকার - ২

১ম ইপিআই ভিজিট-মা ও শিশু (বয়স জন্ম থেকে দেড় মাস)

শিশুর জন্ম তথ্য
১। শিশুর জন্ম তারিখ :------- দিন ----- মাস --------সন ২। লিঙ্গ : ছেলে / মেয়ে
৩। জন্মের সময় শিশুর ওজন ------- কেজি ৪। শিশুর বর্তমান ওজন: ------- কেজি
৫। শিশুর বর্তমান উচ্চতা:---------- সেমি:
৬। শিশুর কোন পদ্ধতিতে এবং কোথায় জন্ম হয়েছে?
বাড়িতে এলাকার দাইয়ের হাতে / বাড়িতে প্রশিক্ষনপ্রাপ্ত সরকারী দাইয়ের হাতে / সরকারী হাসপাতাল বা হেলথ কমপ্লেক্সে নরমাল ডেলিভারি/ সরকারী হাসপাতাল বা হেলথ কমপ্লেক্সে সিজারিয়ান ডেলিভারি/ প্রাইভেট ক্লিনিকে নরমাল ডেলিভারি /প্রাইভেট ক্লিনিকে সিজারিয়ান ডেলিভারি ।

শিশুকে বুকের দুধ খাওয়ানোর তথ্য
৭। আপনি এই শিশুকে কি বুকের দুধ খাওয়াচ্ছেন? হ্যাঁ / না
৮। এই শিশুকে কি শাল দুধ খাইয়েছেন ? হ্যাঁ / না
৯। শিশুকে কখন থেকে বুকের দুধ দেয়া শুরু করেছেন?
জন্মের ১ ঘন্টার মধ্যে / জন্মের ৬ ঘন্টার মধ্যে / জন্মের ২৪ ঘন্টার মধ্যে / জন্মের ২ দিনের মধ্যে / জন্মের ৩ দিনের মধ্যে / জন্মের ৩ দিন পর / অন্যান্য----------
১০। শিশুকে যদি ২৪ ঘন্টা বা তার পর বুকের দুধ খাওয়ান তা হলে এই সময়টুকু শিশুকে কি খাইয়েছেন?
কিছুই না / পানি / চিনির পানি বা মিস্রির পানি / কৃত্রিম দুধ / পানিমিশ্রিত গরুর দুধ বা ছাগলের দুধ / গুঁড়া দুধ / অন্যান্য--

জন্মের প্রথম সপ্তাহে শিশুকে খাওয়ানোর তথ্য
১১। জন্মের প্রথম সপ্তাহে শিশুকে বুকের দুধ ছাড়া অন্য কিছু খাইয়েছেন কি? হ্যাঁ / না, যদি হ্যাঁ হয় তাহলে কি খাইয়েছেন?

পানি / মধু / মধু এবং সরিষার তেল / চিনির পানি বা মিস্রিপানি / কৃত্রিম দুধ / পানিমিস্রিত গরুর দুধ বা ছাগলের দুধ / গুড়া দুধ / অন্যান্য ---------

এবং কেন শিশুকে এই ধরনের খাবার খাওয়ানোর সিদ্ধান্ত নিয়েছেন?
শিশু বুকের দুধ টানতে পারছিলো না / ক্ষুধা নিবাড়নের জন্য / শীলদুধ যথেষ্ট নয় / শিশুর কান্না থামানোর জন্য / মা অসুস্থ / শিশুর যাতে সর্দিকাশি না হয় / প্রথাগত বিশ্বাস / শিশু মিষ্টভাষী হয় / পেট পরিস্কার করে / শিশুর শক্তি বৃদ্ধি করে / পারিবারিক সিদ্ধান্ত / অন্যান্য------

এবং কে এই ধরনের খবার খাওয়াতে উপদেশ দিয়েছে? স্বাস্থ্যকর্মী / ডাক্তার / নার্স / স্বামী / মা / শাশুড়ি / দাই / বন্ধুবান্ধব-প্রতিবেশী / রেডিও-টিভি / অন্যান্য -------

শিশুকে বাড়তি খাবার (শুধুমাত্র তরল খাবার) খওয়ানোর তথ্য
১২। আপনি কি শিশুকে বুকের দুধ ছাড়াও পানি বা বাড়তি তরল খাবার দেয়া শুরু করেছেন ? হ্যাঁ / না, উত্তর হ্যাঁ হলে, জন্মের পর কখন থেকে তরল দেয়া শুরু করেছেন ——— দিন অথবা ——— মাস ।

এবং কি ধরনের তরল দেয়া শুরু করেছেন—
পানি / চিনির পানি বা মিস্রিপানি / কৃত্রিম দুধ / পানিমিস্রিত গরুর দুধ বা ছাগলের দুধ / গুড়া দুধ / অন্যান্য ———

এবং শিশুকে কেন এই ধরনের খাবার খাওয়ানোর সিদ্ধান্ত নিয়েছেন-
বুকের দুধ যথেষ্ট নয় / ক্ষুধা-তৃষ্ণা নিবারনের জন্য / শিশুর কান্ন থমানোর জন্য / শিশু বুকের দুধ টানতে পারে না / শিশুর আরও প্রয়োজন / মা অসুস্থ / কর্মজীবি মা / পারিবারিক সিদ্ধান্ত / সংসারে কাজের চাপ / শিশুর ওজন বৃদ্ধির জন্য / অন্যান্য------

শিশুকে বাড়তি খাবার (অর্ধ তরল বা শক্ত খাবার) খওয়ানোর তথ্য
১৩। শিশুকে কি বাড়তি খাবার (অর্ধ তরল বা শক্ত খাবার) দেয়া শুরু করেছেন? হ্যাঁ / না, যদি উত্তর হ্যাঁ হয়, কবে থেকে শুরু করেছেন? জন্মের ——— দিন———— মাস থেকে।
-কি ধরনের বাড়তি খাবার (অর্ধ তরল বা শক্ত খাবার) দেয়া শুরু করেছেন?
সুজি / খিচুড়ি / পারিবারিক খাবার / চালের গুড়া, দুধ ও চিনির মিশ্রন / বিস্কুট / কলা বা অন্যান্য ফল / অন্যান্য ————
-শিশুকে কেন এই ধরনের বাড়তি খাবার (অর্ধ তরল বা শক্ত খাবার) দেয়ার সিদ্ধান্ত নিয়েছেন?
পারিবারিক সিদ্ধান্ত /বুকের দুধ যথেষ্ট নয় / শিশুর আরও বেশী প্রয়োজন / মা অসুস্থ / কর্মজীবি মা / সংসারে কাজের চাপ / শিশুর ওজন বৃদ্ধির জন্য / অন্যান্য------

১৪। শিশুকে পানি বা অন্য বাড়তি খাবার দেয়ার সাথে শুধু মাত্র বুকের দুধ খাওয়ানোর তুলনায় রোগের কম-বেশী কোন পার্থক্য লক্ষ্য করেছেন কি? একইরকম / কম / বেশী ।

১৫। গত ২৪ ঘন্টায় বুকের দুধ ছাড়া আর কি খাইয়েছেন?
কিছুই না / পানি / কৃত্রিম দুধ / পানিমিস্রিত গরুর দুধ বা ছাগলের দুধ / চিনির পানি বা মিস্রিপানি / সুজি / পারিবারিক খাবার / খিচুড়ি / অন্যান্য------

১৬। শিশু জন্মাবার পর থেকে কি ধরনের রোগে ভুগেছে? কোনটাই না / সর্দিকাশি / শ্বাসকষ্ট / খিঁচুনি / জ্বর / ডায়রিয়া / নিউমোনিয়া / অন্যান্য------

১৭। শিশুর জন্মের পর আপনার বা শিশুর অসুস্থতার জন্য আপনি কি হাসপাতাল বা ডাক্তারের কাছে গিয়েছেন?
হ্যাঁ / না, যদি গিয়ে থাকেন, কেন? (সংক্ষেপে বলুন) ————————————————————

১৮। শিশুকে বুকের দুধ খাওয়ানোর সময় আপনি কি কোন সমস্যার সম্মুখিন হয়েছেন?
হ্যাঁ / না, যদি হ্যাঁ হয় কি ধরনের সমস্যা ————————————————————

প্রশ্নকর্তার নাম: ---------- প্রশ্নকর্তার আইডি নং :----------

সাক্ষাৎকারের তারিখ:---------- অংশগ্রহণকারীর আইডি নং:----------

কমিউনিটি ক্লিনিকের নাম: ----------

সাক্ষাৎকার - ৩

২য় ইপিআই ভিজিট-মা ও শিশু (বয়স আড়াই মাস ও তদোর্ধ)

শিশুর তথ্য

১। জন্ম তারিখ :------- দিন ----- মাস ---------সন ২। বর্তমান ওজন ------- কেজি

৩। বর্তমান উচ্চতা:---------- সেমি:

শিশুকে বুকের দুধ খাওয়ানোর তথ্য

৪। আপনি এই শিশুকে কি বুকের দুধ খাওয়াচ্ছেন? হ্যাঁ / না

শিশুকে বাড়তি খাবার (শুধুমাত্র তরল খাবার) খওয়ানোর তথ্য

৫। আপনি কি শিশুকে বুকের দুধ ছাড়াও পানি বা বাড়তি তরল খাবার দেয়া শুরু করেছেন ? হ্যাঁ / না, উত্তর হ্যাঁ হলে, জন্মের পর কখন থেকে তরল দেয়া শুরু করেছেন -------- দিন অথবা ------- মাস ।

এবং কি ধরনের তরল দেয়া শুরু করেছেন----

পানি / চিনির পানি বা মিস্ত্রিপানি / কৃত্রিম দুধ / পানিমিস্ত্রিত গরুর দুধ বা ছাগলের দুধ / গুড়া দুধ / অন্যান্য --------

এবং শিশুকে কেন এই ধরনের খাবার খাওয়ানোর সিদ্ধান্ত নিয়েছেন-

বুকের দুধ যথেষ্ট নয় / ক্ষুধা-তৃষ্ণা নিবাড়নের জন্য /শিশুর কান্না থামানোর জন্য / শিশু বুকের দুধ টানতে পারছিলো না / শিশুর আরও প্রয়োজন / মা অসুস্থ / কর্মজীবি মা / পারিবারিক সিদ্ধান্ত / সংসারে কাজের চাপ / শিশুর ওজন বৃদ্ধির জন্য / অন্যান্য------

শিশুকে বাড়তি খাবার (অর্ধ তরল বা শক্ত খাবার) খওয়ানোর তথ্য

৬। শিশুকে কি বাড়তি খাবার (অর্ধ তরল বা শক্ত খাবার) দেয়া শুরু করেছেন? হ্যাঁ / না, উত্তর হ্যাঁ হলে কবে থেকে শুরু করেছেন? জন্মের ------ দিন-------- মাস থেকে।

-কি ধরনের বাড়তি খাবার (অর্ধ তরল বা শক্ত খাবার) দেয়া শুরু করেছেন?

সুজি / খিচুড়ি / পারিবারিক খাবার / চালের গুড়া, দুধ ও চিনির মিশ্রন / বিস্কুট / কলা বা অন্যান্য ফল / অন্যান্য --------

-শিশুকে কেন এই ধরনের বাড়তি খাবার (অর্ধ তরল বা শক্ত খাবার) দেয়ার সিদ্ধান্ত নিয়েছেন?

পারিবারিক সিদ্ধান্ত /বুকের দুধ যথেষ্ট নয় / শিশুর আরও বেশী প্রয়োজন / মা অসুস্থ / কর্মজীবি মা / সংসারে কাজের চাপ / শিশুর ওজন বৃদ্ধির জন্য / অন্যান্য----------

৭। শিশুকে পানি বা অন্য বাড়তি খাবার দেয়ার সাথে শুধু মাত্র বুকের দুধ খাওয়ানোর তুলনায় রোগের কম-বেশী কোন পার্থক্য লক্ষ্য করেছেন কি? একইরকম / কম / বেশী ।

৮। শিশুকে গত ২৪ ঘন্টায় বুকের দুধ ছাড়া আর কি খাইয়েছেন?

কিছুই না / পানি / কৃত্রিম দুধ / পানিমিস্ত্রিত গরুর দুধ বা ছাগলের দুধ / চিনির পানি বা মিস্ত্রিপানি / সুজি / পারিবারিক খাবার / খিচুড়ি / অন্যান্য----------

৯। শিশু জন্মাবার পর থেকে কি ধরনের রোগে ভুগেছে? কোনটাই না / সর্দিকাশি / শ্বাসকষ্ট / খিঁচুনি / জ্বর / ডায়রিয়া / নিউমোনিয়া / অন্যান্য----------

১০। শিশুর জন্মের পর আপনার বা শিশুর অসুস্থতার জন্য আপনি কি হাসপাতাল বা ডাক্তারের কাছে গিয়েছেন? হ্যাঁ / না, যদি গিয়ে থাকেন, কেন? (সংক্ষেপে বলুন) ----------

প্রশ্নকর্তার নাম: ———————— প্রশ্নকর্তার আইডি নং :————

সাক্ষাৎকারের তারিখ:———————— অংশগ্রহণকারীর আইডি নং:————————

কমিউনিটি ক্লিনিকের নাম: ————————

সাক্ষাৎকার - ৪

৩য় ইপিআই ভিজিট- মা ও শিশু (বয়স সাড়ে তিন মাস ও ততোর্ধ)

শিশুর তথ্য

১। জন্ম তারিখ :——— দিন —— মাস ————সন ২। বর্তমান ওজন ——— কেজি

৩। বর্তমান উচ্চতা:———— সেমি:

শিশুকে বুকের দুধ খাওয়ানোর তথ্য

৪। আপনি এই শিশুকে কি বুকের দুধ খাওয়াচ্ছেন? হ্যাঁ / না

শিশুকে বাড়তি খাবার (শুধুমাত্র তরল খাবার) খওয়ানোর তথ্য

৫। আপনি কি শিশুকে বুকের দুধ ছাড়াও পানি বা বাড়তি তরল খাবার দেয়া শুরু করেছেন ? হ্যাঁ / না, উত্তর হ্যাঁ হলে কবে থেকে তরল দেয়া শুরু করেছেন ——— দিন অথবা ——— মাস ।

এবং কি ধরনের তরল দেয়া শুরু করেছেন—

পানি / চিনির পানি বা মিস্ত্রিপানি / কৃত্রিম দুধ / পানিমিস্ত্রিত গরুর দুধ বা ছাগলের দুধ / গুড়া দুধ / অন্যান্য ————

এবং শিশুকে কেন এই ধরনের খাবার খাওয়ানোর সিদ্ধান্ত নিয়েছেন-

বুকের দুধ যথেষ্ট নয় / ক্ষুধা-তৃষ্ণা নিবাড়নের জন্য /শিশুর কান্না থামানোর জন্য / শিশু বুকের দুধ টানতে পারছিলো না / শিশুর আরও প্রয়োজন / মা অসুস্থ / কর্মজীবি মা / পারিবারিক সিদ্ধান্ত / সংসারে কাজের চাপ / শিশুর ওজন বৃদ্ধির জন্য / অন্যান্য------

শিশুকে বাড়তি খাবার (অর্ধ তরল বা শক্ত খাবার) খওয়ানোর তথ্য

৬। শিশুকে কি বাড়তি খাবার (অর্ধ তরল বা শক্ত খাবার) দেয়া শুরু করেছেন? হ্যাঁ / না, উত্তর হ্যাঁ হলে কবে থেকে শুরু করেছেন? জন্মের —— দিন———— মাস থেকে।

-কি ধরনের বাড়তি খাবার (অর্ধ তরল বা শক্ত খাবার) দেয়া শুরু করেছেন?

সুজি / খিচুড়ি / পারিবারিক খাবার / চালের গুড়া, দুধ ও চিনির মিশ্রন / বিস্কুট / কলা বা অন্যান্য ফল / অন্যান্য ————

-শিশুকে কেন এই ধরনের বাড়তি খাবার (অর্ধ তরল বা শক্ত খাবার) দেয়ার সিদ্ধান্ত নিয়েছেন?

পারিবারিক সিদ্ধান্ত /বুকের দুধ যথেষ্ট নয় / শিশুর আরও বেশী প্রয়োজন / মা অসুস্থ / কর্মজীবি মা / সংসারে কাজের চাপ / শিশুর ওজন বৃদ্ধির জন্য / অন্যান্য------

৭। শিশুকে পানি বা অন্য বাড়তি খাবার দেয়ার সাথে শুধু মাত্র বুকের দুধ খাওয়ানোর তুলনায় রোগের কম-বেশী কোন পার্থক্য লক্ষ্য করেছেন কি? একইরকম / কম / বেশী ।

৮। শিশুকে গত ২৪ ঘন্টায় বুকের দুধ ছাড়া আর কি খাইয়েছেন?

কিছুই না / পানি / কৃত্রিম দুধ / পানিমিস্ত্রিত গরুর দুধ বা ছাগলের দুধ / চিনির পানি বা মিস্ত্রিপানি / সুজি / পারিবারিক খাবার / খিচুড়ি / অন্যান্য------

৯। শিশু জন্মাবার পর থেকে কি ধরনের রোগে ভুগেছে? কোনটাই না / সর্দিকাশি / শ্বাসকষ্ট / খিঁচুনি / জ্বর / ডায়রিয়া / নিউমোনিয়া / অন্যান্য------

১০। শিশুর জন্মের পর আপনার বা শিশুর অসুস্থতার জন্য আপনি কি হাসপাতাল বা ডাক্তারের কাছে গিয়েছেন? হ্যাঁ / না, যদি গিয়ে থাকেন, কেন? (সংক্ষেপে বলুন) ————————————————

প্রশ্নকর্তার নাম: ---------- প্রশ্নকর্তার আইডি নং :----------

সাক্ষাৎকারের তারিখ:---------- অংশগ্রহণকারীর আইডি নং:----------

কমিউনিটি ক্লিনিকের নাম: ----------

সাক্ষাৎকার -৫

৪র্থ ইপিআই ভিজিট-মা ও শিশু (বয়স সাড়ে চার মাস ও ততোর্ধ)

শিশুর তথ্য

১। জন্ম তারিখ :------- দিন ----- মাস ---------সন ২। বর্তমান ওজন ------- কেজি

৩। বর্তমান উচ্চতা:---------- সেমি:

শিশুকে বুকের দুধ খাওয়ানোর তথ্য

৪। আপনি এই শিশুকে কি বুকের দুধ খাওয়াচ্ছেন? হ্যাঁ / না

শিশুকে বাড়তি খাবার (শুধুমাত্র তরল খাবার) খওয়ানোর তথ্য

৫। আপনি কি শিশুকে বুকের দুধ ছাড়াও পানি বা বাড়তি তরল খাবার দেয়া শুরু করেছেন ? হ্যাঁ / না, উত্তর হ্যাঁ হলে জন্মের পর কখন থেকে তরল দেয়া শুরু করেছেন -------- দিন অথবা -------- মাস ।

এবং কি ধরনের তরল দেয়া শুরু করেছেন----

পানি / চিনির পানি বা মিস্রিপানি / কৃত্রিম দুধ / পানিমিস্রিত গরুর দুধ বা ছাগলের দুধ / গুড়া দুধ / অন্যান্য ---------

এবং শিশুকে কেন এই ধরনের খাবার খাওয়ানোর সিদ্ধান্ত নিয়েছেন-

বুকের দুধ যথেষ্ট নয় / ক্ষুধা-তৃষ্ণা নিবাড়নের জন্য /শিশুর কান্না থামানোর জন্য / শিশু বুকের দুধ টানতে পারছিলো না / শিশুর আরও প্রয়োজন / মা অসুস্থ / কর্মজীবি মা / পারিবারিক সিদ্ধান্ত / সংসারে কাজের চাপ / শিশুর ওজন বৃদ্ধির জন্য / অন্যান্য------

শিশুকে বাড়তি খাবার (অর্ধ তরল বা শক্ত খাবার) খওয়ানোর তথ্য

৬। শিশুকে কি বাড়তি খাবার (অর্ধ তরল বা শক্ত খাবার) দেয়া শুরু করেছেন? হ্যাঁ / না, উত্তর হ্যাঁ হলে কবে থেকে শুরু করেছেন? জন্মের ------ দিন-------- মাস থেকে।

-কি ধরনের বাড়তি খাবার (অর্ধ তরল বা শক্ত খাবার) দেয়া শুরু করেছেন?

সুজি / খিচুড়ি / পারিবারিক খাবার / চালের গুড়া, দুধ ও চিনির মিশ্রন / বিস্কুট / কলা বা অন্যান্য ফল / অন্যান্য --------

-শিশুকে কেন এই ধরনের বাড়তি খাবার (অর্ধ তরল বা শক্ত খাবার) দেয়ার সিদ্ধান্ত নিয়েছেন?

পারিবারিক সিদ্ধান্ত /বুকের দুধ যথেষ্ট নয় / শিশুর আরও বেশী প্রয়োজন / মা অসুস্থ / কর্মজীবি মা / সংসারে কাজের চাপ / শিশুর ওজন বৃদ্ধির জন্য / অন্যান্য------

৭। শিশুকে পানি বা অন্য বাড়তি খাবার দেয়ার সাথে শুধু মাত্র বুকের দুধ খাওয়ানোর তুলনায় রোগের কম-বেশী কোন পার্থক্য লক্ষ্য করেছেন কি? একইরকম / কম / বেশী ।

৮। শিশুকে গত ২৪ ঘন্টায় বুকের দুধ ছাড়া আর কি খাইয়েছেন?

কিছুই না / পানি / কৃত্রিম দুধ / পানিমিস্রিত গরুর দুধ বা ছাগলের দুধ / চিনির পানি বা মিস্রিপানি / সুজি / পারিবারিক খাবার / খিচুড়ি / অন্যান্য------

৯। শিশু জন্মাবার পর থেকে কি ধরনের রোগে ভুগেছে? কোনটাই না / সর্দিকাশি / শ্বাসকষ্ট / খিঁচুনি / জ্বর / ডায়রিয়া / নিউমোনিয়া / অন্যান্য------

১০। শিশুর জন্মের পর আপনার বা শিশুর অসুস্থতার জন্য আপনি কি হাসপাতাল বা ডাক্তারের কাছে গিয়েছেন? হ্যাঁ / না, যদি গিয়ে থাকেন, কেন? (সংক্ষেপে বলুন) ----------

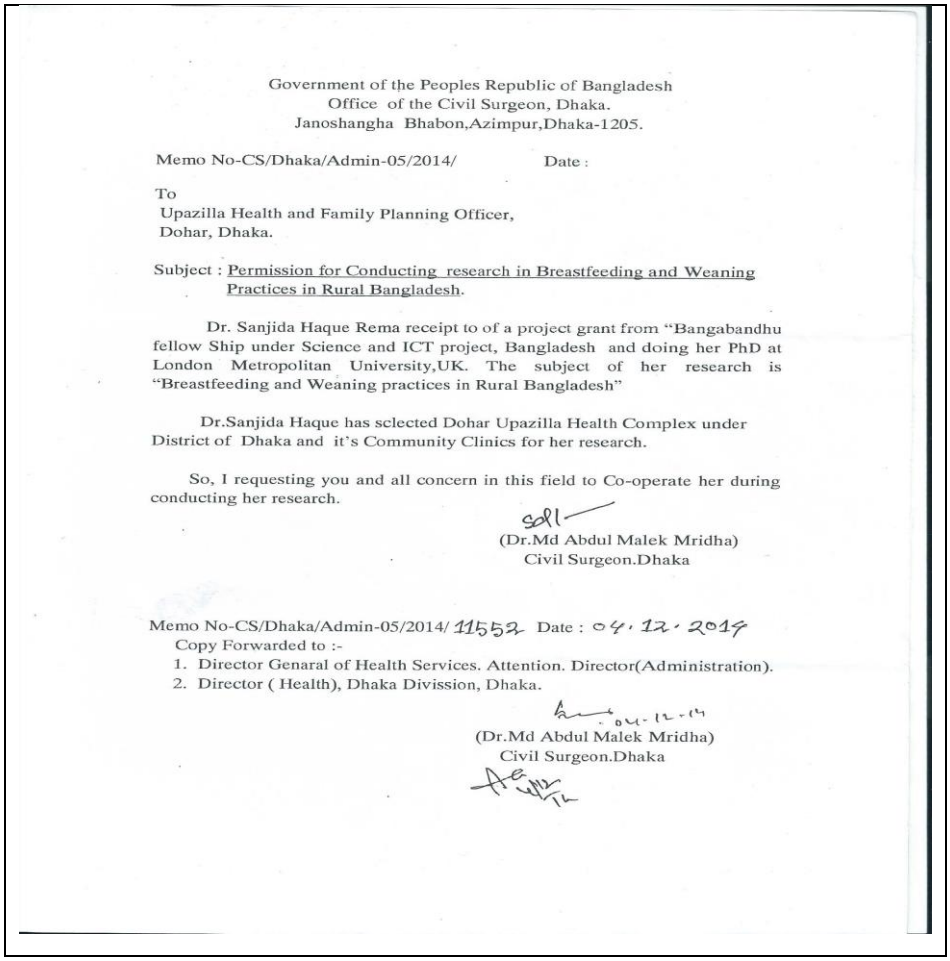
Appendix J:

Door step survey (participant selection)

Interviewer`s Name_____Date____/____/_____ Time _____

No.	House No.	Name	Age (yrs)	EDD	Gestation weeks	Unsuitable Reason	Suitable		Notes	Next Visit
							Willing	Unwilling Reason		

Appendix K: Ethical approval from Civil Surgeon, Dhaka Bangladesh



Government of the Peoples Republic of Bangladesh
Office of the Civil Surgeon, Dhaka.
Janoshangha Bhabon,Azimpur,Dhaka-1205.

Memo No-CS/Dhaka/Admin-05/2014/ Date :

To
Upazilla Health and Family Planning Officer,
Dohar, Dhaka.

Subject : Permission for Conducting research in Breastfeeding and Weaning Practices in Rural Bangladesh.

Dr. Sanjida Haque Rema receipt to of a project grant from "Bangabandhu fellow Ship under Science and ICT project, Bangladesh and doing her PhD at London Metropolitan University,UK. The subject of her research is "Breastfeeding and Weaning practices in Rural Bangladesh"

Dr.Sanjida Haque has sclected Dohar Upazilla Health Complex under District of Dhaka and it's Community Clinics for her research.

So, I requesting you and all concern in this field to Co-operate her during conducting her research.

(Dr.Md Abdul Malek Mridha)
Civil Surgeon.Dhaka

Memo No-CS/Dhaka/Admin-05/2014/ 11552 Date : 04.12.2014
Copy Forwarded to :-
1. Director Genaral of Health Services. Attention. Director(Administration).
2. Director (Health), Dhaka Divission, Dhaka.

(Dr.Md Abdul Malek Mridha)
Civil Surgeon.Dhaka

Appendix L: Ethical approval from London Metropolitan University

LONDON MET RESEARCH ETHICS REVIEW FORM

For Research Students and Staff

Postgraduate research students (MPhil, PhD and Professional Doctorate): This form should be completed by all research students in full consultation with their supervisor. All research students must complete a research ethics review form before commencing the research or collecting any data and no later than six months after enrolment.

Staff: This form should be completed by the member of staff responsible for the research project (i.e. Principal Investigator and/or grant-holder) in full consultation with any co-investigators, research students and research staff before commencing the research or collecting any data.

London Met's *Research Ethics Policy and Procedures* and *Code of Good Research Practice*, along with links to research ethics online courses and guidance materials, can be found on the Research & Postgraduate Office Research Ethics webpage:

http://www.londonmet.ac.uk/research/current-students/research-ethics/

London Met's Research Framework can be found here:

http://www.londonmet.ac.uk/research/current-students/research-framework/

Researcher development sessions can be found here:

http://www.londonmet.ac.uk/research/current-students/researcher-development-programme/

This form requires the completion of the following three sections:

SECTION A: APPLICANT DETAILS
SECTION B: THE PROJECT - ETHICAL ISSUES
SECTION C: THE PROJECT - RISKS AND BENEFITS

SECTION A: APPLICANT DETAILS

A1	**Background information**
	Research project title: A Low Cost, Sustainable, Locally Delivered Intervention To Improve Exclusive Breastfeeding In Rural Bangladeshi Women.
	Date of initial submission for ethics approval: 07/11/2014
	Proposed start date for project: 02/12/2014
	Proposed end date for project: 30/12/2015
	Ethics ID # (to be completed by RERP chair):

A2	**Applicant details, if for a research student project**
	Name: Sanjida Haque Rema
	London Met Email address: shr0502mylondonmet.ac.uk

A3	**Principal Researcher/Lead Supervisor** Member of staff at London Metropolitan University who is responsible for the proposed research project either as Principal Investigator/grant-holder or, in the case of postgraduate research student projects, as Lead Supervisor
	Name: Dr Ruth Ash

	Job title: Course Leader BSc Human Nutrition
	London Met Email address: r.ash@londonmet.ac.uk

SECTION B: THE PROJECT - ETHICAL ISSUES

B1	**The Research Proposal**
	Please attach a brief summary of the research project including: • Background/rationale • Research questions/aims/objectives • Research methodology • Review of key literature in this field & conceptual framework for study • References If you plan to recruit participants, be sure to include information how potential participants in the study will be identified, approached and recruited; how informed consent will be obtained; and what measures will be put in place to ensure confidentiality of personal data.
B2	**Research Ethics**
	Please outline any ethical issues that might arise from this study and how they are to be addressed. ***NB** All research projects have ethical considerations. Please complete this section as fully as possible using the following pointers for guidance. Please include any additional information that you think would be helpful.* • Does the project involve potentially deceiving participants? *No* • Will you be requiring the disclosure of confidential or private information? *No* • Is the project likely to lead to the disclosure of illegal activity or incriminating information about participants? *No* • Does the project require a Criminal Records Bureau check for the researcher? *No* • Is the project likely to expose participants to distress of any nature? *No* • Will participants be rewarded for their involvement? *No* • Are there any potential conflicts of interest in this project? *No* • Are there any other potential concerns? *No* **If you answered yes to any of the points above, please explain.**
B3	Does the proposed research project involve: • The analysis of existing data, artefacts or performances that are not already in the public domain (i.e. that are published, freely available or available by subscription)? *No* • The production and/or analysis of physical data (including computer code, physical entities and/or chemical materials) that might involve potential risks to humans, the researcher(s) or the University? *No* • The direct or indirect collection of new data from humans or animals? *Yes* • Sharing of data with other organisations? *No* • Export of data outside the EU? *No* **If you answered yes to any of the points above, please explain.**
B4	An intervention to promote exclusive breastfeeding in rural Bangladeshi women from their third trimester till baby's aged 6 months. Mothers who are interested to participate will sign the consent form and monitored and advised by health assistants (Govt.

	employee) for a period of 5-6 months. Health assistants will also fill-up the questionnaires based on simple questions on breastfeeding practices. Participants have their right to withdraw from their participation at any time.
B5	
	Will the proposed research be conducted in any country outside the UK? If so, are there independent research ethics regulations and procedures that either: • Do not recognise research ethics review approval from UK-based research ethics services? *No* and/or • Require more detailed applications for research ethics review than would ordinarily be conducted by the University's Research Ethics Review Panels and/or other UK-based research ethics services? *No* **If you answered yes to any of the points above, please explain.**
	Does the proposed research involve: • The collection and/or analysis of body tissues or fluids from humans or animals? *No* • The administration of any drug, food substance, placebo or invasive procedure to humans or animals? *No* • Any participants lacking capacity (as defined by the UK Mental Capacity Act 2005)? *No* • Relationships with any external statutory-, voluntary-, or commercial-sector organisation(s) that require(s) research ethics approval to be obtained from an external research ethics committee or the UK National Research Ethics Service (this includes research involving staff, clients, premises, facilities and data from the UK National Health Service (NHS), Social Care organisations and some other statutory public bodies within the UK)? *No* **If you answered yes to any of the points above, please contact your faculty's RERP chair for further guidance.**

SECTION C: THE PROJECT - RISKS AND BENEFITS

C1	**Risk Assessment**
	Please outline: • the risks posed by this project to both researcher and research participants • the ways in which you intend to mitigate these risks • the benefits of this project to the applicant, participants and any others **Possible advantages and disadvantages of taking part** It is intended as an opportunity for a participant to find out whether her knowledge and practice of breastfeeding baby is appropriate or not. This will also help mothers to understand more about current guidelines on breastfeeding practices. Mothers will also have an opportunity to ask any questions regarding breastfeeding.

	Participation in this study will not involve any discomfort or risk. This research is interview based and baby's weight and height will be measured with trained govt. staff. All the results will be anonymised, so that participant cannot be identified from what she said.

Please ensure that you have completed Sections A, B, and C and attached a Research Proposal before submitting to your Faculty Research Ethics Review Panel (RERP)

Please sign this form and submit it as an email attachment to the Chair of your faculty's Research Ethics Review Panel (RERP) and cc all of the staff and students who will be involved in the proposed research.

http://www.londonmet.ac.uk/research/current-students/research-ethics/

Research ethics approval can be granted for a maximum of 4 years or for the duration of the proposed research, whichever is shorter, on the condition that:

- The researcher must inform their faculty's Research Ethics Review Panel (RERP) of any changes to the proposed research that may alter the answers given to the questions in this form or any related research ethics applications
- The researcher must apply for an extension to their ethics approval if the research project continues beyond 4 years.

Declaration

I confirm that I have read London Met's *Research Ethics Policy and Procedures* and *Code of Good Research Practice* and have consulted relevant guidance on ethics in research.

Researcher signature:...*Sanjida Haque*.....

Date:.....**19/11/14**.....

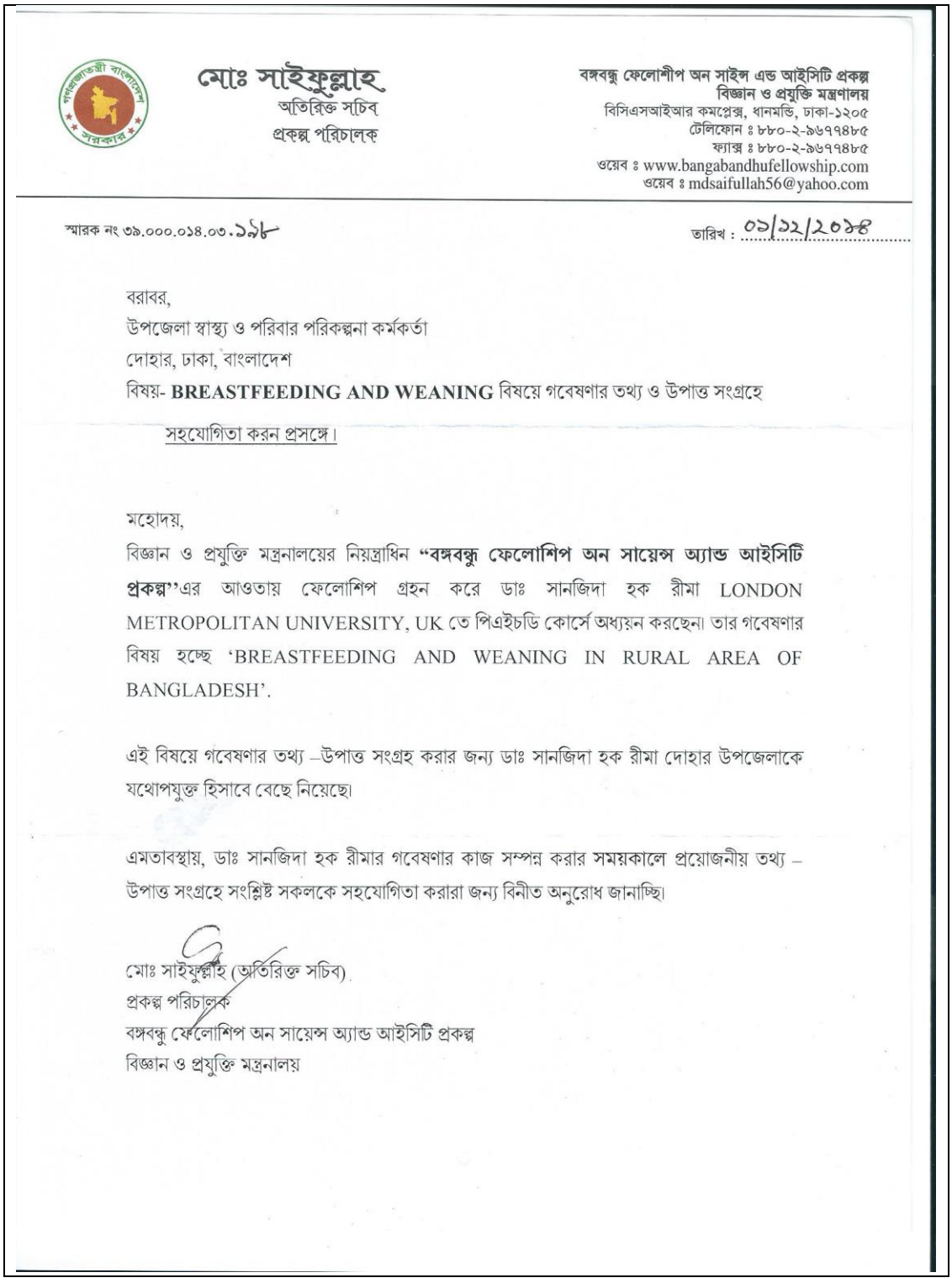
Feedback from Ethics Review Panel

	Approved	*Feedback where further work required*
Section A	Yes	
Section B	Yes	

Section C	Yes	
Date of approval		13.05.15
NB: The Researcher should be notified of decision within two weeks of the submission of the application. A copy should be sent to the Research and Postgraduate Office.		
Signature of RERP chair		

10 October 2014

Appendix M: Letter of permission from the project director



মোঃ সাইফুল্লাহ
অতিরিক্ত সচিব
প্রকল্প পরিচালক

বঙ্গবন্ধু ফেলোশীপ অন সাইন্স এন্ড আইসিটি প্রকল্প
বিজ্ঞান ও প্রযুক্তি মন্ত্রণালয়
বিসিএসআইআর কমপ্লেক্স, ধানমন্ডি, ঢাকা-১২০৫
টেলিফোন ঃ ৮৮০-২-৯৬৭৭৪৮৫
ফ্যাক্স ঃ ৮৮০-২-৯৬৭৭৪৮৫
ওয়েব ঃ www.bangabandhufellowship.com
ওয়েব ঃ mdsaifullah56@yahoo.com

স্মারক নং ৩৯.০০০.০১৪.০৩.১৯৮

তারিখ : ০৯/১২/২০১৪

বরাবর,
উপজেলা স্বাস্থ্য ও পরিবার পরিকল্পনা কর্মকর্তা
দোহার, ঢাকা, বাংলাদেশ
বিষয়- **BREASTFEEDING AND WEANING** বিষয়ে গবেষণার তথ্য ও উপাত্ত সংগ্রহে সহযোগিতা করন প্রসঙ্গে।

মহোদয়,
বিজ্ঞান ও প্রযুক্তি মন্ত্রনালয়ের নিয়ন্ত্রাধিন **"বঙ্গবন্ধু ফেলোশিপ অন সায়েন্স অ্যান্ড আইসিটি প্রকল্প"**এর আওতায় ফেলোশিপ গ্রহন করে ডাঃ সানজিদা হক রীমা LONDON METROPOLITAN UNIVERSITY, UK তে পিএইচডি কোর্সে অধ্যয়ন করছেন। তার গবেষণার বিষয় হচ্ছে 'BREASTFEEDING AND WEANING IN RURAL AREA OF BANGLADESH'.

এই বিষয়ে গবেষণার তথ্য –উপাত্ত সংগ্রহ করার জন্য ডাঃ সানজিদা হক রীমা দোহার উপজেলাকে যথোপযুক্ত হিসাবে বেছে নিয়েছে।

এমতাবস্থায়, ডাঃ সানজিদা হক রীমার গবেষণার কাজ সম্পন্ন করার সময়কালে প্রয়োজনীয় তথ্য – উপাত্ত সংগ্রহে সংশ্লিষ্ট সকলকে সহযোগিতা করারা জন্য বিনীত অনুরোধ জানাচ্ছি।

মোঃ সাইফুল্লাহ (অতিরিক্ত সচিব)
প্রকল্প পরিচালক
বঙ্গবন্ধু ফেলোশিপ অন সায়েন্স অ্যান্ড আইসিটি প্রকল্প
বিজ্ঞান ও প্রযুক্তি মন্ত্রনালয়

Appendix N: Guidelines for TBA's home visits

This guideline is designed to help you (TBAs) when you are meeting with the participants antenatally and postnatally.

During antenatal visit	
Introduction	Introduce yourself Greetings and introduction with mother and her family members The project (give outline of the aims) Explain your position and responsibilities in the project
Ask	Enquire about mother's health and the expecting baby Enquire about mother's delivery plan
Discuss breastfeeding informally Have a brief chat with her and her family members	Try to discuss her feeding plan Ask previous feeding histories if mother was multigravida. How she is influenced in choosing how to feed her baby. Mother-in-law or other older relatives' intention about coming baby's feeding, involve them in discussion, give them importance and get well with them so that they can feel like be a part of the activity and support the mother during breastfeeding. In addition, acceptance from the influential family members will help to get permission for next home visits. Find out mother's and her family member's plan for her infant's feeding and their idea about exclusive breastfeeding.
Length	Of each meeting will vary Some will be interested and ask more questions, others may not be interested or may be short of time. You should decide how much time you feel it is appropriate to spend.
During every postnatal visit	
Check	Health of: Mother and baby How she is doing with breastfeeding Encourage her to be hydrated and advise her to drink plenty.

	Enquire if she encounters any difficulties while breastfeeding: Check nipples- if any sore Breast- any pain, engorgement Check sucking pattern Have a chat with husband and family members: Encourage them to support her and help her to spend more time with the baby.

Appendix O: Details of the TBAs, HAs and CHCPs

Details of the TBAs, HAs and CHCPs who volunteered		
Name of TBA	**Age (years)**	**Husband's name**
Sahera Khatun	61	Ayeub Ali
Chadraban	50	Baseer Sheikh
Rezia Begum	64	Reju Matbor
Sayeda Begum	50	Lutfur Rahman
Morjina	64	Anees Matbor
Begum	59	Ab. Malek Molla
Abidon	52	Oased Bepari
Ambia Khatun	64	Nurul islam Sareng
Amena Khatun	64	Late Romjan Molla
Fatima	64	Baser shekh
Name of the HAs and CHCPs		**Education**
Nazin Akhter HA (Modhur Chor CC)	44	Grade 10
Shahida Parveen CHCP (Mdhur Chor CC)	32	Graduation
Dipu Akhter HA (West Moura CC)	26	H.S.C
Sultana Razia CHCP (West Moura)	31	H.S.C

Appendix P: Baby weighing scale

Appendix Q: Sample size calculation

According to MOHFW Health Bulletin, 2014, the number of registered pregnant women (RPW) between January 2013 to December 2013 were 14,165 and numbers of Gov. health centres were 11 (1 Upazila Health Complex and 10 Community Clinics).

This data indicates that each CC had around 1288 pregnant women visited in 12 months period and in a month the number was 107.

Calculation is described below:

In 12 months RPW visited a CC were 1288

So, in a month RPW visited were 107

These 107 pregnant women were in 1st, 2nd and 3rd trimester

Data will be collected from the women who are in 3rd trimester and expected number is 107/3= 35.

Data collection will continue for 8 months period in two community clinics.

280 pregnant women are expected to be in 3rd trimester in each CC during the 8 months period and number will be 560 in two CC. It is expected that around 500 pregnant women will be included in the project with 250 in each group.

Appendix R: Messsage and materials developed and used for the breastfeeding education during home visits


নবজাতককে সঠিক নিয়মে মায়ের দুধ খাওয়ানো
নবজাতকের একমাত্র খাবার মায়ের দুধ
মায়ের বুকে নবজাতকের সঠিক অবস্থান
দুধ
মধু
কোনোটাই না


১টি নবজাতক শিশুর পাকস্থলীর পরিমাণ
প্রথম দিন
১টি আমলকির আকারের সমান
৫ থেকে ৭ মি. লি.
১ থেকে ১.৪ চা চামচ
তৃতীয় দিন
১টি জলপাইয়ের আকারের সমান
২২ থেকে ২৭ মি. লি.
০.৭৫ থেকে ১ আউন্স
সপ্তম দিন
১টি পাতি লেবুর আকারের সমান
৪৫ থেকে ৬০ মি. লি.
১.৫ থেকে ২ আউন্স
১ মাস
১টি বড় ডিমের সমান
৮০ থেকে ১৫০ মি. লি.
২.৫ থেকে ৫ আউন্স