

博士論文

Factors influencing exclusive breastfeeding in early infancy: a  
prospective study in North Central Nigeria

(早期乳児の完全母乳保育に影響を及ぼす要因：ナイジェリア中  
北部における前向き研究)

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AIC	Akaike Information Criterion
BAC	Bwari Area Council
BFHI	Baby Friendly Hospital Initiative
CI	Confidence interval
CS	Caesarean section
DALYs	Disability Adjusted Life Years
EBF	Exclusive breastfeeding
EPDS	Edinburgh Postnatal Depression Scale
FCT	Federal Capital Territory
FCTA	Federal Capital Territory Administration
HIV	Human Immunodeficiency Virus
HR	Hazards ratio
IFI	Infant feeding intention
KAC	Kuje Area Council
KM	Kaplan-Meier
LGA	Local Government Area

NDHS	Nigeria Demographic and Health Survey
OR	Odds ratio
RCT	Randomised Controlled Trial
SBA	Skilled Birth Attendants
SD	Standard deviations
SE	Standard error
STI	Sexually Transmitted Infections
TBA	Traditional Birth Attendants
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action
UK	United Kingdom
UNFPA	United Nations Population Fund
US	United States
WHO	World Health Organization

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## ABSTRACT

**Objective:** To determine the impact of prenatal breastfeeding intentions on exclusive breastfeeding (EBF) and explore other factors associated with EBF until three months postpartum in a sample of culturally diverse mothers residing in suburban parts of the Federal Capital Territory, Abuja Nigeria.

**Methods:** This longitudinal observational study involved the recruitment of 210 pregnant women who were prospectively followed until 3 months postpartum. Participants were recruited from antenatal clinics attached to four separate public secondary health facilities located in the suburban parts of Abuja. Cox regression hazards model was used to determine the risk of EBF cessation at 3 months postpartum.

**Results:** Over 70.0% of women had strong breastfeeding intention. The risk of exclusive breastfeeding cessation was significantly lower in women with strong breastfeeding intentions (HR=0.87, 95% CI 0.8-0.95). Other risk factors for cessation of exclusive breastfeeding were pre-lacteal feed administration (HR 2.93 95% CI 1.49-5.77) and mode of delivery (HR 0.17 95% CI 0.04 - 0.67). Higher maternal age ( $\geq 35$  years), religion (Muslim) and having an unplanned pregnancy lowered the likelihood of having a strong intention to exclusively breastfeed an infant.

**Conclusion:** Prenatal breastfeeding intention was a strong predictor of exclusive breastfeeding. Breastfeeding intentions were further explained by maternal characteristics. Therefore, effective promotion of exclusive breastfeeding during prenatal period must target correlates of feeding intention. Additional research is warranted into the influence of maternal attitudes and self-efficacy about breastfeeding on breastfeeding intentions and practice.

**Keywords:** Exclusive breastfeeding, breastfeeding intention, longitudinal study, Nigeria.

## **INTRODUCTION**

### **1.1. Background**

Breastfeeding is an important public health practice that provides health benefits for both mother and the breastfed infant. Accordingly, infant feeding patterns have both short (1, 2) and long-term (3) implications for infant and maternal health (4). Suboptimal breastfeeding, especially non-exclusive breastfeeding of infants less than 6 months old has been linked with infant mortality and morbidity (1, 5). Conversely, breastfeeding, besides being a source of adequate nutrition for the breastfed infant, provides clear short term benefits by reducing mortality and morbidity from infectious and allergic disorders (6-8), while reducing maternal risk of type 2 diabetes, breast, and ovarian cancers (4). Despite the clear advantages of breastfeeding for maternal, infant and population-level health, exclusive breastfeeding rates remain low, especially in developing countries where the burden associated with sub-optimal breastfeeding practices is greatest (9, 10). Hence, over the past two decades, public health policies have aimed to increase breastfeeding rates and promote optimal breastfeeding practices globally (11-14).

### **1.2. Current breastfeeding rates and trends**

Although breastfeeding in any form is widely practiced around the world, exclusive breastfeeding remains uncommon in most countries (9). Current global estimates show that only 38% of infants aged between 0-6 months were exclusively breastfed during 2008 – 2012 (10) with considerable variation observable between and within countries (9). For example, estimates of exclusive breastfeeding rates in infants aged less than six months old ranged from a low of 1% in Djibouti to 85% in Rwanda in 2012 (10). Regional variations also exist, showing that Eastern and Southern Africa (52%) and South Asia (47%) have the highest

exclusive breastfeeding rates of infants under 6 months old. Conversely, the rate is lowest in West and Central Africa at 25%, contributing to the low coverage in sub-Saharan Africa where 36% of infants less than 6 months of age were exclusively breastfed in 2011 (10). Nigeria has one of the lowest rates of exclusive breastfeeding among infants aged less than six months old in sub-Saharan Africa. In 2011, merely 15% of infants aged less than 6 months were exclusively breastfed in 2011, and a wide variation was also observable across the geopolitical zones (6% in the North West to 27% in the South West) (15).

### **1.3. Determinants of breastfeeding practice**

Previous studies have shown that breastfeeding practice is influenced by multiple factors related to the mother, infant and the supportive environment. Maternal demographic characteristics such as age, educational level (16) parity (17, 18), religion (19, 20) and employment status (20, 21) are all determinants of breastfeeding success. Further, lack of social support (21, 22), and many cultural influences and beliefs about infant nutrition (23), are known barriers of exclusive breastfeeding. On the other hand, early infant-to-breast contact (17, 24), social support (formal and/or informal) (21) and positive maternal psychosocial affects, such as breastfeeding self-efficacy, and breastfeeding intentions have been shown to positively influence exclusive breastfeeding (21, 24, 25) and breastfeeding duration (26-28) among mothers.

Although many of the demographic characteristics of women are not easily influenced by interventions, it may be possible to intervene in order to influence maternal psychosocial constructs favourably towards exclusive breastfeeding (28-30); either pre-pregnancy or during the pregnancy, using culturally sensitive breastfeeding messages. Importantly, of the modifiable factors that influence a woman's infant feeding behaviour, prenatal breastfeeding

intention has been described as one of the strongest factors associated with compliance with breastfeeding recommendations (21, 24, 26-29, 31, 32). Studies have also shown breastfeeding exclusivity and duration to be closely associated with the strength of the intention (27, 31) and the timing of the decision (26, 32). Hence, the earlier the decision is made to breastfeed, the greater the likelihood of initiation, exclusivity and longer duration of breastfeeding. Among studies describing maternal breastfeeding intentions and how it relates with breastfeeding outcomes, sample populations of women have been diverse (29, 33), yet there is a dearth of studies among women in developing countries such as Nigeria. Also, most of such studies have focused on breastfeeding initiation and duration rather than entirely on exclusive breastfeeding.

#### **1.4. Overview of basic health indicators in Nigeria**

Nigeria, located in West Africa is the most populous African nation. Nigeria composes of more than 250 ethnic groups (34), with varying languages and a diverse range of cultural and religious beliefs and practices. Nigeria is presently made up of 36 states and a Federal Capital Territory (FCT), grouped into six geopolitical zones: North Central, North East, North West, South East, South South, and South West. There are 774 constitutionally recognised Local Government Areas (LGAs) in the country (34).

Nigeria has some of the poorest health indicators in the world (35), and inequalities in health outcomes exist between rural and urban areas; geopolitical zones and states; and across income groups. Nationally, maternal mortality ratio was 576 per 100,000 births for the seven years preceding the 2013 NDHS while the unmet need for family planning is 16%. Approximately 37% of children are stunted and over 29% are underweight. Under-five mortality rates vary from 90/1000 live births in the South West to 185/1000 live

births in the North West. Female literacy rate is 53% and total fertility rate is 5.5 births per woman. The median age at first birth is 20.2 years. Employment among women is high in Nigeria, increasing from 59% in 2008 to 62% in 2013. Most women who work outside the home are engaged in trading or service provision (34).

### **1.5. Healthcare system and maternal and child health services in Nigeria**

The health service system in Nigeria is organised into three tiers of healthcare; primary, secondary and tertiary. Both the private and public sectors provide healthcare services at all levels in the country. Of the estimated 23,640 health facilities available in Nigeria as at 2005, 85.8% were primary healthcare facilities, 14% secondary and 0.2% tertiary (36). While the Federal Government funds public tertiary health institutions, the States and Area Councils fund the public secondary facilities and the primary health care centres, respectively. The national health policy identifies the primary health care centres as the basis to achieve improved population health. Comprehensive healthcare delivered through primary healthcare centres are expected to include health education, disease control, provision of essential drugs, maternal and child health care, including family planning services (34). Unfortunately, the public and private primary health care facilities are the weakest and least functional system across the country, putting the pressure of patronage on the higher levels (36). In the absence of a functional health insurance system, private out of pocket spending accounts for over 70% of expenditure on health in Nigeria further limiting access to quality health care (36).

Maternal and child health is one of the primary focuses of public facilities in Nigeria. A national survey of health facilities in UNFPA assisted states showed that all the facilities offered services including antenatal care, deliveries, postnatal care, child welfare services, immunization, HIV counselling and testing, syndromic management of sexually transmitted

infections (STIs) and other gynaecological conditions to varying degrees (37). In order to promote service utilization and improve maternal and child health outcomes, many states, including the FCT, currently operate a policy of free maternal and child health service targeted at protecting vulnerable groups (36).

## **1.6. Childbirth and breastfeeding practices in Nigeria**

Despite the availability of modern health care facilities, the utilisation of skilled healthcare services during pregnancy and childbirth in Nigeria is still low(34, 38). According to the 2013 NDHS, an estimated 62% of births occurred using unskilled care including traditional birth attendants (TBAs) and other unskilled persons, mostly in rural areas. This national average disguises the inherent regional disparities. For example, while only one in five births were attended by unskilled persons in the South West and South East states, 85% of births in the North Eastern Sokoto state were assisted by TBAs (34). Another study by Babalola and Fatusi (38) also highlighted the regional differences in maternity service utilization showing that women of Hausa decent are less likely than other ethnic groups to report the use of skilled birth attendants (SBA) at delivery (38).

Cultural, economic and social factors have sustained the relevance of unskilled maternity service providers in many Nigerian communities (38, 39). An analysis of the social context of childbirth among the Hausas of Northern Nigeria highlighted the strong influence of cultural beliefs and practices on childbirth and fertility related behaviours (40). Similarly, Yoruba women in South Western Nigeria patronise TBAs for local herbs and concoctions believed to prevent development of labour complications(39). In addition, the services of TBAs are often perceived as being of higher quality than facility based care with regards to interpersonal communications and relationships (38, 39). Access to health facility, cost of delivery and level

of maternal education are other factors known to influence childbirth practices especially among women residing in rural areas in Nigeria(34, 39). The low rate of facility based delivery notwithstanding, majority of Nigerian women seek antenatal care in health facilities. Prior studies assessing healthcare seeking behaviour of rural women during pregnancy and childbirth revealed that most women concurrently access facility based care in addition to unorthodox services (39).

Following childbirth, majority of women in Nigeria breastfeed their infants and breastfeeding culture is well integrated in the various ethnic groups in Nigeria. Notwithstanding, infant feeding practices are poor (34). Pre-lacteal feeding and the early introduction of complementary foods often based on erroneous assumptions, affect breastfeeding initiation and sustainability. For example, while among the Yoruba people, breast milk is generally accepted as the best food for infants, exclusive breastfeeding is considered dangerous (23). Infants are believed to have an obligatory requirement for supplementary water to quench its thirst, and promote normal development, and for herbal teas which serve as food and medicine(23, 41). Complementary foods are also often introduced too early in a bid to adapt babies to other meals with ease (41, 42).

Several healthcare related factors are known to be responsible for the sub-optimal infant feeding practices prevalent in Nigeria, including lack of formal antenatal care and non-institutionalised deliveries (42, 43). A survey of mothers in a semi-urban setting in South West Nigeria showed that delivery outside health facilities strongly contributed to delayed initiation of breastfeeding, pre-lacteal feeding and failure to breastfeed exclusively (42). At the same time, the poor utilization of postnatal services and the absence of home-based new-born care have further makes breastfeeding practices poor in Nigeria. Recent estimates

from the NDHS, 2013 report indicate that early initiation of breastfeeding was practiced by 33% of mothers with women and only 17% of infants aged less than 6 month are exclusively breastfed. The median duration of exclusive breastfeeding was 0.5 months while the corresponding figure for predominant breastfeeding was 4.4 months in 2013 (34). This figure is far below the 50% global nutrition target for exclusive breastfeeding recommended by the World Health Organization (WHO).

### **1.7. Breastfeeding policy and promotion in Nigeria**

Malnutrition along with related infant and child morbidity and mortality are important public health concerns in Nigeria. In recognition of the immediate causes and consequences of malnutrition in first two years of life and beyond, the government of Nigeria in 1992 launched the Baby Friendly Hospital Initiative (BFHI). Of the 2164 ever designated baby friendly facilities in West and Central Africa as at 2010, 1660 were in Nigeria (44). Following the introduction of the BFHI, a National Policy on Infant and Young Child Feeding in Nigeria was adopted in 2005 (12). An important goal of the policy is the protection, promotion and support for breastfeeding. Additionally, the government introduced Maternal New-born Child Health Week to encourage early initiation of breastfeeding with colostrum, exclusive breastfeeding for the first six months of life and appropriate complementary feeding practices, along with other interventions designed enhance child survival.

Regardless of these efforts, progress has been slow at improving exclusive breastfeeding rates over the past decade, despite nearly universal breastfeeding initiation rates (15, 34). In view of this, it is important to identify and examine the factors that may influence a mother's perceived abilities and decisions about breastfeeding. This is particularly significant for Nigerian women given the prevailing socio-cultural influences on infant feeding (23). Also,

the need for continued surveillance of breastfeeding practices at national and regional levels cannot be overestimated. This would help identify high risk groups which could be the target of counselling and breastfeeding promotion efforts.

### **1.8. The present study: Theoretical framework and research objectives**

Behavioural theories that have been employed for investigations of maternal breastfeeding behaviour include the Theory of Reasoned Action (TRA) (45) and its elaboration in the Theory of Planned Behaviour (TPB) (46). Central to both theories is the need to quantify an individual's intention to perform the behaviour of interest. According to the TPB, three types of beliefs guide human action: (a) the outcomes of performing the behaviour (behavioural beliefs), (b) the expectations of significant others and the motivation to comply with these motivations (normative beliefs or perceived behavioural expectations), and (c) the presence of factors that would facilitate or hinder implementing of the behaviour (control beliefs) (46). According to Ajzen (46), the theory states that while intention is considered the proximal determinant of behaviour, the strength of the relationship is affected by how much control a person has over the behaviour. Therefore, it is useful to consider perceived behavioural control in addition to intention. Significant associations between TPB predictor variables and breastfeeding intention and duration have been reported (27, 47). In these studies, intention has consistently been related to breastfeeding initiation or duration; that is, women tend to breastfeed in accordance with their prenatal plans.

Using an expanded TPB -based conceptual framework, Avery, et al. (48) examined predictor variables that differentiated primiparous breastfeeding women in the United States according to the timing of weaning. In addition to TPB variables, the study included demographic variables, and variables relating to breastfeeding knowledge and difficulties

experienced during the first month. Similar to other studies, the study showed that TPB variables were direct predictors of intention explaining 36% of the variance in intended breastfeeding duration. Socio-demographic variables such as maternal age, education and marital status also influenced beliefs and attitudes about infant feeding, which in turn predicted breastfeeding intention and breastfeeding behaviour (48). Based on this expanded model, Dodgson, et al. (49) also showed that perceived control variables exerted a direct effect on breastfeeding duration and an indirect effect through intended duration of breastfeeding among primiparous Hong Kong mothers (49).

The observations from these studies inspired the analyses in the current research. Furthermore, by using this expanded theoretical perspective to guide research about the formation of breastfeeding intentions, health care professionals working in Nigeria can gain insight about potential efficacious interventions for breastfeeding women.

#### *1.8.1. Research objectives and structure of the thesis*

The aim of this study was to determine previously unexplored factors that might influence breastfeeding practice in a culturally diverse group of women.

Specific objectives of this study were to:

1. To assess breastfeeding intentions prenatally among pregnant women and determine its association with exclusive breastfeeding.
2. To identify factors related to sub-optimal breastfeeding practices during early infancy among breastfeeding mothers in suburban places of residence and
3. To determine maternal characteristics influencing breastfeeding intentions.

General overview of this thesis

Chapter 1 provides a general introduction to the research and defines the study objectives.

Chapter 2 provides a general overview of the barriers and facilitators of exclusive breastfeeding of infants aged 0-6 months old by mothers in developing countries; and highlights gaps for breastfeeding research in developing countries.

Chapter 3 gives a detailed description of the measurement of breastfeeding intention and other socio-demographic variables among pregnant women; reports on the attributes and background characteristics of study participants and observed breastfeeding rates as well as the predictors of breastfeeding cessation.

In Chapter 4, analysis is provided on the factors influencing prenatal breastfeeding intentions.

**2. CHAPTER 2: Factors influencing breastfeeding exclusivity during the first 6 months of life in developing countries – A quantitative and qualitative review**

## 2.1. Introduction

Breast milk is recognised to be the most advantageous feeding option for infants (50, 51) and epidemiological studies provide evidence for its promotion, protection and support, especially as it relates to timely initiation and exclusivity (2, 52). Besides being a source of adequate nutrition for the breastfed infant, it provides clear short term benefits by reducing mortality and morbidity from infectious diseases (7, 8). The risks associated with suboptimal breastfeeding practices are well documented. A WHO study on the effect of breastfeeding on infant and child mortality, found that non-breastfed infants had a significantly higher risk of mortality compared with breastfed infants in middle-and low-income countries (1). Furthermore, infectious diseases are a major contributor to child mortality (53, 54) and breastfeeding is known to protect against a wide range of infectious diseases (2, 8, 55-57). Breastfed infants are also reported to present lower morbidity from allergic (6) and atopic diseases (2), as well as reduced risk of sudden infant death syndrome (58).

The long term protective effects of breastfeeding against non-communicable diseases (3, 4, 59, 60) have also been reported. Collective evidence from longitudinal studies (61, 62), randomised controlled trial (52), clinical trials (63, 64) and neuro-developmental research (65, 66) all demonstrate the long-term effect of breastfeeding on improvement of individual cognitive ability and educational achievement, with greater effects often seen with exclusivity and increased duration (52).

As elucidated in the Lancet's Maternal and Child Nutrition series, suboptimal breastfeeding is responsible for over 800,000 deaths in children under five in the developing regions of the world (53). Similarly, a recent Global Burden of disease study by Lim and colleagues (67), ranked suboptimal breastfeeding as the second largest risk factor for children less than five

years of age accounting for 47.5 million Disability Adjusted Life Years (DALYs) lost in 2010. On the other hand, interventions to promote exclusive breastfeeding are estimated to have the potential to prevent up to 13% of all child deaths in developing countries (68), and reduce inequality in child health (9). However, for breastfeeding promotion interventions to be effective, and for the gains of breastfeeding to be maximised, mothers especially in developing countries need to breastfeed optimally and rates need to be high.

Therefore, based on evidence for improved maternal, child and population-level health outcomes, current international opinion recommends that infants be exclusively breastfed for the first six months of life followed by the introduction of age appropriate nutritionally adequate and safe complementary foods with continued breastfeeding until 2 years of age or beyond (69, 70). The potential impact of optimal breastfeeding practices is especially important in developing countries where disease burden associated with suboptimal breastfeeding is high and complicated by poor access to clean water and sanitation. Nevertheless, the gap between breastfeeding practice and recommendations in many developing countries is striking (9).

At the level of the individual, a mother's decision on breastfeeding is influenced by a complex combination of traits and behaviours in different contexts (56-58). This has been further recognised in a recent report examining the breastfeeding patterns across developing countries in relation to child health equity which highlighted the need to understand cultural and contextual factors influencing breastfeeding behaviours in certain regions (9). An understanding of these factors is considered important in providing support to mothers and has been reviewed by several authors (71-75). There is also a substantial amount of literature describing the predictors of exclusive breastfeeding in many developing countries. However,

a systematic review of these studies could not be identified. This might be due to the high variability in the methods employed in this research. In the following sections, a review of literature is provided which aimed to comprehensively delineate factors that facilitate or act as barriers to exclusive breastfeeding of infants aged 0 – 6 months old among mothers in developing countries and identify unexplored factors that might impact breastfeeding success among women in these settings.

## **2.2. Methods**

This review included any relevant studies published between January 2001, when the global breastfeeding recommendations were last revised, and January 2014. Quantitative and qualitative primary studies that focused on factors influencing exclusive breastfeeding during the first six months of life were included. Studies were excluded if they were based entirely on secondary data or examined breastfeeding determinants too broadly covering age range from 6 – 24 months. Participants included pregnant women and mothers of infants aged between 0 – 6 months.

### *2.2.1. Search strategy*

A search strategy was developed to identify studies relevant to the review objective using the following key-words: ‘breastfeeding’, ‘exclusive breastfeeding’, ‘factor(s)’, ‘determinant(s)’, ‘constraint(s)’, ‘facilitator(s)’, ‘practice’. The electronic search terms were used one by one and in combination; were repeatedly refined in response to the emerging data, and modified as appropriate for different databases while maintaining the terms central to the search. Using the optimised search terms, the following databases were searched: CINAHL, MEDLINE, and PsycINFO retrieving 1,302 articles. Following removal of duplicates and title screening based on inclusion criteria, 272 potentially relevant titles were retrieved.

Fifty-seven of these were selected for full-text screening. An additional 19 references were identified from the reference list of these 57 articles and reports for full-text screening.

Twenty-five articles met the final criteria for inclusion (see **Figure 2.1**).

### *2.2.2. Study selection and eligibility criteria*

Studies included in this review were restricted to: 1) Original research articles with primary data considering early infancy (0 – 6 months); and 2) Studies conducted in developing countries. Studies carried out primarily among HIV populations were excluded. Also, unpublished doctoral dissertations, reports and other reviews were not included. The World Bank list of economies (2014) was used to classify developing countries (76). Breastfeeding practices considered were exclusive breastfeeding whereby the infant receives only breast milk allowing no other liquids or solids and full breastfeeding whereby the infant receives only breast milk without supplementation with non-human milk (77) .

### *2.2.3. Data extraction and quality appraisal*

All identified studies were independently assessed by two authors for relevance based on the objective of the review. This process was carried out using the study titles and abstracts (full text for those without an abstract). Discrepancies were resolved through discussion and consensus. Studies that failed to meet the inclusion criteria were excluded. Data extraction from the final sample of articles was then conducted using a pre-established data extraction form. For each study, the data extraction process identified the study design, geographic location, participants breastfeeding practice measured, facilitators and barriers to full or exclusive breastfeeding. Enabling factors and barriers were then grouped into thematic categories and presented as a narrative summary. The Critical Appraisal Skills Programme (CASP) system of appraisal was adopted to appraise the methods, credibility and relevance of

the diverse literature being considered for inclusion (78).

#### 2.2.4. *Data synthesis*

Since the identified studies used different approaches in quantitative and qualitative research and methods, both textual narrative and thematic analyses were performed. For the quantitative studies, study characteristics, key findings and conclusions of individual studies were summarised (see **Table 2-1**). Thematic synthesis of data was performed for the qualitative studies as described by Thomas and Harden (79). Data from qualitative studies were presented under identified themes (see **Table 2-2**).

### 2.3. **Results**

A total of 1,302 references were screened, 272 potentially relevant titles were retrieved and 25 studies involving 11,025 participants were selected for inclusion in the review (see **Figure 2-1**). The studies represented a wide variety of countries and designs. Nineteen countries were represented with the majority located in Africa (10 countries) followed by the Middle East (five countries), South/South East Asia (seven countries) and the Latin Americas (three countries). Almost all studies were observational, employing diverse methodologies. Fourteen studies were cross sectional (41, 43, 80-91) and seven were prospective cohort studies (20, 92-97). Three qualitative studies used in-depth interviews and focus group discussions (98-100) while another four used mixed qualitative and quantitative designs (41, 81, 84, 89). One randomised controlled trial (RCT) was included (101).

The data extraction process identified 17 facilitators of exclusive breastfeeding from 14 studies categorised into three domains; and 22 barriers for optimal breastfeeding from 25 studies grouped into four broad domains (see **Table1-3**).

### *2.3.1. Predictors of exclusive breastfeeding*

#### 1) Socio-demographic factors

Evidence from both qualitative and quantitative studies revealed that maternal characteristics such as employment (20, 41, 80, 82, 84-90, 93, 95, 98-100), age (20, 43, 95, 96), educational level (43, 82, 91, 97), parity (20, 43, 97), family type, religion (20), place of residence and living standard (82, 97), all acted to influence a mother's infant feeding practice. Sixteen of the 25 studies found that being in formal employment or being engaged in work outside the home (20, 41, 80, 82, 84-86, 88-90, 93, 95, 98-100) was strongly associated with exclusive breastfeeding.

A cross-sectional survey to determine actual exclusive breastfeeding rates in a cohort of Sri Lankan infants aged less than six months old showed that mother starting work was a reason to stop exclusive breastfeeding as early as two months infant age (95). Similarly, women in rural Vietnam who had returned to work postpartum were found to be more likely than those who had not, to fail to exclusively breastfeed (84). In-depth interviews with mothers in Ghana (99) and Tanzania (100) also identified maternal employment as an important barrier to exclusive breastfeeding, resulting either from short maternity leaves or lack of on-site feeding locations. In contrast, one study conducted among Turkish women found maternal employment to be positively associated with EBF (86).

Four studies conducted in Brazil (96), Lebanon (20), Nigeria (43) and Sri-Lanka (95) showed that adolescent mothers aged <20 years old (96) or mothers who are  $\geq 35$  years old (20, 43, 95) are less likely to breastfeed their babies exclusively compared with other mothers. While more studies found that lower maternal education was a risk factor for non-exclusive

breastfeeding (43, 91, 97), better educated mothers with high socio-economic status in Laos showed a higher tendency to give up breastfeeding sooner (82). Reports on associations between parity and EBF were inconsistent.

Other factors found to be associated with EBF practice include family type (90), religion (20), place of residence and living standard (82, 97). One study conducted in Nepal reported that living in joint families was negatively associated with exclusive or predominant breastfeeding for up to four months (90). Regarding standard of living of mothers, Barennes, et al. (82) found that living in urban areas, with good sanitary conditions increased the risk of using breast milk substitutes prior to six months among mothers in Laos, while a separate study in Malawi found better adherence to infant feeding recommendations among mothers with higher living standards (97).

## 2) Medical and healthcare related factors

Almost all the included studies reported on medical and healthcare related determinants of exclusive breastfeeding. In eleven studies, mothers stopped exclusive breastfeeding due to perceptions of insufficient breast milk (80, 81, 85, 87, 90, 92, 93, 95, 98, 99), lactational problems (41) or excessive crying of the infant (81). One study also found a significant association between frequent infant crying and increased use of complementary foods (86). In contrast, Dearden, et al. (84) reported that women who felt that they had sufficient milk for their infants were significantly more likely to exclusively breastfeed their infants.

Maternal morbidities found to act as barriers to exclusive breastfeeding included mode of delivery being caesarean section (83), maternal sickness (41, 81, 85, 87, 92), subsequent pregnancies (92), breast problems such as breast/nipple infections (85) and breast abscesses

(41, 99); while in two separate studies, mothers whose infants had colic (93) and those who perceived their babies as not gaining sufficient weight (95) were less likely to exclusively breastfeed. Regarding timing of initiation of breastfeeding, delayed initiation of breastfeeding was associated with greater risk of EBF cessation (94) in one study, while two other studies showed that mothers who initiated breastfeeding within the first hour of delivery were significantly less likely to introduce complementary foods prior to six months (89, 93). Similarly, mothers in Nepal (83) and Laos (82) who fed colostrum to their infants as the first meal were more likely than others to practice EBF.

Early cessation of exclusive breastfeeding was found to be significantly associated with fewer maternal (96) or no paternal (88) antenatal visits and non-attendance of formal antenatal clinics at a health facility (43). However, maternal knowledge of WHO recommendations on early infant feeding was significantly associated with higher likelihood of exclusive breastfeeding among mothers in three studies (89, 90, 93). Other healthcare-related predictors of exclusive breastfeeding included institutional delivery (43), presence of a SBA at delivery (84), early discharge from hospital after childbirth, paediatrician being female (20) and presence of community health workers who encouraged mothers to exclusively breastfeed (84, 101).

### 3) Sociocultural and other maternal related factors

Several studies reported on sociocultural factors influencing exclusive breastfeeding. Major determinants included availability of support (41, 80, 85, 99, 100), cultural influences and beliefs about breastfeeding and infant nutrition (41, 85, 89, 93, 99), concerns about body image (41, 89, 98, 99) and influence from family and/or friends (41, 83, 85, 99). In three studies employing qualitative methods to explore facilitators and barriers to exclusive

breastfeeding, lack of support from significant family members (41, 99) and the lack of social support (100) was a commonly recurring theme associated with EBF cessation. Conversely, mothers who experienced family support also reported that it served as an important facilitator of exclusive breastfeeding (98).

Four studies described the role of maternal beliefs about infant nutrition on exclusive breastfeeding (41, 85, 89, 99). Some mothers were found to discontinue (or not practice) EBF due to cultural beliefs or family traditions (89, 99). In other studies, mothers reported offering foods other than breast milk to their infants because they believed water-based drinks aided digestion (93) and to acclimate the infant to other foods (41, 99). Kakute, et al. (85), Otoo, et al. (99) and Agunbiade and Ogunleye (41) all reported family and community pressure as a major reason for discontinuing EBF in different African communities. On the other hand, a study carried out in Nepal showed that feeding practices of friends influenced the mothers decision to breastfeed exclusively whereby mothers whose friends practiced EBF were more likely to breastfeed their baby exclusively (83).

Psychosocial determinants of exclusive breastfeeding reported in two studies using qualitative methods include maternal determination and resilience that came from knowledge of the benefits of breastfeeding (98, 100), and mothers' perception of breastfeeding as a natural, joyful and connecting experience for both mother and child (98). In three studies from Ghana (99), Nigeria (41) and Lebanon (98), women cited unwanted body changes as an important reason for early cessation of EBF or non-breastfeeding at all. Negative effects of breastfeeding on body image described in these studies include changes in breast shape and breasts sagging (41, 98, 99) as well as weight gain (98). On the other hand, Tamiru, et al. (89) reported that some mothers failed to breastfeed due to concerns that their breasts were too

small.

#### 4) Environmental factors

Other factors identified by several studies to serve as barriers to exclusive breastfeeding include fear of contamination if breast milk was expressed due to non-availability of steady supply of electricity to refrigerate breast milk if expressed (80, 84) and unavailability of hygienic and convenient infant feeding locations (99, 100). Findings from two studies conducted in Brazil also showed that pacifier use was associated with EBF discontinuation in infants less than six months old (91, 96).

#### 2.3.2. *Comparison with developed countries*

The determinants of breastfeeding have been the focus of recent reviews in several developed countries (71, 73-75, 102). Although many socio-demographic determinants of breastfeeding are comparable across the regions, some important differences exist. For example, an extensive literature review on achieving EBF in the U.S. broadly categorised obstacles and constraints specific to EBF practice to include factors relating to healthcare system and providers, social, economic and political influences as well as media and marketing practices (73). Unlike the findings from studies in developing countries, medical constraints experienced by mothers in developed countries relate more to problems from health systems (73, 75), rather than directly to the mother's health. However, lactational problems and perceptions of breast milk insufficiency are common barriers to successful breastfeeding among mothers in both developed and developing countries.

While health behaviours such as smoking (73, 75, 102) and over-nutrition (73, 75) was often reported to reduce the likelihood of exclusive breastfeeding among mothers in the U.S.

and Japan, none of the studies from developing countries reported on maternal smoking, while concerns of body image was related more with breasts appearance (41, 98, 99) rather than obesity. This may be due to the fact that in many developing countries (especially in Africa and Middle East); there is an overall veneration of larger body size for women (103-105).

At the level of the individual, lower maternal education and household income, being unmarried and of ethnic minority groups negatively influence breastfeeding outcome among mothers in the U.S. (72, 75). A similar pattern was observed in studies from developing countries with regards to maternal education. However, while rates of exclusive breastfeeding was found to increase with increasing maternal age among mothers in the U.S. (73, 75) and the U.K. (74), majority of studies from developing countries revealed that older mothers are less likely to exclusively breastfeed their infants.

Several studies from developed countries showed that positive maternal attitudinal and intrapersonal characteristics predicted higher rates of exclusive or full breastfeeding (71-73, 75, 102). In addition, several review studies have identified maternal prenatal breastfeeding intention as an important predictor of breastfeeding duration and exclusivity among mothers in developed countries (71, 73-75, 102). In the current review of literature, only two studies (98, 100) were identified that described the impact of positive maternal attitude towards breastfeeding on exclusive breastfeeding while one study (88) determined that the lack of maternal EBF plan was associated with cessation of EBF during the first six months of infant life. However, two of these studies utilised qualitative study designs and evidence of the impact of such psychosocial determinants of breastfeeding were based on retrospective accounts which may have been subject to recall bias and influence of the women's actual

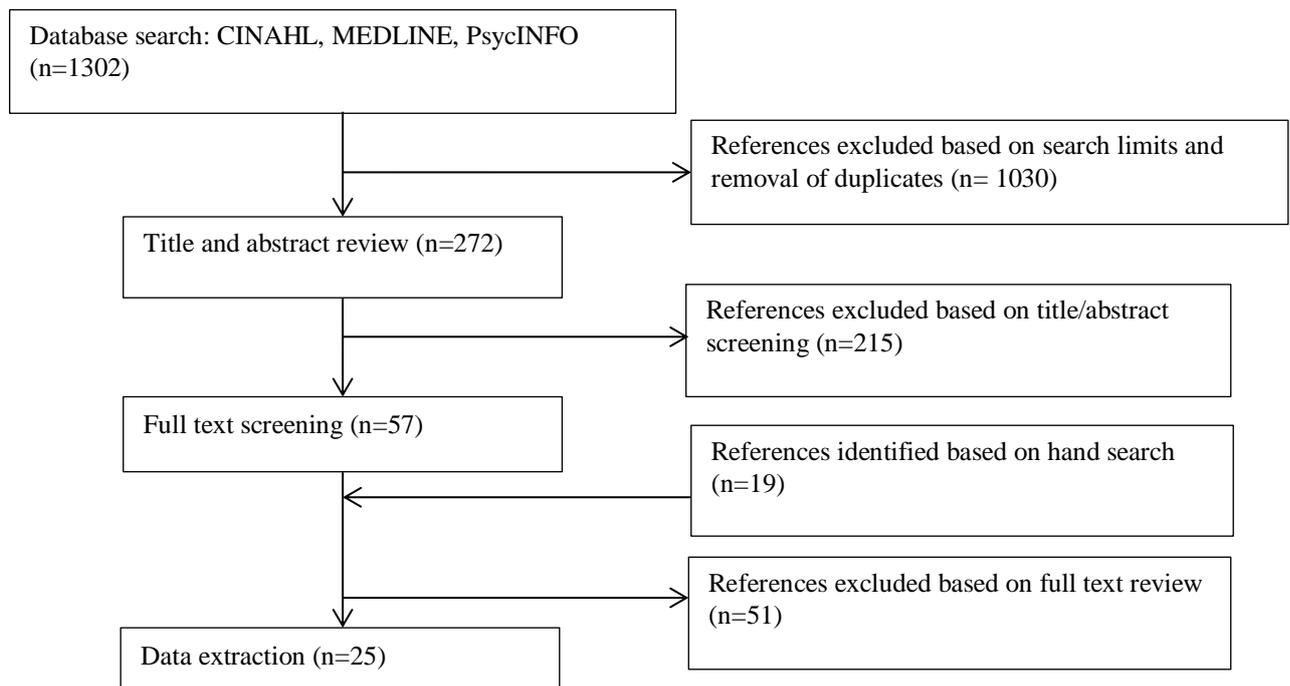
postpartum experiences. This is an important research gap that warrants investigation among different populations in various developing countries.

#### **2.4. Conclusion**

Studies aiming to identify factors associated with and influencing infant feeding practices are of great public health significance given the importance of exclusive breastfeeding and the proportion of women who are not meeting the WHO global recommendation of exclusive breastfeeding to six months across the developing world (5, 9). Although breastfeeding is almost universally practiced in many developing countries (10), mothers may be constrained from breastfeeding optimally due to difficulties that they face. This review revealed socio-demographic, medical, psychosocial, cultural and environmental determinants of exclusive breastfeeding among mothers in developing countries. Further, a comparison of EBF determinants between mothers in developed and developing countries revealed certain important differences, and a dearth of studies focusing on psychosocial determinants of exclusive breastfeeding in most developing countries. While a few studies highlighted the impact of maternal knowledge and attitude on exclusive breastfeeding, evidence regarding associations between breastfeeding intention and exclusive breastfeeding are lacking.

Prior to this doctoral dissertation, no study had reported on the association between prenatal breastfeeding intentions and EBF among Nigerian mothers. This review of literature also makes potential areas of interventions and gaps in research apparent. Healthcare providers, development partners and policy makers should be informed about these determinants and provide practical anticipatory guidance targeted at helping mothers in overcoming the barriers herein described. In so doing, healthcare providers in developing countries can make significant contribution to the improvement of maternal and child health outcomes. Research

might also explore the effect of maternal breastfeeding self-efficacy and self-confidence on optimal breastfeeding practices and perceived milk insufficiency.



**Figure 2-1:** Flowchart for literature review

**Table 2-1:** Study characteristics, and summary of findings from included quantitative studies

No	Study(year), location	Participants (n)	Design	Main barriers /facilitators	Authors conclusion
1.	Abuidhail <i>et al.</i> (2014), Jordan	Postpartum mother and infant pairs (n=600)	Longitudinal prospective design Reported percentages of particular responses	<b>Barriers:</b> Infant hungry after BF (53%), subsequent pregnancy (27.4%), breast problems (25.5%)	Postpartum mothers initiated EBF practice within the first hour of birth but practice declined gradually as the infant grew up within the first six months
2.	Agbo <i>et al.</i> (2013), Nigeria	Married female residents doctors (n=47)	Descriptive cross sectional study Reported percentages of particular responses	<b>Barriers:</b> Return to work (61.1%), inadequate lactation and return to work (22.2%), other family demands (5.6%) <b>Facilitators:</b> Family support and longer maternity leave (25.5%), early closure from work (17.0%), perceived benefit to child (10.6%) crèche at work place (6.4%), exemption from calls (4.3%)	Conducive atmosphere should be created at the work place to encourage the female healthcare professional to practice EBF on their children as they encourage other mothers to do same
3.	Agnarsson <i>et al.</i> (2001), Tanzania	Mothers with infants < 7 months old (n=108)	Household survey Percentages of responses were reported	<b>Barriers:</b> Perceived insufficient breast milk, child crying due to insatiety	The average duration of EBF, though far below recommended levels, is higher than is found in most studies in Africa and Tanzania.
4.	Agunbiade & Ogunleye (2012), Nigeria	Breastfeeding mothers with child between age 3 mo. and 1 yr. (n=200)	Complementary mixed method design Reported percentages of particular responses	<b>Barriers:</b> Baby hungry after feeding (29%), maternal health problems (27%), fear of infant addiction to breast milk (26%), breast pains (25%), pressure from mother-in-law (25%), return to work/business (24%)	Breastfeeding mothers are faced with multiple challenges as they strive to practice EBF. Scaling up of EBF among mothers requires concerted multi-level efforts
5.	Al-Sahab <i>et al.</i> (2008), Lebanon	First Year of Life Follow-up study birth cohort aged 0-2 months followed up for first year of life (n=1320)	Prospective cohort study Odds ratios were presented	<b>Barriers:</b> Maternal employment (non-working mothers 2.38 times more likely to fBF), pediatrician being male (mothers seeing female pediatrician fBF 1.49 times more likely to fBF) <b>Facilitators:</b> Multiparity (one child OR=1.90; CI 1.23-2.93) or (two children OR=2.26; CI 1.40-3.65), younger maternal age (being ≤25) (OR=2.5; CI 1.46-4.37), early discharge (OR=1.68; CI 1.14-2.48), religion being Muslim (OR=1.88; CI 1.27-2.78)	Breastfeeding rates have been explained by maternal factors such as age, parity religion and healthcare related factors such as early discharge and sex of pediatrician. This constitutes the basis for designing interventions
6.	Arusei <i>et al.</i> (2011), Kenya	Mother infant pair attending maternal and child health	Longitudinal study Percentages of particular responses and odds ratios	<b>Barriers:</b> Maternal belief that water aids digestion (38%), insufficient breast milk (25%), advice from relatives /friends (18%), acclimatization (22%), work resumption (13%). Mother's lack of knowledge on infant	There is a need to accelerate awareness of optimum infant feeding recommendations and augment the rigorous practice of the WHO ten steps to successful breastfeeding.

**Table 2-1: (continued)**

No	Study(year), location	Participants (n)	Design	Main barriers /facilitators	Authors conclusion
		clinic (n=151)		feeding recommendations OR=9.19; CI, 1.72-49.23) late BF initiation (OR=8.19; CI, 1.34-58.93)	
7.	Barennes <i>et al.</i> (2012), Laos	Mothers with infants <24 months old (n=1057)	Randomised multi-stage sampling survey Percentages of particular responses and odds ratios	<b>Barriers:</b> Ethnic majority (Lao Loum) mothers of ethnic majority (OR=1.8 CI, 1.2-2.8) with higher living standards (mothers living in concrete houses (OR=1.6 CI, 1.1-2.5) more likely to use BMS prior to 6 months. Lack of colostrum use (OR=0.6 CI, 0.4-1.0)	In Laos, mothers with the highest socio-economic status are showing a tendency to give up breastfeeding.
8.	Bashour <i>et al.</i> (2008), Syria	Postpartum mothers (n=876)	Randomised controlled trial Percentages of observed outcomes	<b>Facilitators:</b> Early postpartum home visit (28.5% and 30% in intervention groups)	Postpartum home visits significantly increased exclusive breastfeeding while other outcomes did not change
9.	Chandrashekar <i>et al.</i> (2007), Nepal	Mothers who delivered within the previous 2 months (n=385)	Cross sectional Percentages of responses; odds ratios	<b>Barriers:</b> Caesarean section delivery (mothers with vaginal delivery more likely to EBF (OR 7.6, CI 1.7–34.1) <b>Facilitators:</b> Friend's feeding practice (Mothers more likely to EBF if friend did (OR 2.2, CI, 1.1–4.5), colostrum use (more likely to EBF if colostrum was first meal(OR 27.2, CI, 12.6–58.7)	Practices such as pre-lacteal feeds and premature introduction of complementary feeds are of great concern in this urban population
10.	Dearden <i>et al.</i> (2002), Viet Nam	Mothers of infants less than six months old in northern Viet Nam (n=120)	Cross sectional Responses categorised according to outcome and barrier using pre-established format	<b>Barriers:</b> Work outside home, poor maternal diet, belief that mother ate something unsuitable of mother's body does not supportive of EBF <b>Facilitators:</b> Perceptions of sufficient BM to feed infant, belief that BM is nutritious, encouragement by commune HW	Strategies such as improving knowledge about the introduction of water and semi-solids, addressing perceptions of milk insufficiency and presenting mothers with options for EBF even when they work outside home can be implemented to increase EBF practice in rural work environments
11.	do Nascimento <i>et al.</i> (2010), Brazil	Caregivers of children <1yr (n=1470)	Cross sectional population survey Prevalence ratios for factors associated with non-EBF	<b>Barriers:</b> Pacifier use (PR=1.69, CI, 1.37-2.09), lower maternal education (PR=1.59, CI, 1.10-2.29)	In developing countries, specific strategies must be created for the delivery of information about breastfeeding and the effects of pacifier use especially for less educated women
12.	Hruschka <i>et al.</i> (2003), Guatemala	Mothers of infants aged 0-6mo (n=328)	Prospective cohort study Hazards ratio	<b>Barriers:</b> Delayed onset of lactation (HR=4.87, CI, 2.29-10.36), caesarean birth (HR=1.72, CI, 1.06-2.78)	Mothers who experience delayed OL are less likely to continue full breastfeeding in the first 6 months

**Table 2-1:** (continued)

No	Study(year), location	Participants (n)	Design	Main barriers /facilitators	Authors conclusion
13.	Kakute <i>et al.</i> (2005), Cameroon	Actively breastfeeding mothers (n=320)	Survey questionnaire Percentages of particular responses	<b>Barriers:</b> Family/community pressure (42.5%), baby not satisfied with BM (20%), mother exhausted from field work (8.4%), no help for daily work (7.2%)	Women identified various cultural beliefs that constitute barriers to EBF. Health education efforts should focus not only on promoting EBF, but on changing knowledge and attitudes of the communities
14.	Karacam (2008), Turkey	Mothers with babies aged 0-4 months old (n=514)	Cross sectional Percentages of particular responses and odds ratios	<b>Barriers:</b> Frequent crying of baby (OR=1.69, CI, 1.13-2.53) <b>Facilitators:</b> Maternal employment reduced likelihood of ending EBF (OR=0.49, CI, 0.29-0.83)	Midwives and nurses can encourage EBF behaviour by providing focused education and counselling to women whose babies cry frequently
15.	Nawaz <i>et al.</i> (2009), Pakistan	Children under six month of age (n=305)	Cross sectional Percentages of particular responses were presented	<b>Barriers:</b> Perceptions of insufficient BM (45.9%), maternal employment (18.4%), maternal sickness (13.11%), congenital/acquired disease of child (17.04), subsequent pregnancy (3.61%)	Main causes of non-breastfeeding of infants <6 months are perceptions of having insufficient milk, working women and twin babies.
16.	Okafor <i>et al.</i> (2013), Nigeria	Women whose child was <=2 years old (n=600)	Community based, cross-sectional Percentages of particular responses and odds ratios	<b>Barriers:</b> Older maternal age, nulliparity or having >=5 children, lower maternal education, lack of formal antenatal clinic attendance, lack of institutional delivery	Promotion of good health-seeking behaviour, maternal education and family planning are recommended to improve mothers breastfeeding practice and infant nutrition
17.	Perera <i>et al.</i> (2012), Sri Lanka	A birth cohort (n=500)	Prospective observational study Percentages of particular responses	<b>Barriers:</b> Maternal anxiety of inadequate BM, inadequate weight gain, return to work, older maternal age	Mothers resuming work and concerns regarding adequacy of breast-milk were the major reasons to cease EBF
18.	Santo <i>et al.</i> (2007), Brazil	Postpartum mother and infant pairs (n=220)	Prospective cohort study Percentages of particular responses and hazards ratios	<b>Barriers:</b> Adolescent mother (HR=1.48, CI, 1.01-2.17), < 6 antenatal clinic visits (HR=1.60, CI, 1.10-2.33), pacifier use (HR=1.53, CI, 1.12-2.11), poor latch-on (HR=1.29, CI, 1.06-1.58)	Activities to promote EBF should be intensified for adolescent mothers and for those whose prenatal care is less than ideal reinforcing the ill effects of pacifier used. Mothers also need appropriate instruction on correct breastfeeding techniques
19.	Sasaki <i>et al.</i> (2010), Cambodia	Mothers with infants aged from 6-24 months	Cross sectional study Percentages of particular responses and odds ratios	<b>Barriers:</b> Maternal occupation (OR=4.71, CI, 2.77-8.01), lack of paternal attendance at breastfeeding classes (OR=1.93, CI, 1.13-3.28), lack of a maternal antenatal EBF plan (OR=10.01, CI, 3.68-27.24)	It is important to educate mothers on the significance of EBF so that they will develop the intention and plan to practice EBF. Paternal involvement in breastfeeding

**Table 2-1:** (continued)

No	Study(year), location	Participants (n)	Design	Main barriers /facilitators	Authors conclusion
		(n=312)			classes may help complement breastfeeding practices
20.	Tamiru <i>et al.</i> (2013), Ethiopia	Mothers with infants aged < 6 months (n=384)	Community based cross-sectional study Percentages of particular responses and odds ratios	<b>Barriers:</b> Maternal beliefs that: complementary food provides more nutrients than BM (41.88%), additional food protected baby from evil eyes/stomach ache (15.7%), breasts too small (3.1%). Mothers perception that complementary food is necessary for normal growth (AOR=4.24, CI, 2.33-7.71) <b>Facilitators:</b> Early BF initiation (AOR=0.52, CI, 0.32-0.84), maternal knowledge of EBF duration (AOR=0.43, CI, 0.06-0.99), maternal preference for BM (AOR=0.15, CI, 0.05-0.45)	Factors contributing to early introduction of complementary foods need to be taken into account while designing intervention strategies for breastfeeding
21.	Ulak <i>et al.</i> (2012), Nepal	Mothers with infants aged < 6 months (n=325)	Cross-sectional survey Percentages of particular responses and odds ratios	<b>Barriers:</b> Insufficient BM (51.4%), baby crying/hungry (29.2%), work outside home (16.3%) mothers illness (3.1%). Living in joint families (84% vs 64%, p<0.001) <b>Facilitators:</b> Knowledge of EBF recommendation (OR=0.6, CI, 0.4-0.9), infant not hospitalised (OR=2.7, CI, 1.0-7.4)	Continuation of EBF until 6 months was not common despite initiation of breastfeeding. Very few mothers received information on breastfeeding duration during antenatal visit indicating a need for counseling on EBF
22.	Vaahtera <i>et al.</i> (2001), Malawi	Mothers with infants aged < 6 months (n=760)	Prospective cohort study Associations between predictor variables and duration of EBF	<b>Barriers:</b> Lower maternal education, higher number of children <15 years old	EBF is uncommon and complementary foods were introduces to infants early among rural families. Education and family planning may improve adherence to infant feeding recommendations in the population

BF=Breastfeeding, EBF=Exclusive breastfeeding, fBF= Full breastfeeding, BMS=Breast milk substitutes, ANC=Antenatal clinic, HW=Health worker, AOR=Adjusted odds ratio, OR= Odds ratio, HR=Hazards ratio, PR=Prevalence ratio, CI=95% confidence interval

**Table 2-2:** Study characteristics, and summary of findings from included qualitative studies

No.	Author (year), location	Participants (n)	Data collection /synthesis	Main barriers/facilitators	Authors conclusion
1.	Agnarsson <i>et al.</i> , (2001), Tanzania	Mothers with infants < 7 months old, elderly women, TBAs and healthcare providers (nurses/midwives, medical doctor, nurse tutor)	Key informant interviews and focus group discussions using semi-structured questions.	<b>Barriers:</b> Cultural beliefs about breast milk ("bad breast milk"), belief that colostrum is bad, old milk	Divergent views were expressed about infant feeding practices among healthcare providers and mothers, grandmothers and TBAs.
2.	Agunbiade & Ogunleye (2012), Nigeria	Nurses (n=10), mothers practicing exclusive breastfeeding (n=11), grandmothers (n=10)	In-depth structured interviews and focus group discussions. Notes and audiotapes were transcribed translated and coded based on major themes	<b>Barriers:</b> Health-related problems, refusal of breast milk by infant, inadequate maternal nutrition, lactation problems, inadequate support from husband and conflicting opinions on infant feeding practices from the significant other	Breastfeeding mothers are faced with multiple challenges as they strive to practice EBF. Policies aimed at improving EBF uptake should also incorporate significant others in the process
3.	Dearden <i>et al.</i> (2002), Viet Nam	Mothers of infants <6 months old, husbands, parents and parents-in-law	Focus groups. Interviews were tape recorded, data were transcribed, translated and categorised according to outcome and barrier	<b>Barriers:</b> Work outside home, poor maternal diet, mother eats something unsuitable, mothers body does not support EBF <b>Facilitators:</b> Belief that BM is sufficient to feed infant, BM is nutritious, encouragement by commune health workers	Strategies addressing perceptions of milk insufficiency and presenting mothers with options for EBF even when they work outside home can be implemented to increase EBF practice in rural work environments
4.	Shao Mlay <i>et al.</i> (2004), Tanzania	Breastfeeding working mothers of babies < 7months old (n=6)	Participants were interviewed individually until a repeat pattern of information was heard. Data was analyzed and organised under specific properties of the central categories	<b>Barriers:</b> Maternal employment, lack of workplace flexibility, no on-site child care, lack of expressing/breastfeeding rooms and short maternity leave at most workplaces <b>Facilitators:</b> Women's assigned value of breast milk, previous experience and knowledge of EBF, maternal determination and resilience,	Public health officials educated women on the advantages of EBF in terms of their babies' health and their own but women were left to their own devices when it came to solving the practical problems of breastfeeding at the same time as holding down a full-time job

**Table 2-2:** (continued)

No.	Author (year), location	Participants (n)	Data collection /synthesis	Main barriers/facilitators	Authors conclusion
5.	Nabulsi (2011), Lebanon	Postpartum women with healthy live term newborns (n=36)	Focus group discussions and serial follow-up in-depth interviews. Interviews were tape recorded and transcribed. Major and minor themes were generated	<b>Barriers:</b> Perceptions of insufficient BM, fear of weight gain or breast sagging, breast pains, sleep deprivation, exhaustion and maternal employment <b>Facilitators:</b> Maternal positive attitude towards breastfeeding, determination, family support	Increasing awareness of future mothers about breastfeeding difficulties along with the benefits to children, mothers, and society at large may further promote breastfeeding, and improve exclusivity and continuation rates in Lebanon
6.	Otoo <i>et al.</i> (2009), Ghana	Breastfeeding mothers with at least one child <4 months old (n=35)	Focus group discussions. Tape-recorded discussions were transcribed, coded and grouped to form major themes	<b>Barriers:</b> Maternal employment, breast and nipple problems, perceived BM insufficiency, pressure from family and inability to breastfeed outside home <b>Facilitators:</b> Mothers prior experience with non-exclusively breastfed infant, belief that BM is best, convenient and available at no cost	Addressing the concerns expressed in this study can be used to enhance EBF promotion in this region
7.	Tamiru <i>et al.</i> (2013), Ethiopia	Key informants (n=15)	In depth interviews. Audio-taped data was transcribed and categorised to generate themes	<b>Barriers:</b> Cultural beliefs about infant feeding e.g. belief that complementary food protects infant from evil eyes, perceptions of insufficient BM <b>Facilitators:</b> Mothers knowledge of the benefits of breastfeeding	Factors contributing to early introduction of complementary foods need to be taken into account while designing intervention strategies for breastfeeding

BF=Breastfeeding, EBF=Exclusive breastfeeding, TBA=Traditional birth attendant

**Table 2-3:** Summary of barriers and facilitators of exclusive/full breastfeeding in infants aged 0-6 months

<b>Barriers</b>	<b>n</b>	<b>Facilitators</b>	<b>n</b>
<b>Socio-demographic factors</b>		<b>Social support</b>	
Maternal employment	16	Family support	2
Maternal age	4	Friends breastfeeding pattern	1
Maternal education	4	Nuclear family structure	1
Parity	3	Workplace flexibility and support	2
Religion	1	<b>Medical and healthcare/nutrition</b>	
Place of residence/ living standard	2	Naturalness and perceived benefits to the child (nutritional and health)	3
<b>Medical and healthcare related factors</b>		Early postpartum discharge	2
Perceptions of insufficient or lack of breast milk	13	Paediatrician being female	1
Maternal/infant morbidity / mortality and lactation problems	8	Early postpartum home visiting/ encouragement from health workers	2
Twin delivery	2	Early initiation of breastfeeding and colostrum use	2
Caesarean section	2	ANC attendance and institutional delivery	1
Subsequent pregnancy	2	Maternal knowledge of EBF duration	2
Lack of ANC attendance and EBF plan	4	Rooming in	1
Poor maternal nutrition	3	<b>Psychological and other maternal factors</b>	
Other infant related factors	3	Mothers will and resilience	2
<b>Sociocultural factors</b>		Perceived joyful and connecting experience	1
Other family demands/lack of support	5	Maternal food preference	1
Maternal beliefs about breastfeeding and infant nutrition	5	Convenient for mother	1
Relative's advice (pressure) / peer pressure	5	Breastfeeding on demand and night feeding	1
Acclimate infant to other foods	2		
Cultural practices	3		
Concerns about body image	2		
<b>Environmental factors</b>			
Lack of social infrastructure and amenities	4		
Breast milk substitute and pacifier use	2		

EBF=Exclusive breastfeeding, ANC=Antenatal clinic; n=number of sources citing factor. Sum of n not equal to number of studies stated in text due to several sources citing multiple factors.

**3. CHAPTER 3: Breastfeeding practices among mothers with infants aged 0 – 3 months  
old in North Central Nigeria - (a longitudinal observational study)**

### **3.1. Introduction**

Optimal breastfeeding practices include exclusive breastfeeding for the first six months of life, followed by breast milk and complementary foods from about six months of age on, and continued breastfeeding for up to at least two years of age while receiving nutritionally adequate age appropriate complementary foods (69, 70). Despite robust evidence to support the benefits of breastfeeding (1, 3, 4, 7) and international initiatives to promote its practice (2, 70), exclusive breastfeeding rates during the first six months of life in Nigeria still fall below the global recommendation of 50% coverage for children in developing countries. According to the most recent Nigeria Demographic and Health Survey (NDHS) 2013, 17% of infants aged less than six months old were exclusively breastfed, showing a slight increase from the 2008 estimate of 15% (34). However, wide variation exists by geopolitical area and place of residence. Recent studies have shown that in Nigeria, exclusive breastfeeding rates up to 6 months of age ranged from 33.5% in South East (106) to 91% in the South West (107).

Although breast milk is the most advantageous feeding option for infants (50, 51) women's breastfeeding decision is influenced by a complex combination of traits and behaviour as previously described in Chapter 2. Factors ranging from socio-demographic, biomedical, cultural, and psychosocial determinants have been identified to influence infant feeding practices, especially exclusive breastfeeding. Of the modifiable factors that influence a woman's infant feeding behaviour, breastfeeding intention has been described as one of the strongest factors associated with breastfeeding compliance (21, 24, 26-29, 31, 32). Studies have also shown breastfeeding exclusivity and duration to be closely associated with the strength of the intention (27, 31) and the timing of the decision (26, 32). A review of literature, however, reveals that studies examining this association in developing countries are scarce.

While numerous studies have reported on determinants and practice of breastfeeding among mothers in Nigeria, none has examined the influence of prenatal breastfeeding intentions on breastfeeding initiation, duration and exclusivity. Also, given the wide cultural diversity present in Nigeria, continued surveillance of breastfeeding practices using standard definitions and methods is needed. This chapter describes breastfeeding practices and examined the impact of prenatal breastfeeding intentions on exclusive breastfeeding. Specifically, the study aimed to describe breastfeeding intentions measured prenatally during pregnancy; determine the association between breastfeeding intention and exclusive breastfeeding; and identify other factors associated with exclusive breastfeeding until three months postpartum in a sample of culturally diverse Nigerian women residing in suburban parts of the FCT, Abuja.

## **3.2. Methods**

### *3.2.1. Study area*

This study was carried out in Nigeria's capital city, Abuja. The FCT, Abuja is located at approximately the geographic centre of Nigeria and has the highest population growth (9.3%) rate in Nigeria. Based on the 2006 population census, the population of the FCT was estimated to be approximately 2.7 million in 2013 (108) comprising of people of all Nigerian ethnicities. The FCT has six area councils. This study was conducted in two of the six area councils with the aim of targeting less urban populations and gaining information that might be generalisable to majority of Nigerian women. Thus, study locations were purposively selected in view of the study objectives and in consultation with the Human and Health Services Secretariat of the FCTA. The locations were Bwari Area Council (BAC) and Kuje Area Council (KAC). BAC is located North East of Abuja and is the second largest area council of the FCT while KAC is located about 40km South West of Abuja. According to

records obtained from the Federal Capital Territory Administration (FCTA) Health and Human Services Secretariat, at the time of this research, there were 122 health facilities in BAC (two secondary public facilities, 24 public primary facilities and 96 private facilities); while KAC had 58 health facilities comprised of two secondary public facilities, 42 public primary facilities and 14 private facilities. In order to obtain a representative sample of women, participants were selected from the public secondary health facilities serving each of the selected area councils.

The public health care system provides care for a substantial proportion of the population in the study areas. Forty nine percent of women residing in the FCT delivered their babies in a public sector health facility compared to 20% who delivered in private sector facilities. Recent reports show that most Nigerian women (61%) receive antenatal care from a skilled provider; 51% of women reporting four or more antenatal clinic visits. However, women in urban areas are more likely to receive antenatal care from a skilled provider compared to their rural counterparts (34) and there is higher service utilization at public health facilities in comparison to private health facilities or other non-orthodox antenatal services (109). In Nigeria, public health facilities are heavily patronised based on the general belief that these hospitals have better trained and more experienced personnel. Also, many public health facilities provide services (including antenatal services) at subsidised rates or free of charge, hence antenatal care attenders at public health facilities include a wide range of participants of varying socio-demographic characteristics. On the contrary, services provided by most private facilities (such as privately owned clinics and hospitals) are paid for full-cost.

### *3.2.2. Study design and population*

This was a longitudinal observational study carried out between 1 July 2013 and 31

December 2013. A sample of 268 pregnant women was purposively recruited from antenatal clinics attached to four separate public secondary health facilities located in the suburbs of the FCT. Throughout the study, all hospitals had membership to the BFHI, and provided free antenatal care services two or three days every week. Each antenatal clinic involved different batches of women who were invited to participate in the present study. Women were deemed eligible to participate if they were  $\geq 36$  weeks gestational age,  $\geq 18$  years old, reported singleton pregnancy and did not have any medical condition that would contraindicate breastfeeding or severely compromise its success. From an initial sample of 328 women who were originally approached and assessed for eligibility, 268 agreed to participate and gave signed consent. All eligible mothers who subsequently delivered a healthy term infant weighing  $\geq 2.5$ kg at birth were followed up postpartum. The cohort was followed using three questionnaires that were completed for each mother-infant pair. Of the 268 women who were recruited, 213 (79.5%) were followed up at the sixth week interview. From this group, 210 (98.6%) were followed up at three months. Owing to case exclusion due to loss of contact (n=40), withdrawal (n=17) and postnatal infant death (n=1), 210 mothers met the criteria for the final data analysis.

### *3.2.3. Ethical consideration*

The study protocol was approved by the Research Ethics Committee of the University of Tokyo (approval number: 3948- (1)), Ahmadu Bello University, Zaria and the FCTA Health and Human Service Secretariat, Abuja Nigeria (protocol approval number: FHREC/2013/01/05/05-03-13). Participation was on voluntary basis and written informed consent was obtained from each participant prior to administration of the study procedures.

#### *3.2.4. Data collection*

Face-to-face interviews were conducted with mothers prenatally at the time of recruitment in the hospital antenatal clinic and at six weeks ( $\pm 2$  weeks) postpartum follow-up in the mother's home. The final follow-up was at three months infant's age ( $\pm 2$  weeks) via telephone by the same investigator. Interviews were carried out by eight investigators who were trained on questionnaire administration and data collection processes. Training of the investigators consisted of an overview of the study objectives, detailed description of all questionnaires and interviewing techniques; and a field practice. Data were collected using semi-structured questionnaires. The questionnaires elicited responses on socio-demographic factors (34, 110, 111); breastfeeding intentions and motivations using the infant feeding intentions (IFI) scale (112, 113); breastfeeding practice and barriers (110, 111, 114) and postpartum depressive symptoms using the Edinburgh Postnatal Depression Scale (EPDS) (115).

The prenatal interview comprised of three sections and was designed to record information on: mother's infant feeding preference, antenatal clinic visits, maternal and paternal socio-demographic, and employment factors. Data relating to mothers' medical and obstetric conditions were also obtained and confirmed from medical records. At the six week postpartum follow-up interviews, information was collected from respondents relating to mothers' infant-feeding methods and practices along with reasons for such feeding choices. Detailed barriers to early initiation and exclusive breastfeeding, or reasons for EBF cessation were elicited. Mothers were questioned on breast milk substitutes and/or solid foods offered to their infants. Infant feeding status was determined by previous day recall of infant's diet. Any feeding transitions that occurred were retrospectively recorded. For mothers who had stopped breastfeeding exclusively, at the time of follow-up interviews, data was collected on

the number of days/weeks the mother exclusively breastfed. Such mothers were further asked about their current breastfeeding status from which the duration of any breastfeeding was recorded. Information was also collected on maternal postpartum depression. The three month postpartum evaluation consisted of the earlier interview conducted at six weeks excluding questions on depressive symptoms. All three questionnaires were assessed for content validity independently by three health care professionals and pre-tested on two separate pilot groups.

#### *3.2.4.1. Assessment of breastfeeding practice*

The breastfeeding definitions adopted in this study were in accordance with WHO set of definitions of breastfeeding, indicators and specific methodologies for their measurement in household surveys (114). Thus, exclusive breastfeeding referred to mothers who offered only breast milk to their infants without giving any other food or liquid with the exception of drops and syrups (vitamins, minerals and medicines). Assessment of infant feeding status was by previous day (24-hour) recall (114, 116).

#### *3.2.4.2. Assessment of infant feeding intentions*

Infant feeding intention (IFI) was quantitatively assessed prenatally using the IFI scale (112, 113). This scale measures the mother's prenatal plan for breastfeeding. It is made up of five items including two items that measure the strength of the intention to initiate breastfeeding and three items that assess the strength of intention to exclusively breastfeed at one, three, and six months. Hence, breastfeeding intention in this study refers to a woman's intention to exclusively breastfeed her infant. The response to each statement in the IFI scale is scored from 0 – 4. The total IFI score was calculated by averaging the score for the first two items and summing this average with scores on items 3 – 5 (113). Possible scores thus ranged from 0 (very strong intention to not breastfeed at all) to 16 (very strong intentions to provide breast

milk as the sole source of feeding until 6 months of age).

### 3.2.5. *Statistical analysis*

Statistical analyses in this study were conducted using SAS version 9.3 (SAS Institute Inc., Cary, NC USA). All reported p-values are two-tailed with statistical significance at p-value of <0.05. Prior to data analysis, all data were reviewed and examined for coding errors and missing data. Missing data were handled by complete case analysis.

Data are presented using numerical descriptive statistics including means with standard deviations (SD) and medians with interquartile ranges (IQ). Comparison between groups was performed using chi square tests or t-tests. Percentages were used to describe responses regarding breastfeeding practices and socio-demographic characteristics of women. Socioeconomic status was constructed using principal components analysis based on data obtained regarding ownership of a set of assets by each household (117). While family size was measured as the number of persons residing in the household at the time of the interview; family type was described either as nuclear or joint depending on the household composition at the time of the interview (118). Frequency of antenatal care attendance was categorised based on the focused antenatal care model (119). Knowledge on breastfeeding practices was rated as either adequate or inadequate depending on a participants knowledge of a series of statements that was designed to capture their acquaintance with the mechanisms and benefits of exclusive breastfeeding (120). Child gender was included as an inherent biological factor (121). Infant feeding intention scores was categorised as being low (0 – 8), moderate (8.5 – 12) or strong (12.5 – 16). Fewer categories were created to enable each sub-category to have sufficient power when used for predicting EBF cessation in the model. Internal consistency of the IFI scale was checked and the Cronbach Alpha for this sample was 0.80.

Kaplan-Meier (KM) survival curves were used to describe the survival time of exclusive breastfeeding and probability of EBF cessation while separate KM curves with log-rank test was used to compare survival probability by IFI category. To characterise the determinants of EBF cessation, univariate and multivariate Cox proportional hazards regression models were used. The dependent variable was cessation of EBF, a time dependent factor indicating the age a mother stopped exclusive breastfeeding. Cessation of EBF was taken as an event and children were censored if they were still being breastfed exclusively on the interview date. Individual model effects was measured by conducting univariate Cox analysis and further keeping covariates with p values <0.3 (122) in the multivariate model. The proportionality hazards assumption was tested by using the time-dependent covariate method (123). In this method, an extended Cox model that contained time-dependent variables was fit and test statistics were obtained. Collinearity was assessed using the variance inflation factors and the functional form of covariates was evaluated by checking the Martingale residuals (124). The resulting multivariate Cox regression model was built through a manual stepwise backward selection process. Model fit was assessed by observing the Akaike Information Criterion (AIC) which helps select the best fit from a set of models (125). The chosen model was the one with the smallest AIC value. Since participants were recruited from different health facilities at the community level, we adjusted for facility effects during the analysis.

### **3.3. Results**

#### *3.3.1. Background characteristics*

The baseline characteristics of the 210 participants for whom data are available at three months follow-up is presented in **Table 3-1**. The mean age of the participants was 29.3 (SD 4.3) ranging from 19 – 40 years. All study participants could hold basic communication in

English language and only one respondent had never attended school at any level. All the women were married and only 2.0% of the participants had a co-wife/wives. The respondent's ethnicity varied across the major and minority ethnic groups in Nigeria. Antenatal attendance among respondents was high (median 4 visits, IQ 3-8) and over two-thirds (68.1%) of the women attended antenatal clinics more than four times. Sixty-five percent of women attended their first antenatal clinic after 16 weeks gestational age and a majority (71.0%) of the respondents had strong prenatal breastfeeding intentions. Mothers who exclusively breastfed their infants differed from those who did not practice exclusive breastfeeding at three months postpartum in terms of IFI score and pre-lacteal feed administration whereby more than half of non-EBF mothers had moderate to weak intentions towards exclusive breastfeeding.

The non-responders in the present study (n=58) were lost to follow-up mainly due to loss of contact with the mothers. Others either declined further participation or were excluded due to death of the infant (see **Appendix 1**). Compared to responders, the non-responders were significantly more likely to be less educated and show ambivalence towards exclusive breastfeeding (see **Appendix 2**).

### *3.3.2. Breastfeeding and pre-lacteal feeding prevalence*

Breastfeeding was almost universally practiced among follow-up participants. Fifty-nine percent of mothers (n=124) initiated breastfeeding within the first hour of birth; 73 (34.8%) within 24 hours, while 13 (6.2%) mothers reported that they initiated breastfeeding after 24 hours following childbirth. The prevalence of any breastfeeding was 99.5% and 98.6% at six weeks and three months postpartum respectively, while exclusive breastfeeding rate was 89.1% and 79.4% at the same time points. Pre-lacteal feeding was practiced among 48 (23.0%) respondents, with most mothers (62.5%) citing "lack of breast milk" as the reason for

administering other fluids prior to first breastfeed. The most common pre-lacteal food given was sweetened water (64.6%) (see **Appendix 3**).

### *3.3.3. Survival analysis for breastfeeding cessation*

At three months postpartum (log-rank test  $\chi^2=13.9$ ;  $P=0.001$ ) more mothers in the highest category of IFI score were breastfeeding their infants exclusively compared to mothers in the low and moderate categories (**Figure 3-1**). Likewise, mothers who did not administer pre-lacteal feeds at birth practiced exclusively breastfed more than other mothers who did (log-rank test  $\chi^2=5.6$ ;  $P=0.02$ ) (**Figure 3-2**). At six weeks postpartum, 11.0% of mothers had ceased exclusive breastfeeding while at three months postpartum, the figure was 20.6%. The mean survival time for exclusive breastfeeding duration in the low, moderate and strong IFI score categories was 0.9 (SE 0.05), 3.6 (SE 0.20), and 5.8 (SE 0.09) weeks at six weeks; and 8.6 (SE 1.26), 10.0 (SE 0.65), and 11.3 (SE 0.21) weeks at three months respectively.

### *3.3.4. Determinants of exclusive breastfeeding at three months postpartum*

Results for the univariate associations between independent variables and exclusive breastfeeding duration are shown in Table 3.3. Individual factors significantly associated with exclusive breastfeeding cessation were IFI score and the administration of pre-lacteal feeding at birth (**Table 3-2**). The unadjusted effects of IFI score and pre-lacteal feed administration were  $HR=0.9$  (95% CI 0.85-0.97) and  $HR=2.1$  (95% CI 1.13-3.97), respectively. The factors associated with the risk of discontinuing exclusive breastfeeding in the multivariate Cox model were breastfeeding intention, pre-lacteal feed administration and mode of delivery. The risk of exclusive breastfeeding cessation was significantly lower for women with stronger breastfeeding intentions. For every unit increase in IFI score, women with prenatal breastfeeding intentions had a 13% reduced risk for discontinuing exclusive breastfeeding

(HR=0.87, 95% CI 0.8-0.95). Mothers who administered pre-lacteal feeds to their infants in the early hours after birth had a higher risk (HR 2.93 95% CI 1.49-5.77) for discontinuing exclusive breastfeeding as compared to mothers who did not practice pre-lacteal feeding. In this study, delivery of an infant by caesarean section was not a risk factor for cessation of exclusive breastfeeding. Women who delivered by caesarean section had a significantly reduced risk (HR 0.17 95% CI 0.04 - 0.67) of discontinuing exclusive breastfeeding prior to three months compared to those who delivered their infants vaginally.

### **3.4. Discussion**

Breastfeeding, especially as it relates to exclusivity during the first six months of life is essential for child survival, and the support, protection and promotion of breastfeeding is a global priority (126). In view of this, the present prospective study sought to identify little studied factors that strongly influence initiation and duration of exclusive breastfeeding in addition to those factors usually studied in this type of research. The findings from this study showed that more than half of the respondents initiated breastfeeding within the first hour of childbirth. The rate of early initiation of breastfeeding in the current study is higher than the national average presented in the recent NDHS report. This finding may be due to the fact that participants in this study were recruited from an urban population; and almost all mothers delivered in a health facility. Moreover, health surveys in Nigeria show that mothers delivering in health facilities and those residing in urban areas are more likely to initiate breastfeeding earlier than others (34).

Although breastfeeding was almost universal among all participants in this study, an important finding to be highlighted was the high rate of exclusive breastfeeding reported among mothers. As much as this trend has been previously reported in another study (107),

the rate in the present study was much higher than exclusive breastfeeding rates reported in recent large scale national surveys (34) and studies in other parts of Nigeria (41, 42, 106). While this may be due to differences in study design and breastfeeding indicators used in various surveys, breastfeeding rates is known to vary considerably across geographic locations in Nigeria (15, 16). A recent analysis of the practice of exclusive breastfeeding in Nigeria revealed that mothers in several South Western and North Central states have a higher likelihood of exclusively breastfeeding their infants (16). However, the striking dissimilarity in exclusive breastfeeding rates in the present study and national estimates suggests the need for separate analysis of breastfeeding rates by state and place of residence in future infant feeding monitoring systems and NDHS reports. Such analysis would provide valuable information as regards inherent regional differences and disparities in breastfeeding trends over time.

It is also likely that the high rates of exclusive breastfeeding reported in this study is specific to mothers attending antenatal clinics and delivering their babies in BFHI designated facilities in urban regions. Prior studies conducted among women in urban and rural parts of Nigeria comparing breastfeeding practices of mothers with their exposure to BFHI also showed that having previous contact with a BFHI designated hospital conferred advantages in terms of appropriate breastfeeding practices (127, 128). However, Ogunlesi, et al. (127) highlighted the possibility of formal and informal interactions between different health facilities within communities as a source of contact with information regarding BFHI practices due to knowledge of BFHI practices among women with no previous contact with a baby friendly hospital attending non-BFHI designated hospitals.

Regardless of possible information sharing among BFHI and non-BFHI designated

facilities, studies have shown poor knowledge of BFHI practices among health workers with no prior BFHI training (129). Moreover, public health facilities in Nigeria are often better staffed with professionals who provide necessary instructions to mothers on breastfeeding after delivery. In view of this, the findings of this research should be interpreted within the given context and caution should be exercised in generalising the results to non-BFHI facilities in the study location.

Another possible reason for the high exclusive breastfeeding rates may be linked to the level of education of the study participants. Evidence from studies among Nigerian (16, 106, 130) and other African (16, 106, 130) populations have shown that higher maternal education is associated with improved compliance with infant feeding recommendations. Since majority of mothers in this study were educated beyond secondary level, it is also possible that the observed practice may be due to an understanding of the benefits of exclusive breastfeeding among more educated mothers. It is therefore imperative that the findings reported here be interpreted in context of the study.

The precipitous drop in exclusive breastfeeding rates among pre-lacteal feeders and low intention mothers should also be highlighted. With the highest drop occurring between hospital discharge and two weeks postpartum, data from this study suggests that interventions aimed at improving breastfeeding intentions should be done early in the prenatal period, given that mothers with strong breastfeeding intentions are more likely to initiate and continue exclusive breastfeeding.

The present study clearly showed the positive association between prenatal breastfeeding intention and exclusive breastfeeding among mothers. Over two-third of mothers had a strong intention to breastfeed their infant and prenatal breastfeeding intention was associated with a

significantly lowered risk for discontinuation of exclusive breastfeeding. Many studies from developed countries have shown prenatal maternal intention to breastfeed to be strongly correlated with initiation and longer duration of breastfeeding (26, 28, 31), while fewer studies describe the impact on exclusive breastfeeding. However, evidence on either association from developing countries is sparse and this is the first study conducted in Nigeria examining the association between prenatal breastfeeding intention and exclusive breastfeeding.

In the current study, the risk of exclusive breastfeeding cessation was significantly lower in women with strong breastfeeding intentions. Several behavioural theories have been proposed in breastfeeding literature to explain the association between breastfeeding intention and practice. These include the TRA and the TPB (45, 46). Central to both theories is the assertion that the most important determinant of a person's behaviour is one's behavioural intention (131). Previous studies from the United States (27, 132) and Hong Kong (49) have used these theories to examine factors associated with breastfeeding behaviour. Reports are consistent showing that breastfeeding intention is positively associated with breastfeeding initiation and duration (27, 29, 49, 132). However, other studies indicate that the role of prenatal intentions change when initial breastfeeding experiences are taken into account (17, 27).

The positive effect of prenatal breastfeeding intention on exclusive breastfeeding was consistent over the follow-up period confirming the role of breastfeeding intention in actual breastfeeding initiation and duration in this study. In view of this, and findings from other studies (27, 49, 132), this is an important area to focus on in future interventions. It is also important to establish if interventions can alter infant feeding intentions, so that at risk groups can be targeted with the goal of shaping progressive breastfeeding intention during pregnancy.

Moreover, exploring the motivations behind women's prenatal breastfeeding choices may be useful in improving breastfeeding intention through addressing sociocultural issues and misconceptions regarding infant feeding.

In the present study, a negative association was found between exclusive breastfeeding and pre-lacteal feeding. Similar associations have been reported previously as well (22, 133). Interestingly, almost two-thirds of mothers cited "the lack of breast milk" as the primary reason for administering pre-lacteal feeds. This factor in itself has been associated with negative attitudes towards breastfeeding, as well as maternal lack of confidence in her ability to breastfeed (134). Pérez-Escamilla, et al. (133) and Mannan, et al. (22) also showed the negative influence of pre-lacteal feeding on breastfeeding in new-borns in separate studies. Provision of water-only and milk-based pre-lacteal feeds to infants was negatively associated with exclusive breastfeeding in Honduras (133); while mothers in Bangladesh who provided any kind of pre-lacteal feed to their infants were significantly more likely to report infant feeding problems as early as the first week compared to mothers who did not provide any pre-lacteal feeds (22). Administration of pre-lacteal feeds is suggested to interfere with both breastfeeding initiation and exclusivity due to a delay in the 'coming in' of milk (135). However, despite the potentially serious implications for infant nutrition, pre-lacteal feeding is often overlooked by health systems, given that in the current study as well as others (136), pre-lacteal feeding reportedly occurred during hospitalisation in a majority of mothers,

The findings from this study revealed that mothers delivering by caesarean section were significantly at reduced risk of exclusive breastfeeding cessation compared to vaginally delivered mothers. While this is contrary to results of studies conducted to evaluate the determinants of breastfeeding practice among several African populations (18, 106, 130), a

similar association was found among mothers in Sierra Leone (130). Previous studies have noted the negative influence of caesarean delivery on breastfeeding (137), however, results are inconsistent. An extensive review of literature to determine the association between mode of delivery and breastfeeding concluded that, among mothers who initiated breastfeeding, full/exclusive breastfeeding at six months was not significantly different between mothers regardless of their mode of delivery (138).

In the present study, 64% of respondents were educated beyond secondary level. A recent study to determine the relationship between maternal demand for caesarean section and socio-demographic characteristics found greater awareness and willingness to request a caesarean section among women attending tertiary health facility and those with tertiary education (139). Similarly, the recent NDHS report shows that caesarean deliveries was highest among births to highly educated mother and mothers in the highest wealth quintile (34). Therefore, the likelihood for prolonged exclusive breastfeeding among women delivered by caesarean section may be due to having a highly educated study population. This finding may also be as a result of postpartum in-hospital supportive care received by women who had caesarean deliveries. In Nigeria, women with caesarean deliveries usually stay at the health facility for more than three days compared to those having vaginal deliveries who are discharged from the hospital within hours of delivery (34). This finding therefore underscores the need to enhance the capacity of public hospitals in Nigeria to offer sufficient postpartum care to mothers regardless of mode of delivery.

**Table 3-1:** Attributes and characteristics of participants by feeding type

Characteristic	Infant feeding method at three months postpartum						p value
	Total (n=210)		EBF <sup>a</sup> (n=166)		Non-EBF <sup>b</sup> (n=44)		
	Mean or n	SD or %	Mean or n	SD or %	Mean or n	SD or %	
<b>Maternal age (years)</b>	29.3	4.3	29.4	4.2	29.1	4.6	0.74 <sup>c</sup>
≤ 24	29	13.9	23	13.9	6	14.0	
25-34	156	74.6	124	74.7	32	74.4	
≥35	24	11.5	19	11.5	5	11.6	
<b>Education</b>							
Up to secondary level	87	41.8	68	41.2	19	44.2	0.72 <sup>d</sup>
Higher than secondary level	121	58.2	97	58.8	24	55.8	
<b>Employment</b>							
No formal employment	146	69.9	117	70.5	29	67.4	0.70 <sup>d</sup>
Formal employment	63	30.1	49	29.5	14	32.6	
<b>Maternity leave*</b>							
One to two months	19	23.2	17	26.2	2	11.8	0.33 <sup>e</sup>
Three to four months	63	76.8	48	73.9	15	88.2	
<b>Partner education</b>							
Up to secondary level	74	35.8	60	36.6	14	32.6	0.62 <sup>d</sup>
Higher than secondary level	133	64.3	104	63.4	29	67.4	
<b>Parity</b>							
First	58	27.9	43	26.1	15	34.9	0.50 <sup>e</sup>
Second	66	31.7	53	32.1	13	30.2	
Third	48	23.1	41	24.9	7	16.3	
Fourth	21	10.1	15	9.1	6	14.0	
Fifth or more	15	7.2	13	7.9	2	4.6	
<b>Religion</b>							
Catholic	23	11.0	15	9.0	8	18.6	0.10 <sup>d</sup>
Other Christian	152	72.7	126	75.9	26	60.5	
Islam	34	16.3	25	15.1	9	20.9	
<b>Wealth tertile</b>							
Lowest	70	33.5	54	32.5	16	37.2	0.84 <sup>d</sup>
Medium	71	34.0	57	34.3	14	32.6	
High	68	32.5	55	33.1	13	30.3	
<b>Antenatal attendance</b>							
< four times	66	31.9	56	33.9	10	23.8	0.21 <sup>d</sup>
≥four times	141	68.1	109	66.1	32	76.2	
<b>IFI score</b>	13.9	3.7	14.2	3.4	12.5	4.4	0.01 <sup>f</sup>
Low	20	9.5	14	7.5	6	26.1	
Moderate	41	19.5	35	18.7	6	26.1	
Strong	149	71.0	138	73.8	11	47.8	
<b>Pregnancy planned</b>							
No	50	24.0	42	25.5	8	18.6	0.35 <sup>d</sup>
Yes	158	76.0	123	74.6	35	81.4	
<b>Family structure</b>							
Nuclear	161	77.0	125	75.3	36	83.7	0.24 <sup>d</sup>
Joint	48	23.0	41	24.7	7	16.3	
<b>EBF knowledge</b>							
Inadequate	91	43.5	69	41.6	22	51.2	0.26 <sup>d</sup>
Adequate	118	56.5	97	58.4	21	48.8	

**Table 3-1:** (continued)

Characteristic	Infant feeding method at three months postpartum						p value
	Total (n=210)		EBF <sup>a</sup> (n=166)		Non-EBF <sup>b</sup> (n=44)		
	Mean or n	SD or %	Mean or n	SD or %	Mean or n	SD or %	
<b>Pre-lacteal feeding</b>							
No	158	77.1	130	80.3	28	65.1	0.04 <sup>d</sup>
Yes	48	22.9	32	19.8	15	34.9	
<b>Initiation of breastfeeding</b>							
Within 1 hour of birth	123	58.9	94	56.6	29	67.4	0.34 <sup>e</sup>
Within first day of birth	73	34.9	60	36.1	13	30.2	
After first day of birth	13	6.2	12	7.2	1	2.3	
<b>Delivery place</b>							
Government facility	190	90.9	151	91.0	39	90.7	0.90 <sup>e</sup>
Private facility	12	5.7	9	5.4	3	7.0	
Home	7	3.4	6	3.6	1	2.3	
<b>Delivery person</b>							
Doctor	60	28.7	52	31.3	8	18.6	0.28 <sup>e</sup>
Midwife/nurse	148	70.8	113	68.1	35	81.4	
Other	1	0.5	1	0.6	0	0.0	
<b>Mode of delivery</b>							
Vaginal birth	174	83.3	134	80.7	40	93.0	0.07 <sup>e</sup>
Caesarean section	35	16.8	32	19.3	3	7.0	
<b>Postpartum depression</b>							
No depression	198	94.7	156	94.0	42	97.7	0.47 <sup>e</sup>
Possible depression	11	5.3	10	6.0	1	2.3	
<b>Infant birth weight (kg)</b>							
<4.00	171	82.2	152	82.2	19	82.6	0.81 <sup>e</sup>
≥4.00	37	17.8	33	17.8	4	17.4	
<b>Child gender</b>							
Male	112	53.6	87	52.4	25	58.1	0.50 <sup>d</sup>
Female	97	46.4	79	47.6	18	41.9	
<b>Alcohol use</b>							
No	198	94.7	159	95.8	39	90.7	0.24 <sup>e</sup>
Yes	11	5.3	7	4.2	4	9.3	

Table values show n or mean and SD or % excluding missing responses.

<sup>a</sup> denotes mothers who were practicing EBF at three months postpartum.

<sup>b</sup> denotes mothers who had stopped practicing EBF and gave other foods to their infants at three months postpartum.

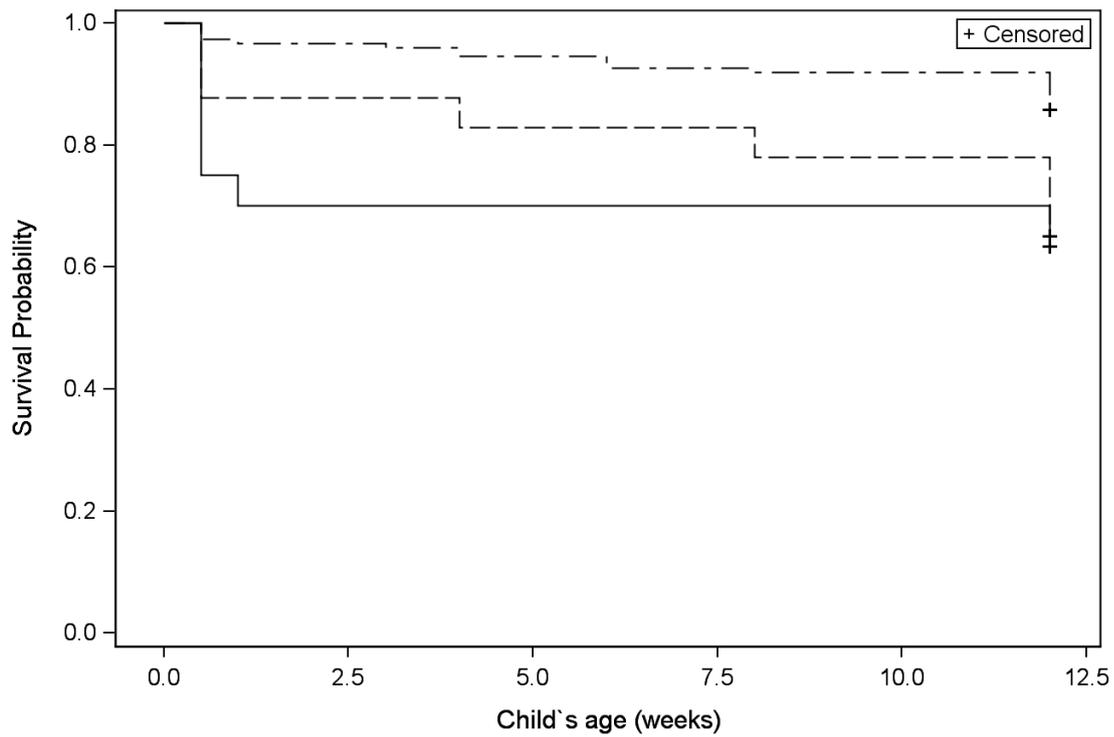
<sup>c</sup> Student's t-test

<sup>d</sup>  $\chi^2$  test

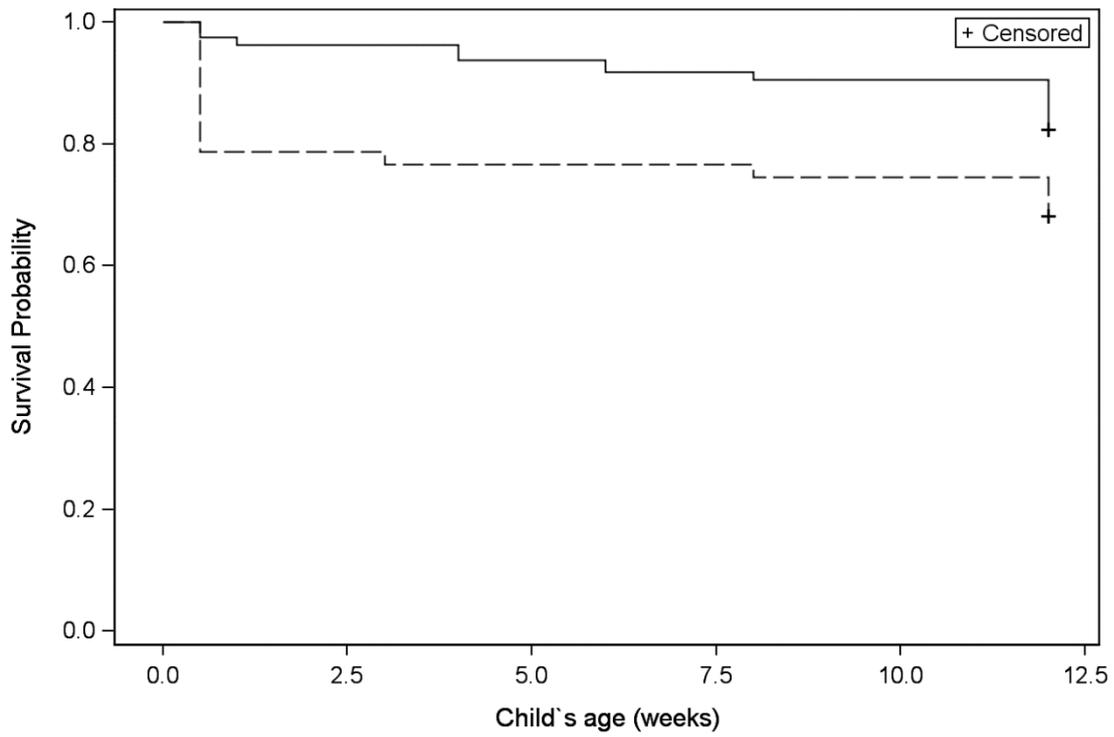
<sup>e</sup> Fisher's exact test

<sup>f</sup> Wilcoxon Mann-Whitney test

\*Only respondents with maternity leave



**Figure 3-1:** Survival curve for EBF at 3 months postpartum stratified by IFI category  
 The dash dotted line represents the survival curve for the group with strong intention to practice EBF, the dashed line represents the survival curve for the group with moderate intention to practice EBF and the solid line represents the survival curve for the group with low intention to practice EBF



**Figure 3-2:** Survival curve for EBF at 3 months postpartum stratified by pre-lacteal feed administration. The solid line represents the survival curve for the group that did not administer pre-lacteal feeds and the dashed line represents the survival curve for the group that gave pre-lacteal feeds.

**Table 3-2:** Factors associated with exclusive breastfeeding assessed using Cox regression models at three months postpartum

Variables	Unadjusted			Adjusted (n=194)		
	HR	p-value	95% CI	HR	p-value	95% CI
<b>Maternal age (years)</b>						
≤24	1.00					
25 – 34	0.98	0.95	0.41 - 2.33			
≥35	0.96	0.95	0.29 - 3.15			
<b>Education</b>						
Up to secondary level	1.00					
Higher than secondary level	0.89	0.72	0.49 - 1.63			
<b>Employment status</b>						
No formal employment	1.00					
Formal employment	1.11	0.76	0.59 - 2.10			
<b>Tertile of socioeconomic status</b>						
Low	1.00					
Medium	0.85	0.65	0.41 - 1.74			
High	0.83	0.61	0.40 - 1.72			
<b>Maternity leave</b>						
No	1.00					
Yes	2.31	0.27	0.53 - 10.09			
<b>Parity</b>						
Primipara	1.00					
Multipara	0.67	0.22	0.36 - 1.26			
<b>Partner education</b>						
Up to secondary level	1.00					
Higher than secondary level	0.87	0.66	0.46 - 1.64			
<b>IFI score</b>	0.91	0.00	0.85 - 0.97	0.87	<0.01	0.80 - 0.95
<b>Antenatal attendance</b>						
< four times	1.00			1.00		
≥ four times	1.58	0.21	0.78 - 3.21	2.05	0.07	0.94 - 4.45
<b>Birth weight (kg)</b>						
<4.0	1.00					
≥4.0	0.89	0.77	0.40 - 1.99			
<b>Pre-lacteal feeding administration</b>						
No	1.00			1.00		
Yes	2.12	0.02	1.13 - 3.97	2.93	<0.01	1.49 - 5.77
<b>Place of delivery</b>						
Home	1.00					
Health facility	1.06	0.91	0.38 - 2.97			
<b>Mode of delivery</b>						
Vaginal	1.00			1.00		
Caeserean section	0.35	0.08	0.11 - 1.13	0.17	0.01	0.04 - 0.67
<b>EPDS</b>						
<9	1.00					
≥9	0.40	0.37	0.06 - 2.93			
<b>Child gender</b>						
Female	1.00					
Male	1.26	0.45	0.69 - 2.31			
<b>Family structure</b>						

**Table 3-2: (continued)**

Variables	Unadjusted			Adjusted (n=194)		
	HR	p-value	95% CI	HR	p-value	95% CI
Nuclear	1.00					
Extended	0.61	0.23	0.27 - 1.37			
<b>EBF training</b>						
No	1.00					
Yes	1.04	0.95	0.32 - 3.36			
<b>EBF education</b>						
Inadequate	1.00					
Adequate	0.70	0.24	0.38 - 1.27			

Cox Proportional-Hazards Regression Model to determine predictors of EBF cessation among mothers around satellite towns around FCT, Nigeria

Covariates with p-value <0.30 are included in adjusted model

Adjusted for parity, mode of delivery, frequency of antenatal attendance, family structure and wealth tertile using principal components analysis

1.00 denotes reference category

IFI score is a measure of the strength of a respondents intention to exclusively breastfeed her infant at 1, 3, and 6 months. Possible scores range from 0 (no intentions to breastfeed) to 16 (very strong intentions to breastfeed)

Socioeconomic status was based on a set of assets including house type and toilet facilities

**4. CHAPTER 4: Maternal characteristics in relation to breastfeeding intention among pregnant women in North Central Nigeria - (a longitudinal observational study)**

#### **4.1. Introduction**

Breastfeeding intention is a significant predictor of infant feeding methods, being strongly correlated to initiation and longer duration of breastfeeding. Several studies employing various methodologies have also shown that many factors are in turn associated with the intention to breastfeed (140-145). A prospective controlled study conducted among socioeconomically disadvantaged Scottish women to evaluate the impact of peer support on breastfeeding behaviour found that previous breastfeeding experience, living with a partner, primigravid mothers and increasing maternal age were all positively predictive of breastfeeding intentions while women who smoked were less likely to report breastfeeding intentions (143). Similar findings were reported in other studies (141, 142, 145) as well. In another study, women in Syria and Jordan who reported a positive attitude towards breastfeeding, had previous breastfeeding experience and supportive partners were more likely to intend to breastfeed (140). Other factors found to be associated with intention to breastfeed include maternal education (141, 145), compliance with social contacts that supported breastfeeding (141), and having an early antenatal booking (145). Although many of these maternal demographic characteristics are non-modifiable, researchers need to be aware and consider them when conducting research and designing interventions to improve infant feeding practices.

The influence of intention to breastfeed on exclusive breastfeeding has been established among a sample of Nigerian women in Chapter 3 of this thesis. In view of the fact that maternal socio-demographic characteristics are often associated with infant feeding decisions, an understanding of maternal characteristics that influence intention to breastfeed is needed. Further, determining the factors that predict breastfeeding intention in this population would help identify high risk groups and enable policy makers and healthcare providers plan and

implement appropriate interventions to improve exclusive breastfeeding across Nigeria. The objective of this study was to determine maternal characteristics influencing breastfeeding intentions. This chapter provides a description of factors affecting intention to breastfeed among a sample of culturally diverse Nigerian women residing in suburban parts of the FCT, Abuja.

## **4.2. Methods**

The methods used in this study have been previously described. Details of the study area, design and population have been reported in Chapter 3.2. Briefly, participants in this study included a sample of pregnant women recruited from four antenatal clinics attached to four separate public secondary health facilities located in the suburbs of the FCT. Women were invited to participate in the study if they were  $\geq 36$  weeks gestational age,  $\geq 18$  years old, reported singleton pregnancy and did not have any medical condition that would contraindicate breastfeeding or severely compromise its success.

### *4.2.1. Data collection*

Data were collected using a semi-structured prenatal questionnaire during face-to-face interviews with women at the time of recruitment in the hospital antenatal clinics. The questionnaire comprised of three sections and was designed to record information on: mother's infant feeding preference, antenatal clinic visits, maternal and paternal socio-demographic, and employment factors. Infant feeding intention was quantitatively measured using the IFI scale (113). A more detailed description of this scale is provided in Chapter 3.2.4.2. Data relating to mothers' medical and obstetric conditions were also obtained and confirmed from medical records.

#### 4.2.2. *Statistical analysis*

In order to determine factors associated with IFI score a multivariate cumulative ordinal logistic regression analysis was used. In this model, the dependent variable was a 3-level ordered IFI score categorised as low, moderate and strong. This method provides an estimate of the effect of a factor on the likelihood of obtaining any given score or higher compared with a lower score. Hence, the ordinal logistic regression simultaneously modelled two cumulative odds ratios (OR) corresponding to the use of cut off points for moderate and strong IFI categories. An OR >1 indicates that an exposure is associated with increasing IFI score, and an OR <1 indicates that an exposure is associated with a decrease in IFI score. All variables associated with IFI scores that had p values  $\leq 0.30$  were considered potential factors and were included in the multivariate model predicting IFI score. Covariates in the model were maternal age, education, religion, family structure, parity, pregnancy intention, antenatal attendance, breastfeeding education and adequacy of breastfeeding education. All the covariates were modelled as previously described and as presented in **Table 4-1**.

Statistical analyses were performed with SAS statistical software, version 9.3 (SAS Institute Inc., Cary, NC, USA). Statistical significance for both the unadjusted and adjusted odds ratios (OR) were defined as  $p < 0.05$ .

### **4.3. Results**

The baseline characteristics of the sample have been previously described (**see Table 3-1**). The results from the ordinal logistic regression analysis for the factors predicting IFI score pattern showed that higher maternal age, maternal religion being Islam and having an unplanned pregnancy lowers the likelihood of having a higher IFI score (**see Table 4-1**). Compared to mothers in the lowest age category, being  $\geq 35$  years old significantly lowered

the likelihood of having a higher IFI score by as high as 79.0% (OR=0.21, 95% CI 0.05-0.85) while compared to non-Muslim mothers, maternal religion being Islam lowered the likelihood of having a higher IFI score (OR=0.23, 95% CI 0.06-0.86). On the other hand, mothers who planned their pregnancies were twice as likely to have higher IFI scores compared with mothers who had an unplanned pregnancy although this association was only marginal (OR=2.12 95% CI 0.99-4.54).

#### **4.4. Discussion**

The present study sought to identify the factors that influence prenatal breastfeeding intention. Maternal religion and older maternal age were both independently associated with the likelihood of a low breastfeeding intention. Several studies from Nigeria have reported on breastfeeding outcomes in various regions (16, 41, 42, 146). Independent analyses of NDHS 2003 data by Agho, et al. (146) and a pooled NDHS dataset from 1999, 2003 and 2008 by Gayawan, et al. (16) showed that the odds of exclusive breastfeeding among women were lower in the predominantly Muslim North West and North Eastern parts compared to other regions of Nigeria.

According to literature, breastfeeding has a religious basis in Islam wherein women are admonished to breastfeed an infant for two years (147). However, an important aspect of breastfeeding in Muslim cultures is the mother's need for privacy (147), the lack of which may prompt Muslim women to begin supplementary feeding, especially among those engaged in activities outside the home. Other religious and cultural practices have also been reported among Muslim women in Nigeria. In a study conducted among women in the North Eastern Sokoto state to assess their knowledge and practice of breastfeeding, common religious and cultural practices were found to include beliefs about colostrum and administration of

washouts from writings of the Quran on slates (148). Such beliefs, as well as the relatively lower level of education among women from Muslim dominated regions (34) are also possible reasons for lower breastfeeding intentions among this subgroup of women.

Older mothers were also found to have lower breastfeeding intentions. This is in accord with studies in several developing countries which show that older mothers have a lower likelihood to practice exclusive breastfeeding (16, 20). Similarly, a pooled analysis based on three NDHS datasets revealed a nonlinear effect of maternal age on exclusive breastfeeding concluding that younger (mostly teenagers) and older women contribute negatively to exclusive breastfeeding practise in Nigeria (16). It is therefore unsurprising that older mothers were less likely to have strong prenatal breastfeeding intentions.

Majority of the participants in this study (66%) were engaged in formal or informal economic activity outside the home. Regardless of employment status, short birth interval common to many Nigerian women, (149), economic pressures resulting from large family size, and presence of other professional and domestic responsibilities might force older women to quickly resume their usual activities at the expense of the providing the optimum nutrition for their infants. However, a factorial ANOVA revealed that there was no main effect of maternal age ( $F=0.98$   $p$  0.32) or employment ( $F=1.79$   $p$  0.18) on IFI score indicating that the mean change in IFI score was not significantly different between age groups and employment status. There was also no interaction found between maternal age and employment. The finding in this study however emphasises the need for healthcare providers to encourage and support older mothers to develop strategic plans to enhance their breastfeeding success.

Another important finding was the association between pregnancy intention and IFI score. According to the present study, women with an unplanned, mistimed or unwanted pregnancy were less likely to have strong breastfeeding intention compared to others. Several studies across different cultures have shown that pregnancy intentions are associated with breastfeeding outcomes (150-152). As suggested by Chinebuah and Pérez-Escamilla (150), women with unplanned pregnancies may experience psychosocial pressures that inhibit them from following desirable public health behaviours such as committing to breastfeeding. Pregnancy intendedness was also shown to influence breastfeeding behaviour among women in Hong Kong, whereby having a planned pregnancy significantly increased the likelihood to opt for breastfeeding (145).

In this study, approximately 29% of women were primipara. In a study assessing the impact of pregnancy intentions on breastfeeding among mothers in Ghana, an inverse association was found between pregnancy intentions and breastfeeding among primiparous mothers (150). The lack of association in this study may be due to previous child feeding and rearing experience among multiparous women. In another study examining the impact of pregnancy intentions on early childhood stunting, children aged less than 36 months old from unwanted and mistimed pregnancies were found to be at greater risk of stunting than children from planned pregnancies, a condition suggested to be exacerbated by neglect related to pregnancy intention (153).

The findings from this and other studies (145, 150-153) may have important implications for breastfeeding and child health programs because they suggest that women with unplanned, mistimed or unwanted pregnancy may need additional counselling and support. It is also important to not only promote effective and accessible family planning services but to educate

women on the need to utilise available services while highlighting the consequences of unintended pregnancies. Further, healthcare providers may screen for cases of unintended pregnancies and provide them with supportive care and positive encouragement during antenatal clinic visits to foster their commitment to breastfeed.

Several methodological features strengthen the findings presented in this thesis. First, breastfeeding intention was measured prenatally thereby reducing the possibility of eliciting a response influenced by future experience. As with other studies that assess infant feeding practices, recall bias and post hoc rationalisation is a concern (154). For example, a mother may not recall the exact time she stopped breastfeeding, or may provide a socially acceptable response. An extensive review on the validity and reliability of maternal recall of breastfeeding practices agrees on the validity of response to breastfeeding initiation and duration within three years of birth (155). Conversely, maternal recall for the age at introduction of food and fluids other than breast milk were less satisfactory with reliability decreasing as time between interviews increased (155). To improve maternal recall, a series of questions were used to elicit the response using categorical groups representing different time intervals. Also, breastfeeding practices were assessed within the first three months of birth reducing the recall bias.

Second, while many studies examining the impact of breastfeeding intention focus on breastfeeding initiation and/or duration relatively fewer studies have focused on exclusivity. In the current study, we quantitatively assessed both the strength of intention to initiate exclusive breastfeeding as well as the intended duration of exclusive breastfeeding thereby assessing mother's breastfeeding behaviour on a broader scale than most studies. Third, a longitudinal data was used thereby examining the stability of the assumption that prenatal

breastfeeding intention is related not only to breastfeeding initiation but to duration as well. Fourth, we tested the proportionality assumptions in our Cox model; an assumption which if violated would render the results of the Cox model unreliable and may lead to wrong conclusions.

Finally, the present study included participants from different majority and minority ethnic groups across Nigeria. A major limitation of many other Nigerian studies in this field is that they are often limited to a particular ethnic group within urban or rural settlements. An important consideration given to the present study was an attempt to reflect the cultural diversity prevalent in Nigeria. Hence, the present study was conducted among a culturally diverse population of women in an effort to capture the cultural variations present within the country and expand the generalisability of the findings.

Limitations of this study must also be highlighted. Participation in the study was strictly voluntary and there was no system in place to account for breastfeeding intentions and practice among individuals who refused to participate. Thus, the possibility of participation bias cannot be ruled out. Besides an absolute lack of interest, other reasons for non-participation were that participants wanted to avoid the burden of visiting the health facility for the scheduled interviews, and when at the facilities, they frequently hurried back home or to their businesses; often unwilling to wait for the interviews. In order to minimise the burden and encourage participation, interviews were conducted in the respondents home (or any other preferred location) following confirmation by a telephone call. Participants were also given a symbolic gift as compensation for their time.

Another important limitation was that participants lost to follow-up differed slightly from

the retained sample. While such attrition could have underestimated association effects, the 21.4% of mothers who were lost to follow-up are unlikely to have biased the findings significantly as several studies have demonstrated that drop-out impact on association estimates is modest (156-158) even where the drop-out occurs systematically (158).

Although efforts were made to elicit truthful response to the questions asked, there was still the possibility of some participants giving socially desirable responses which may have led to over-reporting of exclusive breastfeeding rates. Also, restricting the study to women who could understand and speak English; and recruitment from an urban area may somewhat restrict the generalisability of the findings, given that majority of women of childbearing age live in rural communities (34). However, attempts were made to reduce this bias by targeting populations living in the suburban and satellite areas of the FCT which are known to be home to in-migrants from smaller towns and rural parts of Nigeria (159). Finally, the follow-up period was only three months. Following up until six months would have provided further information on infant feeding transitions.

**Table 4-1:** Multivariate ordinal logistic regression model showing predictors of infant feeding intention score

Variables	Unadjusted			Adjusted (n=203)		
	OR	p-value	95% CI	OR	p-value	95% CI
<b>Maternal age (years)</b>						
≤24	1.00			1.00		
25 - 34	0.80	0.65	0.32 - 1.96	0.55	0.27	0.19 - 1.59
≥35	0.47	0.16	0.15 - 1.47	0.21	0.03	0.05 - 0.85
<b>Maternal education</b>						
Primary	1.00			1.00		
Secondary	0.15	0.08	0.02 - 1.27	0.13	0.08	0.01 - 1.28
Higher	0.18	0.17	0.02 - 1.45	0.20	0.17	0.02 - 1.94
<b>Parity</b>						
Primipara	1.00			1.00		
Multipara	1.24	0.51	0.65 - 2.36	0.79	0.60	0.32 - 1.94
<b>Planned pregnancy</b>						
No	1.00			1.00		
Yes	1.69	0.12	0.87 - 3.27	2.12	0.05	0.99 - 4.54
<b>Antenatal attendance</b>						
< four times	1.00			1.00		
≥ four times	1.69	0.09	0.92 - 3.13	1.62	0.17	0.81 - 3.21
<b>Maternal religion</b>						
Catholic	1.00			1.00		
Other Christian	0.52	0.97	0.17 - 1.60	0.57	0.35	0.17 - 1.86
Islam	0.26	0.02	0.07 - 0.91	0.23	0.03	0.06 - 0.86
<b>Family structure</b>						
Nuclear	1.00			1.00		
Extended	1.58	0.23	0.23 - 1.26	0.66	0.38	0.27 - 1.65
<b>EBF training</b>						
No	1.00			1.00		
Yes	1.65	0.34	0.59 - 4.59	0.56	0.36	0.16 - 1.94
<b>EBF education</b>						
Inadequate	1.00			1.00		
Adequate	1.28	0.41	0.71 - 2.31	0.81	0.55	0.41 - 1.61
<b>Household size</b>						
	1.20	0.11	0.96 - 1.50	1.22	0.24	0.88 - 1.69

Ordinal logistic regression model to determine factors associated with being in a stronger breastfeeding intention category as assessed by the Infant Feeding Intention Scale.

IFI score category=low intention; moderate intention; strong intention.

Household size ranged from 1-9 and represents the number of individuals living in the household at the time of the interview. Model adjusted for parity and wealth tertile in addition to table variables.

## CONCLUSION

The present study sought to identify previously unexplored factors that influence exclusive breastfeeding in addition to those factors usually studied in this type of study. The findings from this study provide clear evidence on the positive association between prenatal breastfeeding intention and exclusive breastfeeding. Mothers who displayed a strong intention to breastfeed their infants were found to breastfeed exclusively at three months postpartum. Importantly, this study also found that mothers who did not practice pre-lacteal feeding at birth consistently had a significantly reduced risk of exclusive breastfeeding cessation throughout the study period. Another goal of this study was to delineate the factors that influence infant feeding decisions among mothers. In this study, breastfeeding intentions were further explained by maternal characteristics such as religion, age and pregnancy intendedness. Although socio-demographic characteristics associated with infant feeding choices and methods may be difficult to change, maternal breastfeeding intentions are likely to change in response to information and actual experiences. Also, identifying high risk groups will facilitate healthcare providers in delivering anticipatory guidance and counselling messages that could help mothers foster positive breastfeeding attitudes.

As at the time of this research, the current study was the first known research to assess the impact of breastfeeding intention on exclusive breastfeeding among Nigerian population. Also, no study could be identified that described factors associated with breastfeeding intentions among Nigerian population. In view of the novelty of these reports, it is necessary to replicate the study across the major ethnic groups in Nigeria among both urban and rural populations. The findings from this study also form a basis for designing interventions targeting both pregnant women and healthcare providers,

## **RECOMMENDATION**

Optimal breastfeeding of infants has the greatest potential to improve child health outcomes and reduce child health inequality in developing countries like Nigeria. However, exclusive breastfeeding rates must be high across rural and urban areas; geopolitical zones and states; and income groups. To achieve this, it is imperative that healthcare providers understand the context specific factors that influence a mother's ability and decisions on breastfeeding.

Although it may be difficult to directly impact certain socio-demographic and socio-cultural barriers to exclusive breastfeeding, knowing these barriers and other reasons why women fail to meet recommendations for breastfeeding would assist healthcare providers in targeting anticipatory guidance during antenatal clinics and postpartum follow-up visits. Therefore in practice, there is the need for breastfeeding promotion efforts to focus on the periodic training of healthcare providers to be able to 1) identify high risk group mothers; 2) provide anticipatory guidance to help women foster positive breastfeeding attitudes and 3) effectively communicate breastfeeding promotion messages using visual aids and demonstration tools.

In view of the fact that prenatal breastfeeding intentions were associated with breastfeeding outcome in the current study, breastfeeding counselling and promotion should be introduced prior to and/or early in pregnancy to promote a positive attitude and commitment to breastfeeding. Also, antenatal clinics should be packaged to deliver standardised, practical and consistent messages about the practice and benefits of exclusive breastfeeding. Encouraging close family members to attend antenatal clinics would also help elicit support and dispel certain myths around infant feeding. Additionally, breastfeeding promotion efforts in Nigeria could include role modelling and peer-information sharing as part of the communal antenatal

clinic practice wherein pregnant women can learn from the experiences of others who have been successful at exclusive breastfeeding.

For further studies, additional research should examine the influence of maternal attitudes and self-efficacy about breastfeeding on breastfeeding intentions and practice.

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## APPENDICIES

### Appendix 1: Reasons for non-participation in study

Reason	n(58)	%
Could not be contacted/located	40	69.0
Declined	13	22.4
Husband refusal	4	6.9
Loss of baby	1	1.7

**Appendix 2:** Baseline characteristics and comparison of characteristics between participants and women lost to follow-up using Chi-square test

Characteristic	Total		Participants (n=210)			Drop-outs (n=58)		p value
	n	or SD	n	or SD	n	or SD		
	mean	or %	mean	or %	mean	SD or %		
<b>Maternal age (years)</b>	29.2	4.5	29.3	4.3	28.6	5.3	0.33 <sup>a</sup>	
≤24	42	15.7	30	14.3	12	20.7		
25-34	194	72.4	156	74.3	38	65.5		
≥35	32	11.9	24	11.4	8	13.8		
<b>Education</b>								
Up to secondary level	125	46.8	87	41.6	38	65.5	0.00 <sup>b</sup>	
Higher than secondary level	142	53.2	122	58.4	20	34.5		
<b>Employment</b>								
No formal employment	190	70.9	147	70.0	43	74.1	0.54 <sup>b</sup>	
Formal employment	78	29.1	63	30.0	15	25.9		
<b>Maternity leave</b>								
One to two months	25	24.5	19	23.2	6	30.0	0.57 <sup>c</sup>	
Three to four months	77	75.5	63	76.8	14	70.0		
<b>Partner education</b>								
Up to secondary level	103	38.9	75	36.1	28	49.1	0.07 <sup>b</sup>	
Higher than secondary level	162	61.1	133	63.9	29	50.9		
<b>Parity</b>								
First	77	28.8	59	28.2	18	31.0	0.75 <sup>c</sup>	
Second	82	30.7	66	31.6	16	27.6		
Third	60	22.5	48	23.0	12	20.7		
Forth	30	11.2	21	10.1	9	15.5		
Fifth or more	18	6.7	15	7.2	3	5.2		
<b>Antenatal attendance</b>								
< four times	89	33.5	66	31.7	23	39.7	0.26 <sup>b</sup>	
> four times	177	66.5	142	68.3	35	60.3		
<b>IFI score</b>	13.6	3.9	13.9	3.7	12.4	4.5	0.03 <sup>d</sup>	
Low	28	10.5	20	9.5	8	13.8		
Moderate	59	22.0	41	19.5	18	31.0		
Strong	181	67.5	149	71.0	32	55.2		
<b>Family structure</b>								
Nuclear	206	77.4	162	77.1	44	78.6	0.82 <sup>b</sup>	
Joint	60	22.6	48	22.9	12	21.4		
<b>EBF knowledge</b>								
Inadequate	117	43.7	91	43.3	26	44.8	0.84 <sup>b</sup>	
Adequate	151	56.3	119	56.7	32	55.2		

Table values show n or mean and SD or % excluding missing responses.

<sup>a</sup> Student's t-test

<sup>b</sup>  $\chi^2$  test

<sup>c</sup> Fisher's exact test

<sup>d</sup> Wilcoxon Mann-Whitney test

\* Only respondents with maternity leave

**Appendix 3:** Types of pre-lacteal feeds administered and reasons for giving pre-lacteal feeds to infants\*

<b>Pre-lacteal feeds given (n=48)</b>		
Fluid given	n**	%
Water	20	41.7
Sweetened water	31	64.6
Infant formula	3	6.3
Other milk	1	2.1
Gripe water	1	2.1
Energy drink	1	2.1

\*\*sum greater than 48 due to multiple responses

<b>Reasons for pre-lacteal feeding</b>		
Reason	n	%
No breast milk	30	62.5
Baby ill	2	4.17
Mother ill	13	27.1
Mother's choice	4	8.3
Baby could not suckle	1	2.1

\*Pre-lacteal feed is any food other than breast milk given to infant within the first three days of birth before initiating breastfeeding

**Appendix 4:** Bivariate analysis showing predictors of infant feeding intention score using ordered logistic regression analysis

Covariates	OR	p-value	95% CI
<b>Maternal age (years)</b>			
≤24	1.00		
25 – 34	0.80	0.65	0.32-1.96
≥35	0.47	0.16	0.15-1.47
<b>Maternal education</b>			
Primary	1.00		
Secondary	0.15	0.08	0.02-1.27
Higher	0.18	0.17	0.02-1.45
<b>Parity</b>			
Primipara	1.00		
Multipara	1.24	0.51	0.65-2.36
<b>Planned pregnancy</b>			
No	1.00		
Yes	1.69	0.12	0.87-3.27
<b>Antenatal attendance</b>			
< four times	1.00		
≥ four times	1.69	0.09	0.92-3.13
<b>Maternal religion</b>			
Catholic	1.00		
Other Christian	0.52	0.97	0.17-1.60
Islam	0.26	0.02	0.07-0.91
<b>Family structure</b>			
Nuclear	1.00		
Extended	1.58	0.23	0.23-1.26
<b>EBF training</b>			
No	1.00		
Yes	1.65	0.34	0.59-4.59
<b>EBF education</b>			
Inadequate	1.00		
Adequate	1.28	0.41	0.71-2.31
<b>Household size</b>			
	1.20	0.11	0.96-1.50
<b>Employment status</b>			
No formal employment	1.00		
Formal employment	0.747	0.3886	0.39-1.45
<b>Ethnicity</b>			
Hausa	1.00		
Yoruba	0.72	0.83	0.21-2.41
Igbo	0.75	0.72	0.24-2.29
Ijaw	0.17	0.39	0.00-7.29
Fulani	0.80	0.83	0.08-8.22
Bini	0.98	0.33	0.32-3.00
Other groups			
<b>Postpartum depression (ppd)</b>			
No depression	1.00		
Possible ppd	2.03	0.38	0.42-9.92
<b>Tertile of socioeconomic status</b>			
Low	1.00		

**Appendix 4:** Bivariate analysis showing predictors of infant feeding intention score using ordered logistic regression analysis

Medium	1.87	0.10	0.90-3.90
High	1.17	0.63	0.58-2.36

## Appendix 5: Respondent information sheet

Protocol Approval Number: FHREC/2013/01/05/05-03-13

### Information sheet

**Research Title: Sub-optimal breastfeeding in early infancy and associated factors in Nigeria**

**Investigator: Balogun Olukunmi**

**Supervisor: Professor Satoshi Sasaki**

Thank you very much for your participation. My name is ..... I am representing the University of Tokyo in Japan and the Ahmadu Bello University Zaria.

The purpose of this study is to identify and understand problems that breastfeeding women face with regards to exclusive breastfeeding, so that solutions can be found to these problems. The information from this survey will help foreign aid agencies and/or the Government of Nigeria to formulate actions to tackle the problem. For example, foreign agencies can advise the Nigerian authorities on suitable interventions targeting these problems to improve breastfeeding rates and child survival in Nigeria etc.

Although there might not be an immediate benefit in participating in this survey, the information you provide is very helpful for child nutrition policy planning and has the potential to provide ideas to support mothers to feed their babies properly for their survival. In this regard I would like to ask you some questions about how you plan to feed (or are feeding) your baby.

In this study, we would like to give you questionnaire to answer. There is a less than minimal risk if you agree to participate in this questionnaire interview, although some of the questions are personal and may make you feel uncomfortable. However, all the information that you give to me will be kept strictly confidential. Although we will ask your name in the questionnaire, your name will not be used and you will not be identified in any way. If you agree to participate, as gratitude, we will give you Japanese hand fan at the end of the interview.

This study has been approved by the Research Ethics Committee at The University of Tokyo and Ahmadu Bello University, Zaria as well as the FCT Health Research Ethics Committee. This research is funded by The University of Tokyo operational funds made available to different departments. Your participation in this study is absolutely voluntary and there is no penalty for refusing to take part. You are free to ask any questions. You may refuse to be in this interview process, refuse to answer any question in the interview or stop the interview at any point. The interview may take approximately 15 to 30 minutes to complete.

You may ask any question about the study at this time and if you have further questions about this study, please do not hesitate to contact.

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The Secretary,  
FCT Health Research Ethics Committee,  
FCT, Abuja  
email: [ikwubiolaode@yahoo.com](mailto:ikwubiolaode@yahoo.com)  
Tel: +23480-7142-7099

Date: / /

## Appendix 6: Informed consent form

Protocol Approval Number: FHREC/2013/01/05/05-03-13

### Informed Consent Form

**Study title: "Sub-optimal breastfeeding in early infancy and associated factors in Nigeria"**

**Investigator: Balogun Olukunmi**

**Supervisor: Professor Satoshi Sasaki**

The Dean,  
Graduate School of Medicine and Faculty of Medicine,  
The University of Tokyo

### Informed Consent to participate in study

I, after reading and having been briefed about the contents of this study, understand what is expected of me as a participant in the study.

I understand:

1. The purpose and procedure of the study
2. The content of the questionnaire
3. That I will not be placed under any harm or discomfort
4. That I may refuse to answer any question if I don't want to answer
5. That I can withdraw from the study at any time without giving a reason
6. That I can withdraw from the study at any time (during or after the study) without any harm or without it in any way affecting the health service I receive
7. That any information I provide will be strictly treated in a confidential manner and that I will not be identified in the reporting of the result

\_\_\_\_\_  
Name of the person who gives consent

Date:    /    /

**Appendix 7: Withdrawal of consent form**

**Written withdrawal of consent form**

*This form is to be used when you wish to cancel the agreement you signed to participate in this study. Therefore, you **do not** need to fill it out now. You may use this form **ONLY** when you no longer wish to participate in this study.*

**“Sub-optimal breastfeeding in early infancy and associated factors in Nigeria”**

The Dean,  
Graduate School of Medicine,  
The University of Tokyo

**Withdrawal of Consent to participate in study**

I have previously been briefed about the above study and had signed a consent form to participate in the study. At this time, I no longer want to participate and would like to withdraw my consent.

\_\_\_\_\_  
Participant's name

Date:    /    /

**Appendix 8: Protocol approval notice issued by the FCTA Health and Human Service Secretariat, Abuja Nigeria**



**FEDERAL CAPITAL TERRITORY  
HEALTH RESEARCH ETHICS COMMITTEE**  
Research Unit, Room 10, Block A Annex, HHSS  
FCT Secretariat No. 1 Kapital Street Area II, Garki, Abuja - Nigeria

Name of Principal Investigator: Balogun Olukunmi Omobolanle  
Address of Principal Investigator: Dept. of Social & Preventive Medicine, University of Tokyo,  
Japan  
Date of receipt of valid application: 9/02/2013

**NOTICE OF APPROVAL AFTER COMMITTEE REVIEW**  
Protocol Approval Number: FHREC/2013/01/05/05-03-13

**TITLE: Sub – Optimal Breastfeeding in Early Infancy and Associated Factors in Nigeria**

The research described in the submitted protocol has been reviewed.

**Documents Reviewed:**

- (i) Application form
- (ii) Curriculum Vitae of the Investigator
- (iii) Research Protocol:
  - \* Questionnaire
  - \* FGD Guide
  - \* Research Information Sheet
  - \* Consent Form

On the basis of the review, this research has been **approved** by the Committee (FHREC). Subsequent changes are not permitted in this research without prior approval by the FHREC.

This approval dates from **05/03/2013 to 04/03/2014**. Note that no participant accrual or activity related to this research may be conducted outside of these dates. All informed consent forms used in this study must carry FHREC assigned protocol approval number and duration of FHREC approval of the study.

The National Code for Health Research Ethics requires you to comply with all institutional guidelines, rules and regulations and with the tenets of the code including ensuring that all adverse events are reported promptly. The FHREC reserves the right to conduct compliance visit to your research site without previous notification.

In multiyear research, endeavor to submit your annual report to the FHREC early in order to obtain renewal of your approval and avoid disruption of your research. At the end of the research, a copy of the final report of the research should be forwarded to FHREC for record purposes.

Iken Gela S. Adem  
Secretary, FEBRUAR 2013  
March 05, 2013  
**APPROVED**  
Health Research Ethics Committee

倫理委員会  
審査結果報告書

平成25年05月29日

申請者（研究責任者）  
社会予防疫学  
教授  
佐々木 敏 殿

東京大学大学院医学系研究科長・医学部長  
宮園 浩平

審査番号 3948-(1)  
研究課題 ナイジェリアで前期乳児の子育てを行う母親の母乳保育実施状況の把握およびその阻害要因の解明（多施設共同研究）

上記研究計画を審査番号3948の軽微な変更と認めます。  
ここに通知します。

判定

<input type="radio"/> 承認する	条件付きで承認する
変更を勧告する	承認しない
該当しない	

**Appendix 10: Prenatal questionnaire**  
**Section 1: Respondent's background information**

1. How old were you on your last birthday?	Age in completed years:	years
2. Have you ever attended school?	<input type="checkbox"/> Yes	<input type="checkbox"/> No → GO TO NUMBER 4
3. What is the highest level of school you attended?	<input type="checkbox"/> Primary	<input type="checkbox"/> Secondary <input type="checkbox"/> Higher
<input type="checkbox"/> Others (Please specify).....		
4. What is your religion?	<input type="checkbox"/> Catholic	<input type="checkbox"/> Islam <input type="checkbox"/> Other (Please specify).....
	<input type="checkbox"/> Other Christian	<input type="checkbox"/> Traditionalist
5. What is your ethnic group?	<input type="checkbox"/> Hausa	<input type="checkbox"/> Yoruba <input type="checkbox"/> Igbo <input type="checkbox"/> Other (Please specify).....
	<input type="checkbox"/> Ijaw	<input type="checkbox"/> Fulani <input type="checkbox"/> Bini
6. What is your marital status?	<input type="checkbox"/> Married	<input type="checkbox"/> Engaged <input type="checkbox"/> Single
	<input type="checkbox"/> Separated	<input type="checkbox"/> Divorced <input type="checkbox"/> Widowed
7. When is your expected delivery date? (Record date as written in hospital card)	Day...../Month...../Year.....	
8. At the time you became pregnant, did you want to become pregnant <b>then</b> , did you want to wait until <b>later</b> or did you <b>not want</b> to have any (more) children at all?	<input type="checkbox"/> Then	<input type="checkbox"/> Later <input type="checkbox"/> Not want
9. What is the order of this pregnancy?	<input type="checkbox"/> First	<input type="checkbox"/> Third <input type="checkbox"/> Other (Please give detail)
	<input type="checkbox"/> Second	<input type="checkbox"/> Forth
10. How many months pregnant were you when you first received antenatal care for this pregnancy? .....months	<input type="checkbox"/> Don't know	
11. How many times have you received antenatal care during this pregnancy? .....times	<input type="checkbox"/> Don't know	
12. During (any of) your antenatal care visit(s), were you told about exclusive breastfeeding for your baby?	<input type="checkbox"/> Yes	<input type="checkbox"/> No → GO TO NUMBER 14
13. What were you told about exclusive breastfeeding? (Select all that apply)	<input type="checkbox"/> Breastfeed your baby exclusively for the first 6 months	
	<input type="checkbox"/> Begin breastfeeding within 1 hr. after delivery	
	<input type="checkbox"/> Breastfeed on demand	

- Breast milk is the best food for baby
- Breast milk protects babies from becoming sick
- Breastfeeding is good for mother's health
- Avoid using feeding bottles or pacifiers
- Other (Please specify).....

14. What is your current employment?

- |  |   |                     |
|--|---|---------------------|
| <input type="checkbox"/> Public sector employment  | <input type="checkbox"/> Self-employed        | } → GO TO NUMBER 17 |
| <input type="checkbox"/> Private sector employment | <input type="checkbox"/> Unemployed           |                     |
| <input type="checkbox"/> Other (Please specify)    | <input type="checkbox"/> Full time house wife |                     |

15. Are you entitled to a maternity leave?

- |                              |   |
|------------------------------|---|
| <input type="checkbox"/> Yes | <input type="checkbox"/> No → GO TO NUMBER 17 |
|------------------------------|---|

16. How long is your maternity leave? .....months

17. How old was your husband/partner on his last birthday?

(Age in completed years) .....years

18. What is his highest level of school attendance?

- |                                  |                                    |                                 |  |
|----------------------------------|------------------------------------|---------------------------------|--|
| <input type="checkbox"/> Primary | <input type="checkbox"/> Secondary | <input type="checkbox"/> Higher | <input type="checkbox"/> Other (Please specify)..... |
|----------------------------------|------------------------------------|---------------------------------|--|

19. What is your husband's/partner's current employment?

- |  |  |
|--|--|
| <input type="checkbox"/> Public sector employment  | <input type="checkbox"/> Unemployed                  |
| <input type="checkbox"/> Private sector employment | <input type="checkbox"/> Other (Please specify)..... |
| <input type="checkbox"/> Self-employed             |  |

20. Does your husband/partner have other wives?

- |                              |   |
|------------------------------|---|
| <input type="checkbox"/> Yes | <input type="checkbox"/> No → GO TO NUMBER 22 |
|------------------------------|---|

21. Are you the first, second .....wife? Your rank.....

How are you planning to feed your baby?

- |  |   |
|--|---|
| <input type="checkbox"/> Breast milk only      | <input type="checkbox"/> Breast milk and formula                    |
| <input type="checkbox"/> Formula only          | <input type="checkbox"/> Breast milk and other liquids (name .....) |
| <input type="checkbox"/> Breast milk and water |   |

22. For how long do you plan to feed your baby with breast milk **only**?

- |   |  |
|---|--|
| <input type="checkbox"/> Never              | <input type="checkbox"/> 3 months – 6 months |
| <input type="checkbox"/> 1 day – 1 month    | <input type="checkbox"/> 6 months            |
| <input type="checkbox"/> 1 month – 3 months |  |

**Section 2: Breastfeeding intention, motivations and perceived barriers**

23. I will read some statements to you. Please rate your level of agreement or disagreement with each statement

	Agree very much	Agree a little	Not sure	Disagree a little	Disagree very much
a. I am planning to feed my baby with only	<input type="checkbox"/>				

	formula or other feeds such as pap, (I will not breastfeed at all)					
b.	I am planning to at least try breastfeeding my baby exclusively	<input type="checkbox"/>				
c.	When my baby is 1 month old, I will be breastfeeding exclusively without using any formula or other milk,( pap, or other foods)	<input type="checkbox"/>				
d.	When my baby is 3 month old, I will be breastfeeding exclusively without using any formula or other milk,( pap, or other foods)	<input type="checkbox"/>				
e.	When my baby is 6 month old, I will be breastfeeding exclusively without using any formula or other milk,( pap, or other foods)	<input type="checkbox"/>				

24. I will read some statements to you. Please tell me if you agree with the statement (True) or if you do not agree with the statement (False).

	TRUE	FALSE
a. Formula feeding is as good for my baby's health as breastfeeding.	<input type="checkbox"/>	<input type="checkbox"/>
b. Breastfeeding develops a strong bond between mother and baby.	<input type="checkbox"/>	<input type="checkbox"/>
c. Breastfeeding at night is easier than bottle feeding.	<input type="checkbox"/>	<input type="checkbox"/>
d. It will be difficult for me to breastfeed my baby.	<input type="checkbox"/>	<input type="checkbox"/>
e. I am not confident in my ability to breastfeed my baby.	<input type="checkbox"/>	<input type="checkbox"/>
f. I would be very proud of myself if I breastfed my baby.	<input type="checkbox"/>	<input type="checkbox"/>
g. I would feel shy breastfeeding outside my home.	<input type="checkbox"/>	<input type="checkbox"/>
h. I would feel comfortable breastfeeding in front of my family.	<input type="checkbox"/>	<input type="checkbox"/>
i. If I breastfeed people will see my breasts.	<input type="checkbox"/>	<input type="checkbox"/>
j. I feel that my breasts are too small to breastfeed sufficiently.	<input type="checkbox"/>	<input type="checkbox"/>
k. It would take too much time for me to breastfeed my baby.	<input type="checkbox"/>	<input type="checkbox"/>
l. I would be able to breastfeed my baby and go to work or school.	<input type="checkbox"/>	<input type="checkbox"/>
m. If I breastfeed I will feel tied down.	<input type="checkbox"/>	<input type="checkbox"/>
n. A busy mom can breastfeed her baby sometimes and give it other baby food at other times.	<input type="checkbox"/>	<input type="checkbox"/>
o. I feel that my relatives and friends will support me if I breastfeed.	<input type="checkbox"/>	<input type="checkbox"/>
p. I feel that my mother wants me to feed my other baby food.	<input type="checkbox"/>	<input type="checkbox"/>
q. Women in my family, like my sisters and aunts, think that I should give my baby other food apart from breast milk.	<input type="checkbox"/>	<input type="checkbox"/>
r. I feel that my baby's father encourages breastfeeding.	<input type="checkbox"/>	<input type="checkbox"/>

**Section 3: Household characteristics and socioeconomic status**

25. Household roster				
HL1 No.	HL2 Usual residents	HL3 Relationship*	HL4 Sex	HL5 Age
CODE	Please give me the names of the people with whom you usually sleep and eat starting with the head of the household.	What is the relationship to the head of the household?  <b>*REFER TO CODE BELOW</b>	Is (NAME) male or female? 1=Male 2=Female	How old is (NAME)? <b>WRITE IN YEARS</b>  <b>IF AGE LESS THAN 1 YEAR WRITE 00</b>
01				
02				
03				

04				
05				
06				
07				
08				
09				
10				
11				
12				
13				

\*Relationship to head of respondent

01=Head 02=Wife or husband 03=Son or daughter 04=son-in-law or daughter-in-law 05=Grandchild  
06=Parent 07=Parent-in-law 08=Brother or sister 09= Brother-in-law or sister-in-law 10=Other relative  
11=Adopted/fostered/stepchild 12=Not related 13=DK

**Living condition**

26. What is the main source of drinking water for members of your household?

- |  |   |  |
|--|---|--|
| <input type="checkbox"/> Piped water into dwelling | <input type="checkbox"/> Well                 | <input type="checkbox"/> Surface water (e.g. river/dam/lake/pond/stream/canal) |
| <input type="checkbox"/> Piped water to yard/plot  | <input type="checkbox"/> Rainwater            | <input type="checkbox"/> Bottled water   |
| <input type="checkbox"/> Public tap/standpipe      | <input type="checkbox"/> Tanker truck         | <input type="checkbox"/> Other (Please specify).....                           |
| <input type="checkbox"/> Tube well or borehole     | <input type="checkbox"/> Cart with small tank |  |

27. What is the main source of water used by your household for other purposes such as cooking and hand washing?

- |  |   |  |
|--|---|--|
| <input type="checkbox"/> Piped water into dwelling | <input type="checkbox"/> Well                 | <input type="checkbox"/> Surface water (e.g. river/dam/lake/pond/stream/canal) |
| <input type="checkbox"/> Piped water to yard/plot  | <input type="checkbox"/> Rainwater            | <input type="checkbox"/> Bottled water   |
| <input type="checkbox"/> Public tap/standpipe      | <input type="checkbox"/> Tanker truck         | <input type="checkbox"/> Other (Please specify).....                           |
| <input type="checkbox"/> Tube well or borehole     | <input type="checkbox"/> Cart with small tank |  |

28. Where is that water source located?

- |  |   |                                    |
|--|---|------------------------------------|
| <input type="checkbox"/> In own dwelling | <input type="checkbox"/> In own yard/plot | <input type="checkbox"/> Elsewhere |
|--|---|------------------------------------|

29. What kind of toilet facility do members of your household usually use?

- |   |   |
|---|---|
| <input type="checkbox"/> Flush or pour flush toilet | <input type="checkbox"/> Bucket toilet                  |
| <input type="checkbox"/> Pit latrine                | <input type="checkbox"/> Hanging toilet/hanging latrine |
| <input type="checkbox"/> Composting toilet          | <input type="checkbox"/> No facility/bush/field         |

30. Do you share this toilet facility with other households?

- |                              |                             |
|------------------------------|-----------------------------|
| <input type="checkbox"/> Yes | <input type="checkbox"/> No |
|------------------------------|-----------------------------|

31. What type of fuel does your household mainly use for cooking?

- |                                      |  |  |
|--------------------------------------|--|--|
| <input type="checkbox"/> Electricity | <input type="checkbox"/> Firewood                    | <input type="checkbox"/> Charcoal                    |
| <input type="checkbox"/> LPG (gas)   | <input type="checkbox"/> Straw/shrubs/grass          | <input type="checkbox"/> No food cooked in household |
| <input type="checkbox"/> Kerosene    | <input type="checkbox"/> Other (Please specify)..... |  |

32. Is the cooking usually done in the house, in a separate building, or outdoors?



**Appendix 11:** Six weeks postpartum questionnaire

**Section 1: Breastfeeding practice**

4. Child's gender  Male  
 Female

5. Child's age in weeks .....weeks

6. Birth order of child  
 First  Third  Other (Specify).....  
 Second  Forth

7. Who assisted with the delivery of (NAME)?  
 Doctor  Relative/friend  
 Nurse/midwife  Other (Specify).....  
 Traditional birth attendant

8. Where did you give birth to (NAME)?  
 Home  Private hospital/clinic  
 Govt. hospital/health center  Other (Specify).....

9. How was (NAME) delivered?  
 Vaginal delivery  Caesarean section

10. How long after (NAME) was delivered did you stay there?  
 Less than one day .....Day(s) .....Week(s)

11. How much did (NAME) weigh at birth?  
CHECK HEALTH CARD IF AVAILABLE .....kg

12. Before you were discharged after (NAME) was born, did any health care provider assist you to initiate breastfeeding?  
 Yes  No **→** GO TO NUMBER 11

13. Who helped you with breastfeeding at that time?  
 Doctor  Traditional birth attendant  
 Nurse/midwife  Other (Specify).....

14. How long after birth did you first put (NAME) to the breast?  
 Immediately .....Hour(s) .....Day(s)

15. In the first three days after delivery, was (NAME) given anything to drink other than breast milk?  
 Yes  No **→** GO TO NUMBER 15

16. What was (NAME) given to drink?

(RECORD ALL LIQUIDS MENTIONED)

- Milk (other than breast milk)
- Plain water
- Sugar/glucose water
- Other (Specify).....
- Sugar-salt water solution
- Fruit juice
- Infant formula
- Gripe water
- Honey
- Tea/infusions

17. What were the reasons for giving this?

- Breast milk didn't come
- Pre-term birth
- Baby ill
- Cultural practice
- Mother ill
- Other (Specify).....

18. Are you still breastfeeding (NAME)?

- Yes → GO TONUMBER 17
- No

19. For how many weeks did you breastfeed (NAME) .....weeks

20. How many times did you breastfeed (NAME) last night between sunset and sunrise?

(PROBE TO GET NUMERIC RESPONSE) .....times

21. How many times did you breastfeed (NAME) yesterday during the daytime?

(PROBE TO GET NUMERIC RESPONSE) .....times

22. About how long does (NAME) breastfeed each time you feed him/her?

(PROBE TO GET APPROXIMATE DURATION)

- Less than 10 minutes
- 10 to 19 minutes
- 20 to 29 minutes
- 30 to 39 minutes
- More than 40 minutes

23. Did (NAME) feed only with breast milk during the past 24 hours?

- Yes → GO TO NO. 25
- No

24. What else did (NAME) receive apart from breast milk during the past 24 hours?

- Infant formula
- Baby cereal
- Plain water
- Other porridge/gruel e.g. pap
- Other milk

25. At what age did you begin to feed (NAME) with foods other than breast milk?

- Soon after birth
- 1 week old
- 2 weeks old
- 3 weeks old
- 4 weeks old

26. Why did you start to give other fluids/foods?

PLEASE ANSWER EACH ITEM IN LEVEL OF IMPORTANCE

	Not important at all	Not very important	A little important	Very important
Insufficient breast milk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Too much house work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
To supplement breast milk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Right age to start complementary feeding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

To teach child to eat other foods	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Baby refused the breast	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mother ill	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Baby ill	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Return to work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Lack of support from husband and other relatives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Breastfeeding too tiring	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Became pregnant/wanted to be pregnant	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Contraceptive use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Baby still hungry after breastfeeds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I cannot breastfeed my baby in public	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My breasts are too small	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Baby not gaining enough weight	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Advice from health care provider	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Breast milk did not come	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

27. Did anyone advise you to stop breastfeeding/ introduce other foods/fluids?

- Yes (**If yes, who?**)       No  
 Child's Father               Healthcare provider               Your mother-in-law  
 Your mother               Another relative (Specify).....

28. Did/Do you have any problems with breastfeeding (NAME)?

- Yes               No      **→ GO TO NUMBER 27**

29. What problems did/do you have?

PLEASE ANSWER EACH ITEM IN LEVEL OF IMPORTANCE

	Not important at all	Not very important	A little important	Very important
Breastfeeding was painful	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sore cracked nipples	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Breast infection/abscess	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Painful breasts with fever (Mastitis)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Warm and painful breasts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Section 2: Baby's health**

30. Have you taken your baby to the hospital for any reason or has your baby been admitted in the hospital in the past one month?

- Yes               No      **→ GO TO NUMBER 29**

31. Why did you take your baby to the hospital?

.....

.....

.....

.....

.....

32. Did you give your baby any medicines in the past one month?

Yes  No

**↓**  
CONTINUE

Which medicine(s) did you give your baby (RECORD ALL)

33. Name of medicine	Where did you get it from
1.	
2.	
3.	

34. How many stools does your baby usually have in a day? If less than one a day, how many days usually pass between stools?

.....stool per day

One stool every .....days

35. How was your baby's stool in the past 7 days?

Hard  Soft  Watery  
 Formed  Almost watery  Bloody stool

36. How much did (NAME) weigh the last time you checked his/her weight?

.....kg  don't know

#### **Section 4: Maternal wellbeing**

As you have recently had a baby, we would like to know how you are feeling now. Please tick the answer that comes closest to how you feel. **Please choose an answer that comes closest to how you have felt in the past seven days, not just how you feel today**

37. In the past seven days:

I have been able to laugh and see the funny side of things

As much as I always could  
 Not quite so much now  
 Definitely not so much now  
 Not at all

I have looked forward with enjoyment to things:

As much as I ever did  
 Rather less than I used to  
 Definitely less than I used to  
 Hardly at all

I have blamed myself unnecessarily when things went wrong:

Yes, most of the time  
 Yes, some of the time  
 Not very much  
 No, never

I have been anxious or worried for no good reason

- No, not at all
- Hardly ever
- Yes, sometimes
- Yes, very often

I have felt scared or panicky for no real reason

- Yes, quite a lot
- Yes, sometimes
- No, not much
- No, not at all

Things have been getting too much for me

- Yes, most of the time I haven't been able to cope at all
- Yes, sometimes I haven't been coping as well as usual
- No, most of the time I have coped quite well
- No, I have been coping as well as ever

I have been so unhappy that I have had trouble sleeping

- Yes, most of the time
- Yes, sometimes
- Not very often
- No, not at all

I have felt sad or miserable

- Yes, most of the time
- Yes, quite often
- Not very often
- No, not at all

I have been so unhappy I have cried

- Yes, most of the time
- Yes, quite often
- Only occasionally
- No, never

I have thought of hurting myself

- Yes, quite often
- Sometimes
- Hardly ever
- Never

38. Do you currently drink any form of alcohol?

Yes

No → GO TO NUMBER 35

In the last 24 hours, how many bottles of alcoholic drink did you take? .....

In the past week, how many bottles of alcoholic drink did you take? .....

In the past month, how many bottles of alcoholic drink did you take? .....

39. Do you currently smoke cigarettes?

Yes

No → If No, END

In the last 24 hours, how many cigarettes did you smoke? .....

In the past week, how many packets of cigarettes did you smoke? .....							packets
In the past one month, how many packets of cigarettes did you smoke? .....							packets
<b>INTERVIEWERS: CHECK YOUR FILLED IN QUESTIONNAIRE CAREFULLY BEFORE LEAVING THE RESPONDENT AND END YOUR INTERVIEW BY GIVING THANKS TO THE RESPONDENT</b>							
<b>RECORD THE TIME FINISHED:</b>	<b>HOURS:</b>				<b>MINUTES:</b>		

**Appendix 12:** Three months postpartum questionnaire

**INTERVIEWER: (INTRODUCE YOURSELF AND SAY) I WILL LIKE TO ASK YOU SOME QUESTIONS ABOUT HOW YOU ARE FEEDING YOUR BABY AND ABOUT YOURSELF.**

**Section 1: Breastfeeding practice**

1. Are you still breastfeeding (NAME)?  
 Yes **————→**GO TO NUMBER 3       No

2. For how many weeks did you breastfeed (NAME) .....weeks

3. How many times did you breastfeed (NAME) last night between sunset and sunrise?  
 (PROBE TO GET NUMERIC RESPONSE) .....times

4. How many times did you breastfeed (NAME) yesterday during the daytime?  
 (PROBE TO GET NUMERIC RESPONSE) .....times

5. About how long does (NAME) breastfeed each time you feed him/her?  
 (PROBE TO GET APPROXIMATE DURATION)  
 Less than 10 minutes       20 to 29 minutes       More than 40 minutes  
 10 to 19 minutes       30 to 39 minutes

6. Did (NAME) feed only with breast milk during the past 24 hours?  
 Yes **————→**GO TO NUMBER 11       No

7. What else did (NAME) receive apart from breast milk during the past 24 hours?  
 Infant formula       Plain water       Other porridge/gruel e.g. pap  
 Baby cereal       Other milk

8. At what age did you begin to feed (NAME) with foods other than breast milk?  
 Soon after birth       2 months old  
 1 month old       3 months old

9.

10. Why did you start to give other fluids/foods?

PLEASE ANSWER EACH ITEM IN LEVEL OF IMPORTANCE

	Not important at all	Not very important	A little important	Very important
Insufficient breast milk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Too much house work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
To supplement breast milk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Right age to start complementary feeding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
To teach child to eat other foods	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Baby refused the breast	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mother ill	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Baby ill	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Return to work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Lack of support from husband and other relatives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Breastfeeding too tiring	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Became pregnant/wanted to be pregnant	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Contraceptive use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Baby still hungry after breastfeeds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I cannot breastfeed my baby in public	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My breasts are too small	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Baby not gaining enough weight	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Advice from health care provider	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Breast milk did not come	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

11. Did anyone advise you to stop breastfeeding/ introduce other foods/fluids?

- Yes (If yes, who?)                       No  
 Child's Father                               Healthcare provider                               Your mother-in-law  
 Your mother                                   Another relative (Specify).....

12. Did/Do you have any problems with breastfeeding (NAME)?

- Yes     No **————→** GO TO NUMBER 13

13. What problems did/do you have?

PLEASE ANSWER EACH ITEM IN LEVEL OF IMPORTANCE

	Not important at all	Not very important	A little importa nt	Very important
Breastfeeding was painful	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sore cracked nipples	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Breast infection/abscess	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Painful breasts with fever (Mastitis)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Warm and painful breasts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Section 2: Baby's health**

14. Have you taken your baby to the hospital for any reason or has your baby been admitted in the hospital in the past one month?

- Yes     No **————→** GO TO NUMBER 15

15. Why did you take your baby to the hospital?

.....

.....

.....

.....

.....

16. Did you give your baby any medicines in the past one month?

- Yes     No

**↓**  
CONTINUE

Which medicine(s) did you give your baby (RECORD ALL)

