

INFANT AND CHILD FEEDING PRACTICES: ANALYSES OF EXCLUSIVE
BREASTFEEDING AND COMPLEMENTARY FEEDING IN NAMIBIA

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KLEMENS MUTORWA

200241095

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SUPERVISOR: PROF. NELAGO INDONGO

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LIST OF ABBREVIATION

AIDS	Acquired Immune Deficiency Syndrome
ANC	Antenatal Care
DHS	Demographic and Health Survey
EAS	Enumeration Areas
CI	Confidence interval
EBF	Exclusive Breastfeeding
HIV	Human Imune Virus
MICS	Multiple Indicator Cluster Survey
MoHSS	Ministry of Health and Social Services
NDHS	Namibia Demographic and Health Survey
PSU	Primary Sampling Unit
UNICEF	United Nations Children’s Fund
WHO	World Health Organisation

OPERATIONAL DEFINITION OF TERMS

Breastfeeding: the method of feeding a baby with milk directly from the mother's breast.

Bottle-feeding: the infant is fed from a bottle, regardless of its contents, including expressed breast milk.

Complementary feeding: the child receives age-appropriate, adequate and safe solid or semi-solid food in addition to breastmilk or a breastmilk substitute.

Exclusive breastfeeding: an infant receives only breastmilk and no other liquids or solids, not even water, with the exception of drops or syrups consisting of vitamins, mineral supplements or medicines.

Infant: a child aged between 0 and <12 months (sometimes referred to as 0-11 months) that is 12 completed months of life while a **young infant** is defined as an infant aged between 0 and <6 months (sometimes referred to as 0-5 months) that is six completed months of life.

Malnutrition: An impairment of health resulting from a deficiency, excess or imbalance of nutrients. It includes undernutrition, which refers to a deficiency of energy (kJ) and or one or more essential nutrients. It also refers to over –nutrition, which is excess of one or more nutrients and usually energy.

Young child: a child aged between 12 and <24 months (sometimes referred to as 12-23 months).

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All said and done Glory be to God

DECLARATION

I, Klemens T. Mutorwa, hereby declare that this study is a true reflection of my own research, and that this work, or part thereof has not been submitted for a degree in any other institution of higher education, and that all the sources I have used or quoted have been indicated and acknowledged as complete references.

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ABSTRACT

Malnutrition remains a factor, directly or indirectly, in 60% of 11 million deaths of children aged less than five years globally each year. Hence, proper nutrition during infancy and early childhood is fundamentally to the development of a child's potential for normal growth, development, and survival of infants and children, particularly in developing.

This study intent was to examine feeding patterns, practices and factors associated with exclusive breast feeding and complementary feeding among infant (0-6 months) and young children (0-24 months) feeding practices in Namibia.

A quantitative cross-sectional research design was used based on the 2013 Namibia Demographic and Health Survey (NDHS). To determine factors associated with exclusive breastfeeding, a chi-square test was used at a significance level of 0.05. Odds ratios with their 95% CI were computed and variables having p value less than 0.05 in the multivariable logistic regression with the stepwise backward elimination procedure were considered as significantly associated with the dependent variable. The duration of breastfeeding and the time to introduction of complementary foods were presented using Kaplan-Meier survival curves. SPSS was used for all the analysis.

The study found that the proportion of children aged 0-6 months who were being breastfed at the time of survey was 35.1% and only 19% of the children in the same age range were exclusively breastfed. The median duration of exclusive breastfeeding was three months and exclusive breastfeeding decreases with

increasing age of a child. The results showed that exclusive breastfeeding practice among children aged 0-6 months, decreases with age of the child (OR=0.76, 95%CI: 0.71-0.81), the older once have a 24% less likelihood of been exclusively breastfed compared to the once who are younger. The mothers with a secondary or higher educational level are 15% (OR=0.85, 95%CI: 0.71-1.01) less likelihood of exclusive breastfeeding practice respectively, when compared to those with a mothers with a primary or lower educational level. The mothers that were employed had an odds 54% (OR=0.55, 95%CI: 0.46-0.66) less likelihood of exclusive breastfeeding practice when compared to those that that were unemployed.

The analysis of duration of breastfeeding among young children (0-24 months) showed that the probability of breastfeeding decreases as children were given solid foods, indicating that mothers were more likely to stop breastfeeding as the months of breastfeeding increases. The majority of the children in the study were introduced to solid foods before the recommended age of six month. Furthermore, there is urgent need for the MoHSS and other agencies working on improving child health through feeding practices to develop satisfactory, cheap and culturally acceptable complementary recipes that can be prepared from locally available foods.

LIST OF PUBLICATION(S) FROM THE THESIS

The Practice of Exclusive Breastfeeding in Namibia. Published in the *International Journal of Sciences: Basic and Applied Research (IJSBAR)* (2017) Volume 36, No 1, pp 159-169

**SECTION I: THE PREVALENCE AND FACTORS ASSOCIATED WITH
EXCLUSIVE BREAST FEEDING AMONG INFANTS AND
YOUNG CHILDREN IN NAMIBIA**

CHAPTER 1

INTRODUCTION

1.1 Background

The first 100 days of life from conception until age 2 years are critical for the optimal growth and development of infants and young children (Kimani-Murage *et al.*, 2011; Ayisi *et al.*, 2014). Undernutrition that is not addressed during this critical window of opportunity is often irreversible (Kimani-Murage *et al.*, 2011; Molla *et al.*, 2017). Therefore, optimal and appropriate infant and young child nutrition during the first 2 years of life has the potential of reducing stunting, as well as improving child survival outcomes through reduction in mortality and morbidity from common childhood diseases such as diarrhoea and pneumonia (Agho *et al.*, 2011; Laterra *et al.*, 2014). Malnutrition remains a factor, directly or indirectly, in 60% of 11 million deaths of children aged less than five years globally each year (Mwangome *et al.*, 2010; Kassa *et al.*, 2016). It is the most important risk factor for the burden of disease in developing countries, causing long-term detrimental consequences, such as impaired cognitive development, growth impairment, and poor academic performance (Kalam, 2014). Children most at risk are those aged less than five years living in developing countries (Mwangome *et al.*, 2010). Hence, proper nutrition during infancy and early childhood is fundamentally to the development of a child's

potential for normal growth, development, and survival of infants and children, particularly in developing countries including Namibia (Chowdhury *et al.*, 2016). But, Poor breastfeeding and complementary feeding practices have been widely documented in the developing countries including Namibia (Kimani-Murage *et al.*, 2011). According to Kimani-Murage *et al.* (2011) only about 39% of infants in the developing countries, 25% in Africa are exclusively breastfed for the first six months. Additionally, 6% of infants in developing countries are never breastfed.

It has been recognized that inappropriate feeding practices include absence of exclusive breastfeeding in children below 6 months old, premature ab lactation after 6 months, and giving complementary foods too late was responsible for one-third of the cases of malnutrition worldwide (Zhou *et al.*, 2012) Zhou *et al.*, 2012 states that some intervention studies aimed at improving feeding practices were conducted in some areas with a high a prevalence of malnutrition and found that infant growth improved significantly after nutritionally adequate and hygienic complementary foods were added to the infants' diet. These researches showed that exclusive breastfeeding in children below 6 months, continued breastfeeding up to 2 years of age, and timely introduction of complementary food were essential for decreasing malnutrition.

According to Onah *et al.*, (2014) the efforts to promote modest nutritional improvements such as changes in feeding behaviour will have a beneficial impact on reducing mortality rates over time, thus the feeding practices adopted by mothers depends on the knowledge, attitude, socio-cultural tradition they are exposed to. Owing to the known nutritional and health benefits to the infant, women in resource-

poor countries exclusively breastfeed until their babies reach 6 months of age (Onah *et al.*, 2014). This is due to the fact that breastfeeding and exclusive breastfeeding for six months can protect infants from short term illnesses such as gastroenteritis, respiratory infection and under nutrition; and in the long term, against chronic diseases such as type 2 diabetes, hypertension and obesity (Khanal *et al.*, 2014). Adequate nutrition during infancy and early childhood is essential to ensure the growth, health, and development of children to their full potential (Kassa *et al.*, 2016). It has been recognized worldwide that breastfeeding is beneficial for both the mother and child (Breastfeeding plays a vital and influential role on the duration of amenorrhoea, child survival, and fertility, offering protection to an infant against early morbidity and mortality), as breast milk is considered the best source of nutrition for an infant (Motee *et al.*, 2013; Akter and Rahman, 2010). Despite the advantages of breastfeeding, some of the infant feeding practices are inappropriate, leading to the increase in the prevalence of stunting during the first 18 months of life (Mananga *et al.*, 2014).

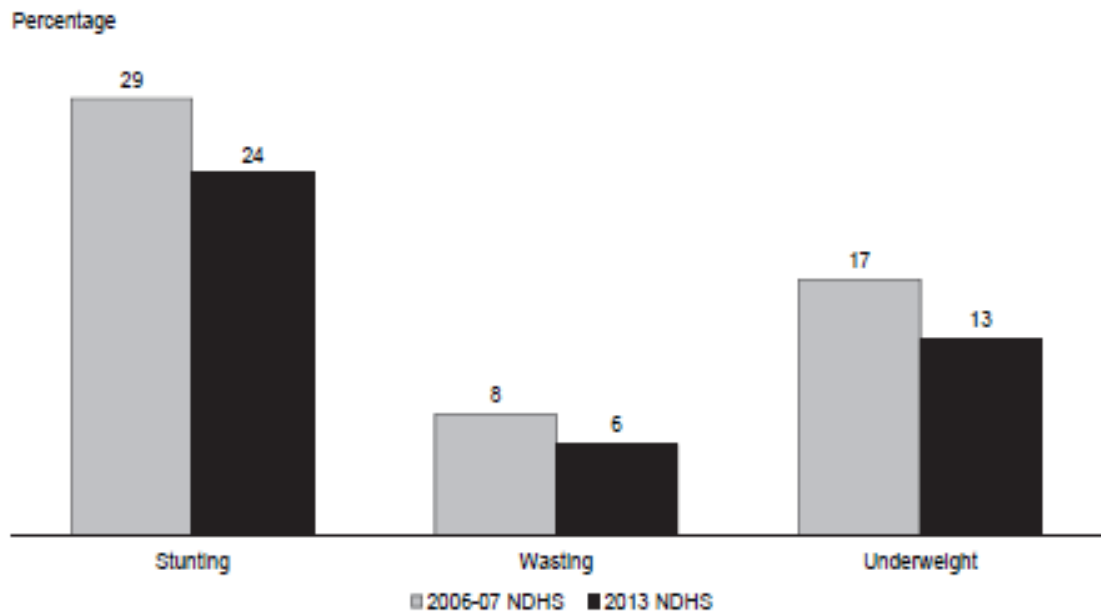


Figure1: Trends in nutritional status of children under age 5 by period adopted from the 2013 DHS report by MoHSS.

The trends in the nutritional status of children under the age of 5 in Namibia over the last six years show that the proportions of children who are stunted, wasted, and underweight decreased between the 2006-07 NDHS and 2013 NDHS surveys. In Namibia malnutrition is common with one in four children under five years short for their age and underweight (MoHSS, 2012). In this report (MoHSS, 2012) observed that stunting in children less than 6 months is a rare occurrence in a breastfeeding population, is also on the increase largely because of HIV/AIDS and inappropriate infant feeding practices; in other words this could be linked with the confusing messages regarding breastfeeding in the context of HIV and the use of infant formula that the population is receiving leading to inappropriate infant feeding practices. Khanal *et al.* (2013) states that complementary feeding practice is a significant factor that determines the nutritional status of children, and suboptimal infant feeding practices are the major reasons for childhood under nutrition in developing countries.

According to the Namibian MoHSS report, only 25% of infants are exclusively breastfed for six months. Bottle-feeding, non-breast milk feeds such as juices and plain water, and complementary foods are introduced within the first three months of infants' lives. (MoHSS, 2012).

1.2 Statement of Problem

The study seeks to examine the feeding patterns, practices and factors associated with exclusive breast feeding and complementary feeding among infant and young children feeding practices in Namibia. Infant and young child feeding practices are important for healthy growth and development and the improvement of child survival rates. Inappropriate feeding practices and low quality complementary foods are a significant cause of the high burden of child under nutrition worldwide. It is estimated that improved breastfeeding and complementary feeding practices have the potential to save the lives of 1.5 million children under 5 years of age every year (Disha *et al.*, 2012; Laterra *et al.*, 2014). A key issue that needs to be addressed in ensuring satisfactory child health is undernutrition, which is an underlying cause of child deaths associated with infectious diseases. Appropriate feeding practices are fundamentally important for the survival, growth, development, health and nutrition of infants and children and for the wellbeing of the mothers. While breastfeeding continues up to the age of two years and beyond, introduction at the right age of safe and adequate amount of food is an important factor to consider in infant and young children feeding practices.

The 2013 NDHS indicates that among Namibian children under age 5 at the time of the survey, 24 % were stunted (short for their age), 6 % were wasted (thin for their height), and 13 % were underweight (thin for their age). Only 3 % of children were overweight (heavy for their height) (MoHSS, 2014). While a number of research on exclusive breastfeeding (Kimane-Murange et al. 2011; Noughabi et al. 2014) quoted that the World Health Organization (WHO) advocated that inappropriate feeding of infants and young children could be responsible for cases of child morbidity worldwide. Although exclusive breastfeeding levels in Namibia have improved over the years from 2007 to 2013, it is still not widespread and there are differentials in practicing it among women with different socio-economic and demographic characteristics (MoHSS, 2014). There is need to investigate more deeply the infant feeding practices that are currently being practices so that appropriate messages or health promotion activities that are targeting children are designed. This is due to the fact that it has been documented by Kimani-Murage *et al.* (2011) that in the developing countries including Namibia there is poor breastfeeding and complementary feeding practices. Understanding the prevalence and predictors that influence exclusive breastfeeding and complementary feeding practices is crucial to promoting the practices.

1.3 Objectives of the study

The main aim of the study is to examine feeding patterns, practices and factors associated with exclusive breast feeding and complementary feeding among infant and young children feeding practices in Namibia in order to be able to provide information to the Ministry of Health and Social Services (MoHSS), policy makers

and public health researchers for future research work and also to be used to develop interventions to improve the health status of children.

Specifically the study objectives are:

- To determine the prevalence of exclusive breastfeeding among infants (0-6 months).
- To examine factors associated with exclusive breastfeeding among infants (0-6 months).
- To determine the pattern of breastfeeding and complementary feeding practices among infants (0-6 months) and young children (0-24 months).
- To examine factors associated with breastfeeding and bottle feeding among young children (0-24 months)
- To assess the duration of breastfeeding among young children (0-24 months)
- To assess and describe feeding practices and nutritional status of infants and young children (0-6 months) against (0-24 months), respectively

1.4 Significance of the study

The study has generated information that may be useful in designing appropriate interventions for the implementation of national nutrition programme for infants and young children to better monitor the changes in the current feeding practices and design interventions in Namibia to increase the recommended feeding practices and thereby contribute in reducing under nutrition. In addition the generated information will be useful to the MoHSS and other agencies working on improving child health through feeding practices. Promotion of appropriate infant feeding practices

including exclusive breastfeeding is an effective strategy in improving the nutritional status of children as well as timely introduction of appropriate complementary food to infants.

1.5 The thesis outline

The thesis is presented in five chapters.

Chapter 1: *Introduces the study, state what the purpose of the study is and explain the study's significance.*

Chapter 2: *Covers related literature and its relevance to the discussion (describes and analyses previous research on the topic)*

Chapter 3: *Presents the methodology used in the study. Thus, the chapter describes, justifies the data used and also outlines how the data was analysed.*

Chapter 4: *This chapter shows the results from the data analysis.*

Chapter 5: *This chapter discusses what the findings mean in relation to the theoretical body of knowledge on the topic*

Chapter 6: *This chapter concludes the study and gives recommendations*

CHAPTER 2

LITERATURE REVIEW

In 2002, the World Health Organization and UNICEF adopted the Global Strategy for infant and young child feeding. The strategy was developed to revitalise world attention to the impact that feeding practices have on the nutritional status, growth and development, health, and survival of infants and young children (WHO, 2009). The Global Strategy reaffirms and builds on the declaration on the Protection, Promotion and Support of Breastfeeding that was adopted in 1990 and revitalized in 2005 (WHO, 2009). In 2006 an estimated 9.5 million children died worldwide before the age of five; of which 35% were due to under nutrition (Khanal *et al.*, 2013). The major measures of under nutrition in developing countries include stunting, wasting, and micronutrient deficiency. Children aged 6–23 months are at a greater risk to suffer from under nutrition.

Malnutrition can impair all aspects of child's growth, motor, cognitive functions and social development (Khamis *et al.*, 2017). In developing countries, more than 50% of all deaths of children are caused by malnutrition; with the major determinant and the root cause of it are the methods of feeding. Two-third of infancy deaths are mostly related to poor feeding practices. Unfortunately, mothers don't really understand the proper methods of feeding their babies, especially exclusive breastfeeding for less than 6 months (Khamis *et al.*, 2017). It has been estimated that less than 40% of children under the age of 6 months were exclusively breastfeed in developing countries. Sub-optimal breastfeeding results into more than 30 million deaths of children globally. Furthermore, in many places, complementary feeding for

children above 6 months begins too early or too late, and foods are often nutritionally inadequate and un-safe for the baby (Khamis *et al.*, 2017)

2.1 Exclusive breastfeeding practice

The World Health Organization (2009) recommends that infants be exclusively breastfed for the first six months, beginning from the first hour of life, to meet the infant's nutritional requirements and achieve optimal growth, development and health followed by breastfeeding along with complementary foods for up to two years of age or beyond in order to meet the evolving needs of the growing infant. Exclusive breastfeeding can be defined as a practice whereby the infants receive only breast milk and not even water, other liquids, tea, herbal preparations, or food during the first six months of life, with the exception of vitamins, mineral supplements, or medicines (WHO, 2009, Kimani-Murage *et al.*, 2011).

Suboptimum breastfeeding, particularly nonexclusive breastfeeding, results in 1.4 million child deaths and 10% of disease burden in children less than five years old (Ayisi *et al.*, 2014). Global risk assessment of suboptimal breastfeeding indicates that 96% of all infant deaths in developing countries are attributable to inappropriate feeding occurring during the first six months of life (Mekuria & Edris, 2015). Suboptimal breastfeeding contributes to 45% of neonatal infectious deaths, 30% of diarrheal deaths and 18% of acute respiratory deaths among children under five in developing countries [4].. (Mekuria & Edris, 2015)

The major advantage of exclusive breastfeeding from 4 to 6 months includes reduced morbidity due to gastrointestinal infection. Kimani-Murage *et al.* (2011) states that interventions promoting optimal breastfeeding could prevent 13% of deaths, while those promoting optimal complementary feeding could prevent another 6% of deaths in countries with high mortality rates. However, many researchers are questioning if there is sufficient evidence to confidently recommend exclusive breastfeeding for 6 months for infants in developed countries due to the fact that breast milk may not meet the full energy requirements of the average infant at 6 months of age. Nevertheless, there is scanty data that give estimation about the proportion of exclusively breastfed infants at risk of specific nutritional deficiencies (Motee *et al.*, 2013).

Mananga *et al.* (2014) indicate that breastfeeding has a unique biological and emotional influence on the health of both the mother and the young child. It is furthermore an important determinant of infant health in the prevention of malnutrition and infections. When an infant reaches the age of about six months, however, breast milk alone is no longer sufficient in meeting nutrient requirements and other food should therefore be given. Despite its advantages, breastfeeding is declining in Cameroon due to the fact that exclusive breastfeeding is little or poorly known by most mothers (Mananga *et al.*, 2014). There is also a tendency in Cameroon to introduce early complementary foods in the diet of the young children because the mothers believed that their milk was not sufficient spoiled or they believe to calm a baby who cries a lot. Hence, some of the infant feeding practices are inappropriate, leading to the increase in the prevalence of stunting during the first 18 months of life.

Although WHO's, Global and National Infant, and Young Child Feeding Guidelines recommend that all new-borns should start breastfeeding immediately (within the first hour after delivery), a study in Mauritius showed that very few mothers started to breastfeed immediately/within minutes after delivery or within one hour after birth. This is due to the fact that caesarean delivery in Mauritius is on the rise (Motee *et al.*, 2013). The delayed initiation of breastfeeding was mostly related to (1) the physical condition of the mother after delivery, whereby some mothers claimed that they were not feeling well enough to be able to breastfeed; (2) painful conditions associated with caesarean section; (3) the absence of their infants who were kept in nursery.

Motee *et al.* (2013) argues that similar studies also noted that the rate of breastfeeding initiation within 1 hour was low and the principal barrier to the initiation and even continuation of breastfeeding is due to the operative obstetrical intervention. It has also been reported that after the caesarean section, mothers and infants are separated for a long period of time owing to anaesthesia, baby being kept in nursery, or mother being sedated for pain and unable to feed. This ultimately leads to poor maternal milk surge (Motee *et al.*, 2013).

A number of strategies have been initiated by UNICEF and WHO in order to promote optimal breastfeeding practices, for example; start breastfeeding within 1 hour of birth, exclusive breastfeeding for first 6 months of infant life and after 6 months introduction of appropriate weaning foods while continuing to breastfeed for 2 years. The Namibian government has recognized these global commitments to improve exclusive breastfeeding practices (MoHSS, 2011). These strategies are Baby

Friendly Hospital initiative, Infant Young Child Feeding policy and breastfeeding recommendation in prevention of mother to child transmission of HIV.

It is estimated that, with exclusive breastfeeding coverage of 90 %, 13 to 15 % of deaths of children fewer than 5 years could be averted in low and middle income countries (Sonko & Worku, 2015). Exclusively breastfed infants have been shown to have lower rates of acute respiratory infections and diarrhoea, to have better neurodevelopment outcomes and have better physical growth compared to mix-fed or non-breastfed infants. In areas where HIV prevalence is high, especially in sub-Saharan Africa, exclusive breastfeeding has been shown to have an added advantage of reducing the rates of mother-to child transmission of HIV(Sonko & Worku, 2015).

Despite the benefits and efforts to promote breastfeeding, exclusive breastfeeding is sub optimally practiced in many developing countries including Namibia (Maonga *et al.*, 2016). Also despite the benefits exclusive breastfeeding, exclusive breastfeeding prevalence and duration in many low and middle income countries including Namibia are lower than the international recommendation of exclusive breastfeeding for the first six months of life which is 90 %. (Sonko & Worku, 2015). Worldwide, only 35 % of the infants are exclusively breastfed. In sub Saharan Africa which has high rates of infants and child mortality only 33 % of infants are exclusively breastfed (Maonga *et al.*, 2016). The exclusive breastfeeding coverage of 90 % is required in order to benefit from 11.6 % reduction of child death in low income and middle income countries (Maonga *et al.*, 2016)

2.2 Complementary feeding practice

Complementary feeding is the period during which a young child's diet is expanded and its dependence on milk as the unique source of nutrition is ended. It is important to introduce solid foods at the age of six months. Reasons for this are that, apart from the fact that solid foods provide increased nutrients to complete daily needs, it might then be difficult for the baby to accept the new tastes and textures of food later in life (Mananga *et al.*, 2014).

Complementary feeding practice is an important factor that determines the nutritional status of children. Suboptimal infant feeding practices are the major reasons for childhood undernutrition in developing countries (Kimani-Murange *et al.*, 2011). The transition period from exclusive breastfeeding to two years is a critical window for optimal growth and development of the child. During this period, appropriate, safe, adequately nourished and frequent feeding is essential. The caregiver should know what, how, and when to give appropriate food. Unknowingly, the food provided to a child might be too high or too low in some nutrients, the diversity of food might be adequate or inadequate, and micronutrient content including iron could be lower than required if they rely on certain food items such as cow's milk and simple porridge. The World Health Organization (WHO) in 1991 developed eight core infant and young child feeding indicators to monitor and to guide the feeding practices of young children. WHO core indicators include: (1) early initiation of breastfeeding; (2) exclusive breastfeeding under six months; (3) continued breastfeeding for one year; (4) the introduction of solid, semi-solid or soft foods; (5) minimum dietary diversity; (6) minimum meal frequency; (7) minimum

acceptable diet; and (8) consumption of iron rich or iron fortified foods (WHO, 2012).

2.3 Factors affecting exclusive breastfeeding and complementary feeding practice

Poor breastfeeding and complementary feeding practices have been widely documented in the developing countries and as well as the impact of cultural factors, maternal age, marital status, family income/social class, mode of delivery, time of initiation of first breastfeeding and proximity to babies on feeding pattern. Outside maternal factors, studies have also shown that the babies' general behaviour influence what feed they receive (Kimani-Murange *et al.*, 2011).

Several studies (Setegn, *et al.*, 2012, Khanal, *et al.*, 2014, Mekuria and Edris, 2015) have shown that mothers find it difficult to meet personal goals and to adhere to the expert recommendations for continued and exclusive breastfeeding despite increased rate of initiation. According to Motee *et al.*(2013) only about 39% of infants in the developing countries, 25% in Africa are exclusively breastfed for the first six months. Additionally, 6% of infants in developing countries are never breastfed (Motee *et al.*, 2013). Some of the major factors that affect exclusivity and duration of breastfeeding include breast problems such as sore nipples or mother's perceptions that she is producing inadequate milk; societal barriers such as employment and length of maternity leave; inadequate breastfeeding knowledge; lack of familial and societal support; lack of guidance and encouragement from

health care professionals. These factors in turn promote the early use of breast milk substitute.

2.4 Prevalence of breastfeeding and exclusive breast feeding in Namibia

In Namibia breastfeeding is common, with 94 per cent of children being breastfed at some point during their life. More than 70 per cent were breastfed in the hour following birth and 92 per cent in the first day after birth. However, 14 per cent of new-borns received liquids other than breast milk in the first three days of life. Bottle-feeding is common in Namibia (35 per cent in 0-5 months, 49 per cent in 6-9 months, 32 per cent in 12-23 months and 15 per cent in 24-35 months). These practices contribute to the low prevalence of exclusive breastfeeding in Namibia (WHO, 2012).

2.5 Frequency and patterns of feeding

According to Chowdhury *et al* (2016) and Molla *et al* (2017), it has been shown that, 6 to 23 months of age of a child is the ultimate age for growth faltering, deficiencies of certain micronutrients and common childhood illnesses such as diarrhoea. After 6 months of age, children need complementary food because breast milk or infant formula alone is no longer sufficient to maintain child's growth. At this stage, children should be fed small quantities of nutritional solid and semisolid foods in addition to breast-feeding. After a child reaches two years of age, the physiological effects are permanent or irreversible. It is very difficult to reverse stunting which is an indication of chronic under nutrition (Molla *et al*, 2017). Although appropriate

complementary feeding among children aged 6–23 months brings numerous health benefits, inappropriate introduction of complementary feeding may increase risk of malnutrition among under-five children. Levels of complementary feeding can be affected by numerous individual, household and community level factors (Chowdhury *et al* , 2016).

2.6 Statistical literature

2.6.1 Logistic regression

The literature shows that studies used univariate analysis to present variables using descriptive analytical methods (frequencies and percentages), bivariate analysis (the chi-square test) to test for significance of factors associated with exclusive breastfeeding and multivariable logistic regression analysis to determine independent predictors of exclusive breastfeeding. The stepwise backward elimination procedure was used in the multivariable logistic regression, odds ratio (OR); and their 95% confidence interval (CI) were reported. A p-value < 0.05 was considered statistically significant (Khanal *et al.*, 2013)

The Logistic regression analysis used, studies the association between a categorical dependent variable with two outcome and a set of independent (explanatory) variables as well as that the logistic regression does not assume that the independent variables are normally distributed. Suppose the numerical values of 0 and 1 are assigned to the two outcomes of a binary variable. Often, the 0 represents a negative response and the 1 represents a positive response. The mean of this variable will be the proportion of positive responses. If p is the proportion of observations

with an outcome of 1, then $1-p$ is the probability of a outcome of 0. The ratio $p/(1-p)$ is called the odds and the logit is the logarithm of the odds, or just log odds.

2.6.2 Survival analysis

Moreover, literature shows that Survival analysis technique was used in analyzing breastfeeding-related data. Survival analysis refers to the analysis of elapsed time. The response variable is the time between a time origin and an end point. The end point is either the occurrence of the event of interest, referred to as a death or failure, or the end of the subject's participation in the study. The survival analysis technique adjusts for truncation bias by incorporating both complete and incomplete segments of histories in the analysis of breastfeeding-related data (some mothers might be continuing to breastfeed at the time of the survey). The Cox's proportional hazards (PH) model may be viewed as a multivariate life-table but unlike other regression techniques, this method uses censored data and, thus, controls for truncation bias (Kimani-Murage *et al.*, 2011)

Survival analysis was used in the analysis of breastfeeding. The analysis of the duration of breastfeeding and the time to introduction of complementary foods were presented using Kaplan-Meier survival curves. Cox regression analysis was performed to determine factors associated with breastfeeding cessation during infancy and early introduction of complementary foods. It is assumed in this model that (1) there is a hazard or risk of occurrence of the event of interest (in this case, the termination of breastfeeding) at each time, t , and this is applicable to all members of the population; and (2) at each time t , the respondents at one level of a given

subgroup experience a hazard proportional to the reference category; the models are a function of time and regressor variable and (3) there will only be one set of coefficients. The hazard ratio (odds ratio) for breastfeeding and its 95% confidence interval (CI) were calculated for the sociodemographic factors associated with breastfeeding.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Study area characteristics

Namibia is a country in south-western Africa that covers approximately 824,000 square kilometres. It is bordered by the Atlantic Ocean in the west, Angola and Zambia in the north, Botswana in the east, and South Africa in the south and east. It lies mostly between 17° and 29° south latitude (a small area is north of 17°) and 11° and 26° east longitude.

Administratively, the country is currently divided into 14 regions but at the time of the survey there were 13 regions: Zambezi, Kavango, Kunene, Ohangwena, Omusati, Oshana, and Oshikoto in the north; Omaheke, Otjozondjupa, Erongo, and Khomas in central Namibia; and Hardap and //Karas in the south. The capital is Windhoek, located in the Khomas region.

According to the 2011 Population and Housing Census, the country's population stands at 2,113,077. Given the presence of the arid Namib Desert, Namibia is one of the least densely populated countries in the world; the population density is estimated to be 2.6 persons per square kilometre. Regional population densities vary substantially, with almost two-thirds of the population living in the four northern regions and less than one-tenth living in the south. Regardless of rapid urbanisation, Namibia is still mostly rural, with about four in ten people living in urban areas (MoHSS, 2014).



Figure 2: Map from 2013 NDHS

3.2 Study Design

This is a quantitative cross-sectional research design that used the recent secondary data based on the 2013 Namibia Demographic and Health Survey (NDHS) which is the fourth nationally representative DHS survey conducted in Namibia.

3.3 Data Source, study population and sample

The data used for analysis has been extracted from the 2013 NDHS. The survey covered 18090 women of reproductive age and a sub-sample of 6566 children aged 0-6 months was considered to assess the practice of exclusive breastfeeding for analysis, along with socio demographic information of their mother. Secondly a sub-

sample of 16 237 children age 0-24 months was used to investigate patterns of breastfeeding and complementary feeding practices.

3.4 Study variables

3.4.1 Dependent variables

The dependent variable in the logistic regression model is “exclusive breastfeeding” is defined as baby takes only breast milk from birth to the age of 6 months and categorized as “1=yes” if exclusively breastfed and a “0=no” otherwise. For this analysis the solids, liquids, were collapsed into broader categories(-given anything if any solid food or any other liquid apart from breast milk was given and not given anything if only and not given anything if only breast milk).

The duration of breastfeeding is used as the dependent variable to compare survival of breastfeeding of children age 0-24 months using the survival curve for duration of breastfeeding and introduction of solid foods. The comparison of survival curves to assess relationship between variables of interest is presented.

3.4.2 Independent variables

The socio-demographic factors influencing exclusive breastfeeding used for the analysis of children age 0-6 months were informed from the literature and include among others; age of mother, place of residence, employment status of mother, birth

order, wealth status of mother, marital status of mother, education level of mother, attend ANC, attend prenatal care and current age of child.

The analysis of complementary feeding practice among infants and children (0-24 months) as well as the assessment of relationship between breastfeeding and complementary feeding also considered the socio-economic, health and demographic factors used for exclusive breastfeeding.

3.5. Data collection: Methods and Tools

The NDHS is conducted as a periodic update of the demographic and health situation in Namibia using a validated questionnaire. The questionnaire was adapted from the standard DHS6 core questionnaires to reflect the population and health issues relevant to Namibia at a series of meetings with various stakeholders from government ministries and agencies, nongovernmental organisations, and international donors.

Data collection was carried out by 28 teams, each consisting of a supervisor, a field editor, three female interviewers, one male interviewer, and a health technician. The 2013 NDHS sample was a two-stage stratified cluster sample; sampling probabilities were calculated separately for each sampling stage and for each cluster.

In the first stage, 554 enumeration areas (EAs) of which 269 in urban areas and 285 in rural areas were selected with a stratified probability proportional to size

selection from the sampling frame. The size of an EA was defined according to the number of households residing in the EA, as recorded in the 2011 Population and Housing Census (MoHSS, 2014). Stratification was achieved by separating every region into urban and rural areas. Therefore, the 13 regions were stratified into 26 sampling strata (13 rural strata and 13 urban strata). Samples were selected independently in every stratum, with a predetermined number of EAs selected.

A complete household listing and mapping operation was carried out in all selected clusters. This provided a sampling frame from which 20 household research clusters in each primary sampling unit (PSU) were selected for the survey, in the second stage.

3.6. Methods of analysis

Analysis will be done using SPSS IBM for windows version 24.0 (IBM Corp., 2013). Univariate analysis was used to characterize the study sample using descriptive analytical methods (frequencies and percentages).

3.6.1 Bivariate analysis

Bivariate analysis was undertaken for each explanatory variable with the outcome variable. Association between exclusive breastfeeding and independent variables was investigated using Chi-squared (χ^2) test. The value of the Chi-Square test of Independence is given as follows:

$$\chi^2 = \sum_{i=1}^r \sum_{j=1}^c \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$$

Whereby χ^2 is the Chi-Square test of Independence, the $O_{i,j}$ is the observed value of two nominal variables and the $E_{i,j}$ is the Expected value of two nominal variables

3.6.2 Multivariable logistic regression

All variables which were tested for significant association with the outcome variable at $p \leq 0.05$ were included in the multiple logistic regression analysis to assess predictors of exclusive breastfeeding. The results are presented using odds ratio with 95% confidence interval. Statistical significance was declared if p-value was less or equal to 0.05. The logistic regression model is of the form:

$$\ln \left[\frac{p}{1-p} \right] = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n$$

where $\ln \left[\frac{p}{1-p} \right]$ is the log odds ratio, or "logit", P is the probability of the characteristic of interest (the dependent variable), β_0 is the constant, β_i (whereby $i = 1, 2, 3, \dots, n$) is the regression coefficients of the independent variable X_i (whereby $i = 1, 2, 3, \dots, n$).

The stepwise backward elimination procedure was used in the multivariable logistic regression to resolve the confounding factors or multicollinearity. That is a set of variables that are strongly inter-correlated. In this process (the stepwise backward elimination procedure), all the independent variables in the model are checked to determine if their significance has been reduced below the specified tolerance level. If a non-significant variable is found, it is removed from the model. By following this process, the regression model has been improved by removing the independent variables that have a non-significant influence on the dependent

variable. In turn the model is only left with the independent variables that have a significant influence on the dependent variable.

3.6.3 The survival analysis

The survival analysis of the duration of breastfeeding and the time to introduction of complementary foods is presented using Kaplan-Meier survival curves.

It is expected that the period between the start of breastfeeding and end of breastfeeding would vary significantly among women. The survival analysis technique takes into consideration both complete and incomplete segments of histories in the breastfeeding analysis. The proportional hazards model was used to obtain Kaplan-Meier survival curves is expressed as

$$h(t, z) = h_0(t)e(bz)$$

where $h(t, z)$ is the hazard rate at time t , $h_0(t)$ is the baseline hazard function of t , b is a vector of coefficients and z is a vector of covariates.

CHAPTER 4

RESULTS

4.1 Background characteristics of mother of children aged 0-6 months

The Tables 1, 2 and 3 shows the distribution of the selected socio-demographic characteristics of mothers aged 15–49 years (N=18090) of the children aged 0 to 6 months (N= 6566) by individual, household and community level factors.

4.1.1 The individual level:

As shown in Table 1, the age distribution indicated that more mothers (47%) were in their twenties, with more of them (26.2%) found in the 25-29 years of age group. The least represented mothers (2.9%) were in the ≥ 40 years of age group. Most of the mothers (67.2%) had at least secondary education or higher, about 23.9% attained primary education, with about 8.9% of them having had no education. The distribution of the mothers marital status show that 49 % were never married and 51% were married. The mothers almost had equally distributed male children (49.8%) and female children (50.2%). There were 31.3% mothers with a 1st birth order child, 24.7% with a 2nd birth order child and 44.2% with a 3rd of higher child. There are more mothers (95.3%) that had antenatal visits, while only a few mothers (4.7%) had no antenatal visit.

There were 13.8% of the mothers that gave birth at home, while 86.2 of the mothers gave birth elsewhere. The mode of delivery distribution indicated that most

mothers (86%) had a normal vaginal delivery, while only 14% had a caesarean section. The majority of the mothers (89.3%) had infants who were considered to have a birth weight of 2500g and more, while 10.7% had a birth weight less than 2500g. There were 73.4% mothers who breastfed within one hour after birth and 26.6% breastfed after one hour after birth. Most of the mothers (54.5 %) were unemployed and 45.5% were employed.

Table 1: Socio-demographic characteristics of mothers of the children aged 0 to 6 months (n= 6566) by individual level factors.

Individual level factors		
Variables	Sample (n)	Percentage (%)
Mother's age in 5 year groups		
15-19	308	4.7
20-24	1369	20.8
25-29	1720	26.2
30-34	1370	20.9
35-39	1047	15.9
40-44	562	8.6
45-49	190	2.9
Mother's educational level		
No education	585	8.9
Primary	1569	23.9
Secondary or Higher	4412	67.2
Mother's marital status		
Never Married	3220	49.0
Married	3346	51.0
Sex of child		
Male	3268	49.8
Female	3298	50.2
Birth order		
1st	2052	31.3
2nd	1615	24.6
3rd or higher	2899	44.2
Attended antenatal		
No	141	4.7
Yes	2885	95.3
Place of delivery (Home)		
Elsewhere	4144	86.2
Yes	664	13.8
Delivery by caesarean		
No	4109	86.0
Yes	670	14.0
Initiation of breastfeeding		
Within one hour	2689	73.4
After one hour	973	26.6
Mother's employment		
Unemployed	3571	54.5
Employed	2987	45.5

4.1.2 The household level:

Table 2: Socio-demographic characteristics of mothers of the children aged 0 to 6 months (n= 6566) by household level factors.

Household level factor (s)		
Variables	Sample (n)	Percentage%
Wealth index		
Poor	2844	43.3
Middle	1438	21.9
Rich	2284	34.8

The poor, and the rich, constituted 43.3% and 34.8% respectively, while 21.9% were of middle wealth status

4.1.3 The community level:

Table 3: Socio-demographic characteristics of mothers (15–49 years old) of the children aged 0 to 6 months (n= 6566) by community level factors.

Community level factors		
Variables	Sample (n)	Percentage %
Region		
Caprivi	504	7.7
Erongo	497	7.6
Hardap	417	6.4
Karas	509	7.8
Kavango	650	9.9
Khomas	525	8.0
Kunene	560	8.5
Ohangwena	608	9.3
Omaheke	463	7.1
Omusati	481	7.3
Oshana	370	5.6
Oshikoto	453	6.9
Otjozondjupa	529	8.1
Place of residence		
Urban	3009	45.8
Rural	3557	54.2

Most of the mothers (54.2%) were residing in the rural areas. Furthermore, the distribution of the mothers by region ranges shows that the majority of the mothers (9.9%) resided in the Kavango region while the smallest number of mothers (5.6%) resided in the Oshana region.

4.2 Prevalence of exclusive breastfeeding

The results indicated that the proportion of children aged 0-6 months who were being breastfed at the time of survey was 35.1% and only 19% of the children in the same age range were reported to have been exclusively breastfed. The median duration of exclusive breastfeeding was three months. Analysis of exclusive breastfeeding by age group decreases with increasing age of a child. Among infants who were aged below 1 month more than 35 percent were exclusively breastfed, the proportion is lower among those aged over one month. Overall, the proportion of children exclusively breastfed is higher in rural areas (67.4 %) than in urban areas (32.6 %).

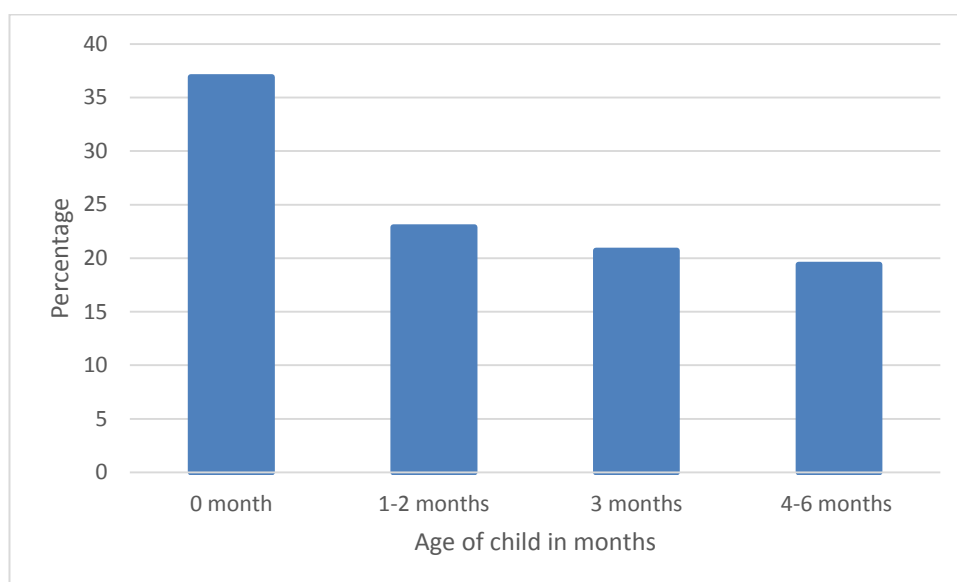


Figure 3: Pattern of exclusive breastfeeding by age of infant

4.3 Factors associated with exclusive breastfeeding

A chi-square test was utilized to assess the relationship between exclusive breastfeeding and selected maternal factors which included attendance of ANC, prenatal visits, birth order and total number of children ever born. Other factors assessed included age of the mother, marital status of mother, her highest education level, employment status, wealth quintile and region.

Table 4: Bivariate analysis of factors associated with exclusive breastfeeding
(N=457)

Variable	EBF (%)	χ^2 - Pvalue	Significance level
Age of mother			
15-19	10.5	$\chi^2=48.9$	P <0.001
20-24	23.0		
25-29	24.1		
30-34	21.7		
35-39	14.2		
40-44	5.3		
45-49	1.3		
Employment status of mother			
Unemployed	73.6	$\chi^2=99.1$	P <0.001
Employed	26.4		
Birth order			
1st	29.9	$\chi^2=6.3$	p=0.044
2 nd	23.4		
3 rd or higher	46.7		
Wealth status			
Poor	56.1	$\chi^2=93.9$	P <0.001
Middle	21.9		
Rich	21.9		
Marital status			
Not in union	44.8	$\chi^2=14.5$	P <0.001
In Union	55.2		
Education level			
Primary	41.6	$\chi^2=50.3$	P <0.001
Secondary+	58.4		
Attend ANC			
No	6.8	$\chi^2=3.8$	p=0.052
Yes	93.2		
Attend prenatal care			
No	47.8	$\chi^2=590.3$	P <0.001
Yes	52.2		

The relationship between exclusive breastfeeding and selected socio-demographic factors using a chi-square test is shown in Table 4. Age of mother, the employment status, Birth order, wealth status and the marital status, education were found to be significantly associated with exclusive breastfeeding. Other factors such as whether a

mother attended ANC and prenatal care as well as birth order also had significant influence on exclusive breastfeeding.

The age of mother ($\chi^2 = 48.9$, $P < 0.001$) with the mothers aged 20 -34 exclusively breastfeeding more than all the other ages. Mothers with a 3rd birth order or higher (46.7%) practiced exclusive breast feeding more compared to the mothers with a 1st birth order 29.9% and 2nd birth order 20.4% ($\chi^2 = 6.3$, $P = 0.044$). More than half (55.2%) of those married practiced exclusive breast feeding compared to the mothers who were not married ($\chi^2 = 14.5$, $P < 0.001$). The results indicated that the majority (74%) mothers who were unemployed practiced exclusive breastfeeding as compared to those who were employed ($\chi^2 = 99.1$, $P < 0.001$). More than half of (56.1%) of the women who are were in the poor wealth status also practice exclusive breastfeeding compared to women who are in the middle or rich wealth status ($\chi^2 = 93.9$, $P < 0.001$). It is also important to note that the most (93.2%) of mothers who practice exclusive breastfeeding had attended antenatal care (ANC) ($\chi^2 = 3.8$, $P < 0.052$). There is also a significant association between exclusive breastfeeding and region of residence of all the children who were exclusively breastfed a high proportion live in Ohangwena region, Kunene region and the Kavango region which all had about 12% (12%, 11.7% and 11.5% respectively). The region with the lowest proportion of children exclusive breastfeeding is Erongo with 3.8%.

4.4 Multivariable logistic regression model for exclusive breastfeeding

Multivariable logistic regression was performed to identify the independent determinants of exclusive breastfeeding. All predictor variables analysed through bivariate analysis were used as predictors in the logistic model. Results of the

multivariable logistic regression are shown in Table 5. The results indicate that all mothers in the different age groups have a less likelihood of exclusive breastfeeding practice when compared to the age group 15-19 years because they all have odds ratio values less than one (1). The mothers that resided in the rural areas had a 33% (OR=1.33, 95%CI: 1.10-1.61) more likelihood of exclusive breastfeeding practice, when compared to those mothers that were from urban areas. The mothers that were employed had a 54% (OR=0.55, 95%CI: 0.46-0.66) less likelihood of exclusive breastfeeding practice when compared to those that were unemployed.

Those mothers that were married had 20% more likelihood to practice exclusive breastfeeding when compared to those that were never married (OR=1.20, 95%CI: 1.01-1.42). The results show that there was a less likelihood of exclusive breastfeeding practice of mothers that were from the middle household wealth status 15% (OR=0.85, 95%CI:0.69-1.05) and 29% (OR=0.71, 95%CI:0.56-0.90) of mothers that were from the rich household wealth status, when compared to those mothers that were from the poor household.

The results showed that exclusive breastfeeding practice among children aged 0-6 months, decreases with age of the child (OR=0.76, 95%CI: 0.71-0.81), the older once have a 24% less likelihood of been exclusively breastfed compared to the once who are younger. The mothers with a secondary or higher educational level are 15% (OR=0.85, 95%CI: 0.71-1.01) less likelihood of exclusive breastfeeding practice respectively, when compared to those with a mothers with a primary or lower educational level.

Table 5: Multivariable logistic regression analysis showing factors associated with exclusive breastfeeding practice of mothers with infants aged 0-6 months, Namibia DHS 2013 (N= 6566)

	OR	95% C.I.	
Age of mother			
15-19	1		
20-24	0.52**	0.36	0.73
25-29	0.46**	0.32	0.68
30-34	0.44**	0.29	0.66
35-39	0.46**	0.30	0.71
40-44	0.41**	0.25	0.67
45-49	0.22**	0.10	0.47
Place of residence			
Urban	1		
Rural	1.33*	1.10	1.61
Employment status of mother			
not employed	1		
employed	0.55**	0.46	0.66
Marital status of mother			
not in union	1		
in union	1.20*	1.02	1.42
Wealth status of mother			
poor	1		
middle	0.85	0.69	1.05
rich	0.71*	0.56	0.90
Current age of child			
	0.76**	0.71	0.81
Birth Order			
1st	1		
2nd	0.11**	0.08	0.15
3rd or higher	0.02**	0.01	0.03
Education level of mother			
Primary or lower	1		
Secondary or higher	0.85*	0.71	1.01

*significance level * p<0.05 ** p<0.01*

In the multivariable logistic regression model for exclusive breastfeeding showed that the Age of mother, her employment status and birth order remained as the important predictors of exclusive breastfeeding practice when all other factors were adjusted for in the model.

SECTION II: FEEDING PRACTICES AND NUTRITIONAL STATUS OF INFANTS AND YOUNG CHILDREN

Infant and young children feeding are critical for child health and survival. Based on well-established evidence, the World Health Organisation and the UNICEF recommend that mothers put new-borns to the breast within one hour of birth, breastfeed infants exclusively for the first six months and continue to breastfeed for two years and beyond, together with nutritionally adequate, safe and age appropriate responsive feeding of solid, semi solid and soft foods starting in the sixth month (Cai *et al*, 2012). Breastfeeding is recognised as the best feeding option for children because of its nutritive, protective, psychological and economic value (Cai *et al*, 2012). Ndiokwetu *et al.* (2014) quoted the World Health Organisation that “The importance of infants and young children feeding was underscored by the 2002 World Health Assembly resolution 54.5.25 on “Global strategy for infants and young children feeding” which re-emphasised the importance of exclusive breastfeeding for six months while promoting the timely introduction of adequate, safe and appropriate complementary feeding together with continued breastfeeding for 2 years and beyond. There is strong evidence that the promotion of appropriate complementary feeding practices reduces the incidence of stunting and leads to better health and growth outcome (Kassa *et al.*, 2016). The decline in the duration of breastfeeding is an inevitable consequence of the modernization process (Abada *et al.*, 2001). Modernization entails a rapid abandonment of traditional approaches to child rearing, and the adoption of modern practices including the use of modern health services and the use of supplementary foods for infants in favour of breastfeeding

One of the key determinants of the decline in breastfeeding is the increasing levels of education among women, a factor which plays a role in the adoption of modern ideas and which usually leads to the abandonment of traditional; practices regarding child care (Ndiokwetu *et al.*, 2014). On the other hand, certain supplementary foods and drinks may be considered culturally important and may affect the timing of weaning process. Previous research findings (in Ethiopia) on factors associated with appropriate complementary feeding practices show high maternal and paternal education, better household wealth, exposure to media, adequate antenatal and post-natal contacts, child age, and low (Kassa *et al.*, 2016). This chapter assessed the infant feeding practices of mothers of children (0-24 months), to determine the time of introduction of complementary foods, and the duration of breastfeeding by mothers.

4.6 Feeding practices among infants and children (0-24 months)

Infant feeding indicators were estimated according to the key indicators described by WHO in 1991. These indicators include the (1) timely first suckling rate (the proportion of infants less than 12 months of age who first suckled within 1 hour after birth), (2) the ever breastfed rate (the proportion of infants less than 12 months of age who were ever breastfed), (3) the current breastfeeding rate (the proportion of children less than 24 months of age who are currently breastfed), (4) the continued breastfeeding rate (1 year) (the proportion of children 12 to 15 months of age who are breastfed), (5) the continued breastfeeding rate (2 years) (the proportion of children 20 to 23 months of age who are breastfed), (6) the full breastfeeding rate (the proportion of infants less than 6 months of age who are fed breastmilk alone or

predominantly breastmilk with no additional food based fluids other than fruit juice and sugar water), (7) the bottle-feeding rate (the proportion of infants less than 12 months of age who received any food or drink from a bottle in the previous 24 hours), (8) the timely complementary feeding rate (the proportion of infants 6 to 9 months of age who received complementary foods in addition to breastmilk in the previous 24 hours), and (9) the median duration of any breastfeeding (the age [in months] when 50% of children are no longer breastfed).

4.5 Description of sample of children aged 0-24 months

Information from a total of 16237 children aged 0-24 months was analysed. The average age of children was 9.5 months and on average their mother reported that they breast fed for 9.8 months. The average age of mothers was 35 years and had an average parity of 3.9 children. The sample consisted of 45.8 percent children from urban area and the majority of children were delivered in a health facility (85.6%). Only 13.8% of children were delivered at home. About 60% of mothers had at least secondary education and 48.1% were employed. Most (95%) of the mothers reported to have attended ANC. Majority (89%) of mothers also reported that they had attended prenatal care with nurse compared to only 14.8% who attended prenatal care with doctor. The Table 6, presents the mean of variables of children aged 0-24 months and the Table 7, presents the percentages of variables of children aged 0-24 months

Table 6: Means of variables of children aged 0-24 months (N= 16237)

Variable	Mean	Standard deviation
Mother's age	35	7.9
Months of breastfeeding	9.8	8.1
Age of child	9.5	6.7
Total number of children ever born	3.9	2.2

Table 7: Percentages of variables of children aged 0-24 months (N= 16237)

Variable	Sample (n)	Percentage (%)
Place of residence		
Urban	7442	45.8
Rural	8795	54.2
Respondent's education		
No education	1769	10.9
Primary education	4757	29.3
Secondary or higher	9711	59.8
Wealth status		
Poor	6973	42.9
Rich	9264	57.1
Employed	7764	48.1
Married	9163	56.4
Attend ANC	2885	95.3
Place of delivery home	664	13.8
Place of delivery hospital	4115	85.6
Prenatal care doctor	566	14.8
Prenatal care nurse	3398	88.6
Given other liquids	3918	81.6
Given solid foods	3245	68.3

The results in Table 8 show that about 77 percent of infants were breastfed within one hour after birth. Although breastfeeding initiation is quite high, most mothers do not continue to breastfeed to 24 months. Among children aged between 0 and 24 months, only 28.2% were still breastfed, and continued breastfeeding is lowly practiced with only 6.1% of children between age 20 and 24 months still breastfeeding. The results indicate that the proportion of infants below 12 months of age who received any food or drink from a bottle in the previous 24 hours was 18.6%.

Table 8: Breastfeeding indicators among children 0 to 24 months of age (N= 16237)

Indicator	Sample (n)	Percentage (%)
Timely put to breast ^a	5796	76.5
Ever breastfed rate ^a	3080	95.7
Current breastfeeding ^b	1353	29.5
Bottle feeding rate ^a	887	18.6

^a infants < 12 months

^b children 0-24 months

There is significant association between breastfeeding status and education level of mother, her employment status, her age, prenatal care status, wealth status and place of residence as shown by Table 9. It also shows relationship between bottle feeding status with a number of socio-economic and demographic characteristics. Breastfeeding decreases with increasing level of education of mother. There were 19.6% of children aged 0-24 months whose mothers had higher level of education that were breastfeeding at the time of the survey. A lower proportion of mothers (23.5%) that were employed also breastfed at the time of the survey compared to 33.6% of the unemployed. The results also show that current breastfeeding is low among mothers with high wealth status and those living in urban areas compared to the poor and those in rural areas (Table 9).

Bottle feeding is highly practiced by mothers with high level of education (35.9%) compared to mothers with no education (6.5%) or primary level of education (11.8%). The practice of bottle feeding is also high among employed mothers (24.1%), mothers with high wealth status (24.4%) and women who live in urban areas (25.6%). A high proportion of infants who feed on bottles are also given other liquids and they are fed on solid foods. Mothers who have given birth to

multiples i.e. twins (28%) are also likely to use bottle feeding compared to those with single birth (19.3%). It is important to note that mothers who attend prenatal care (21%) practice the use of bottle feeding less compared to those who do not attend prenatal care (34.2%).

Table 9: Percentages of current breastfeeding and bottle-feeding by socio-economic, health and demographic characteristics of children aged 0-24 months

Characteristic	Current breastfeeding ^a	Bottle feeding ^b
Education	**	**
No education	32.0	6.5
Primary education	32.7	11.8
Secondary education	28.7	22.9
Higher education	19.6	35.9
Employed mothers	**	**
Not employed	33.6	16.4
Employed	23.5	24.1
Age of mother	**	**
15-19	58.0	25.1
20-24	32.1	19.3
25-29	27.2	18.2
30-34	26.0	21.6
35-39	25.3	19.6
40-44	23.5	15.4
45-49	17.2	13.8
Birth Status		
Singleton	29.8	19.3
Multiple	14.8	28.0
Prenatal Care		
No prenatal care by nurse	34.4	34.2
Prenatal care by nurse	36.9	21.0
Wealth status	**	**
Poor	32.9	13.2
Rich	26.8	24.4
Place of residence	**	**
Urban	25.5	25.6
Rural	32.7	14.5
Given Liquid		
No		10.4
Yes		31.7
Given solid foods		
No		18.8
Yes		31.4

^a children 0-24 months; ^b infants < 12 months;

significance level * $p < 0.05$ ** $p < 0.01$

4.7 Complementary Feeding Practices of children aged 0-24 months

The results indicated that the majority (85.3%) of infants aged between 6 and 9 months were introduced to some complementary feeding, where 83% were given other liquids other than breastmilk and 68% were given solid foods. It is however best practice that infants aged between 6 and 9 months are introduced to some complementary feeding. Hence, the proportion is expected to be high even reaching 100%. It is also noticed that some infants aged between 0 and 6 months were already introduced to complementary feeding. The results show that 35.3% of infants aged 0-6 months were given water, 7.1% were given juice, 7% were given baby formula and 5.1% were given fresh milk. A significant proportion of infants in the study were also introduced to solid foods before the recommended age of six month with 31.3% given some solid foods. The most solid food introduced among children aged 6-9 months are grains (bread, noodles, etc), followed by meat with 9%. Other solid foods were introduced among lower proportion of children (Figure 4).

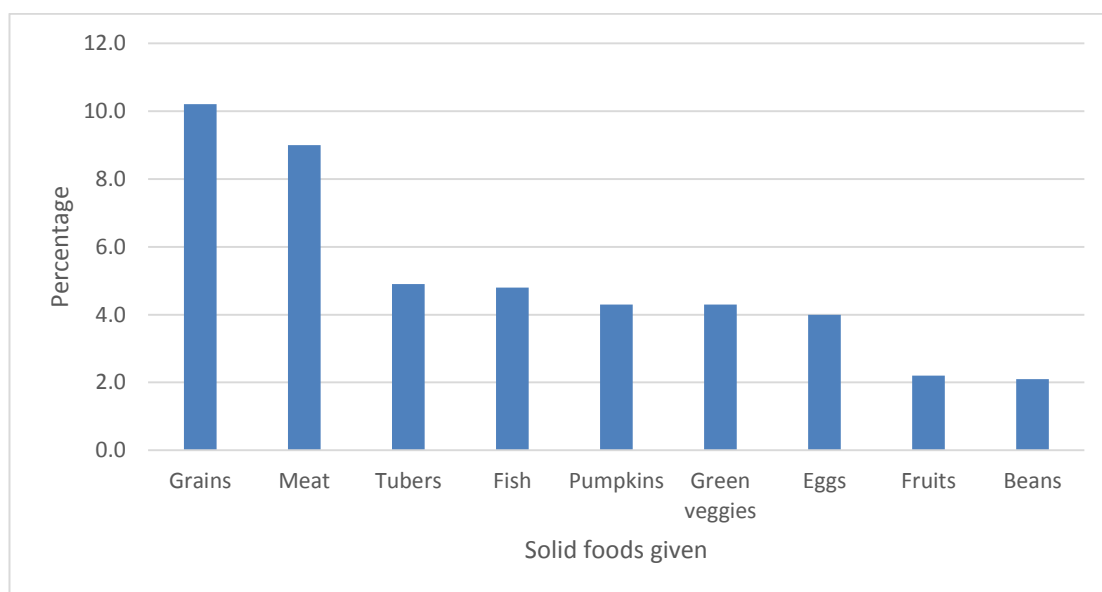


Figure 4: Children aged 6-9 months by type of solid foods given (N=3254)

4.5 The duration of breastfeeding among young children (0-24 months)

The results in Figure 5 show that breastfeeding decreases as children get older and are introduced to solid foods and Table 10 below shows results from survival analysis of breastfeeding duration among children who are introduced to solid foods.

Table 10: Life table for survival analysis for duration of breastfeeding of children aged 0-24 months

Interval Start Time	Number Entering Interval	Number Withdrawing during Interval	Number Exposed to Risk	Cumulative Proportion Surviving at End of Interval
0	2411	130	2346.000	1.00
2	2280	170	2195.000	0.99
4	2093	107	2039.500	0.96
6	1927	36	1909.000	0.91
8	1786	17	1777.500	0.85
10	1654	9	1649.500	0.80
12	1546	9	1541.500	0.75
14	1439	7	1435.500	0.71
16	1351	2	1350.000	0.67
18	1275	3	1273.500	0.64
20	1222	3	1220.500	0.62
22	1184	4	1182.000	0.62
24	1165	270	1030.000	0.08

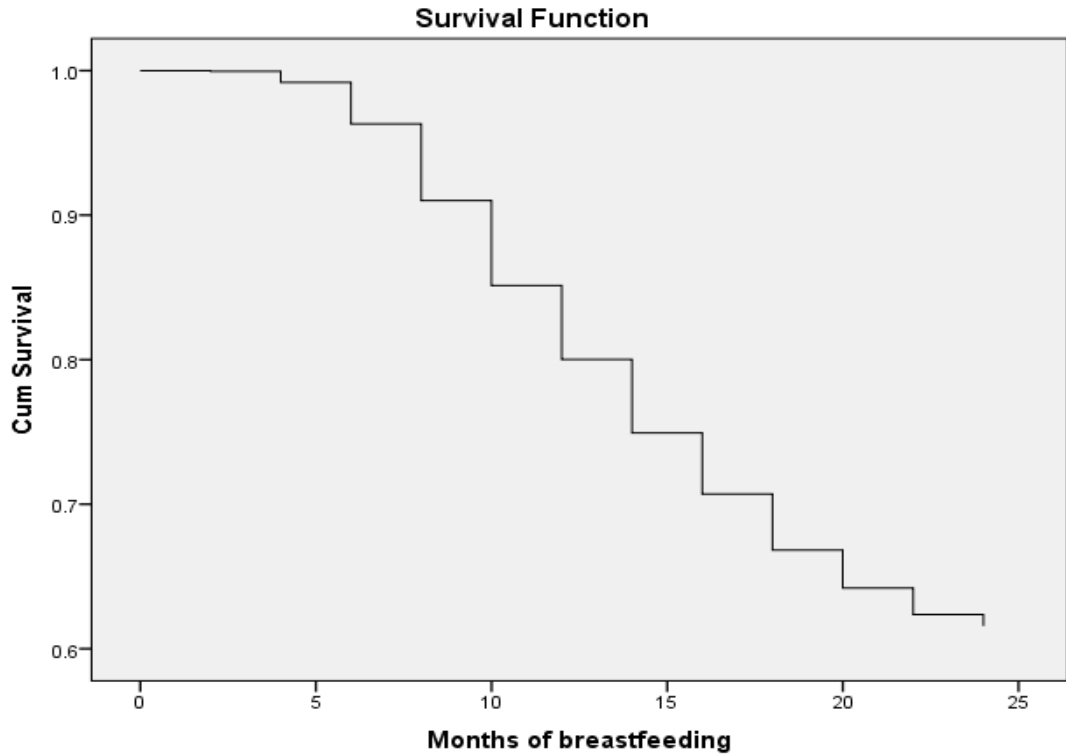


Figure 5: Survival curve for duration of breastfeeding

Results in Figure 6 show that during the first three months of birth only women who are employed introduced solid foods when compared to those that are not employed. The results further indicate that employed mothers practice mixed feeding (solid foods and breastfeeding) compared to mothers who are not employed.

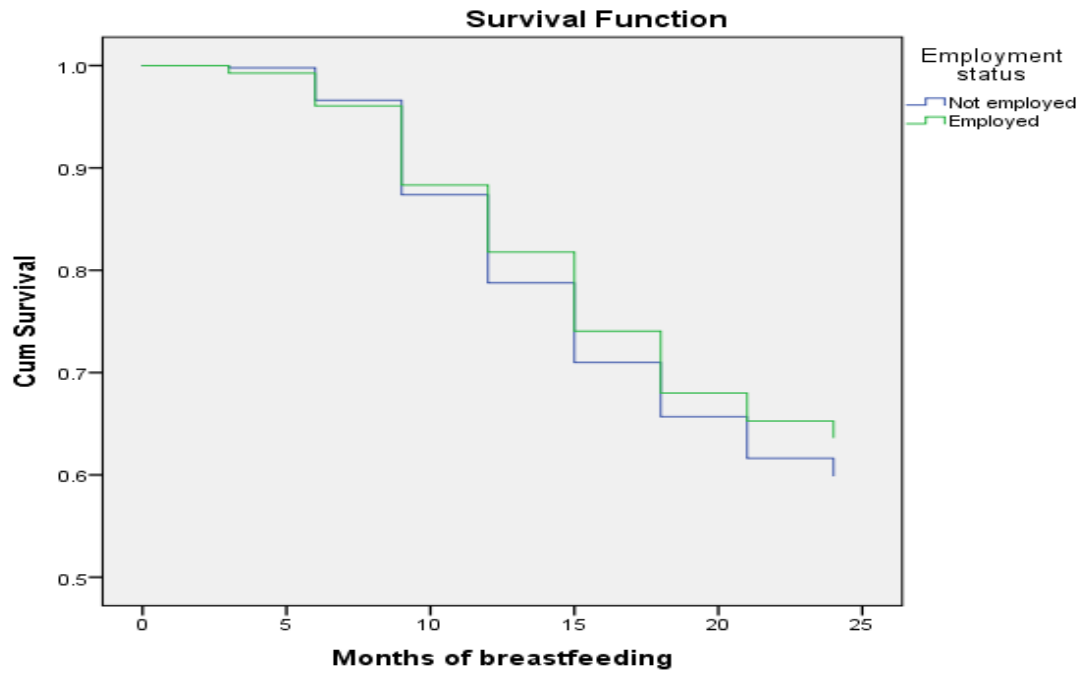


Figure 6: Survival curve for duration of breastfeeding by employment

The study investigated the association between breastfeeding duration, introduction of solid foods among mothers with different wealth status. Most women with rich wealth status are likely to be employed and likely to have high levels of education, thus a similar pattern was observed, starting solid foods as early within 3 months compared to poor women who started solid feeding later after 3 months. Figure 7 shows the survival analysis of breastfeeding duration and introduction of solid foods by wealth status.



Figure 7: Survival curve for duration of breastfeeding by wealth status

The survival curve for duration of breastfeeding and introduction of solid foods by birth status in Figure 8 shows that mothers with multiple births give solid foods earlier than mothers with single births during the first three months of breastfeeding. After the fifth month, the survival curve for mothers with a single birth drops rapidly compared to those with multiple births which almost flatten to a level plateau suggesting that these mothers are giving solid foods to their children more than the mothers with a single birth.

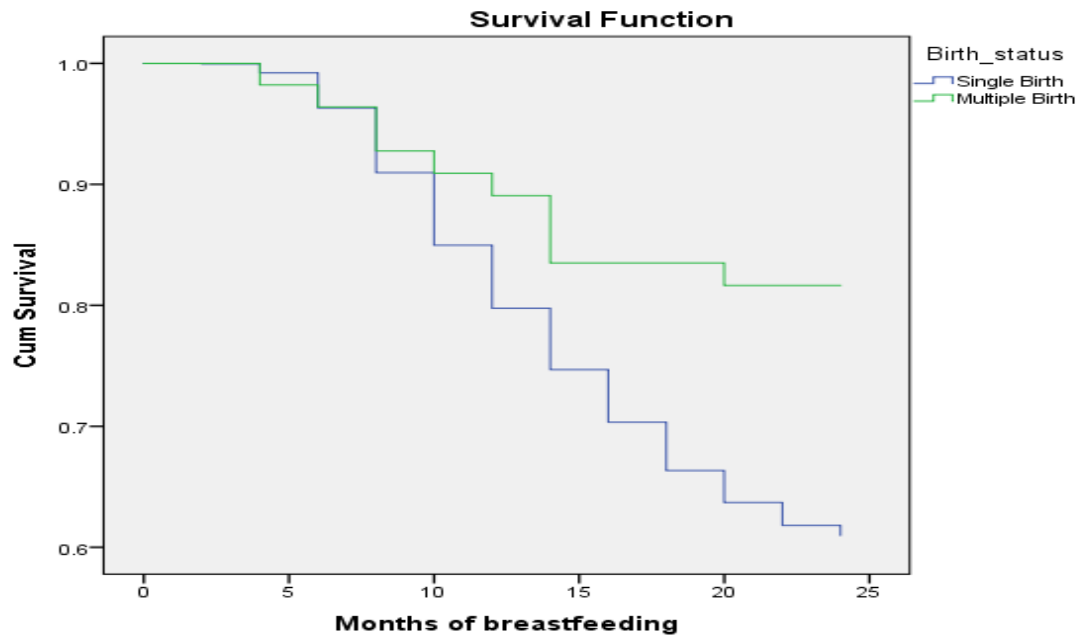


Figure 8: Survival curve for duration of breastfeeding by birth status

CHAPTER 5

5.1 DISCUSSION: SECTION I: THE PREVALENCE AND FACTORS ASSOCIATED WITH EXCLUSIVE BREAST FEEDING AMONG INFANTS AND YOUNG CHILDREN IN NAMIBIA

5.1.1 Prevalence of exclusive breast feeding

The single most effective intervention for preventing child morbidity and mortality is practicing exclusive breastfeeding during the first six months of life (Mekuria and Edris, 2015). In this study the prevalence of breastfeeding practice among children aged 0-6 months at the time of survey was 35.1% and that of exclusive breastfeeding was only 19%. This low proportion of exclusive breastfeeding is very unsatisfactory considering the undisputable benefits of the exclusive breastfeeding of infants. Similar low levels of exclusive breastfeeding were recorded in other countries (Radwan, 2013). Radwan (2013) reported that although higher rates of exclusive breastfeeding have been reported in New Zealand and Norway, where 42% of the infants were exclusively breastfed for 4 months, he further indicated that even in these countries, exclusive breastfeeding declined to 7% at six months of age.

In most Africa countries, exclusive breastfeeding was reported to be a challenge, for example in Zimbabwe exclusive breastfeeding has contributed to child malnourishment, stunted growth and high child mortality. According to the Multiple Indicator Cluster Survey (MICS) conducted in Zimbabwe in 2014, only one in three babies were exclusively breastfed in their first six months of life (Mhlanga *et al.*,

2015). In previous a study by Mhlanga *et al.* (2015), the reasons for low uptake of exclusive breastfeeding were attributed to societal, cultural and religious beliefs of lactating mothers. A cross-sectional study conducted in four provinces in South Africa which comprised mothers and/or caregivers of babies aged ≤ 6 months found that exclusive breastfeeding rate for infants up to the age of six months was 12% (Siziba *et al.*, 2015). However, Mnyani *et al.* (2017) recently reported that there were improvements in the level of exclusive breastfeeding among women in Johannesburg. This means that there is still a need for encouraging mothers to continue exclusive breastfeeding till the infants are 6 months old.

5.1.2 Factors associated with exclusive breastfeeding

In the present study the findings showed that the age of the young infants is positively associated with exclusive breastfeeding. Several studies (Tembo *et al.*, 2015; Asemahagn, 2016) also strengthen this correlation where infant's exclusive breastfeeding and age are inversely related. The logical explanation could be linked to the only three months maternity leave which make it difficult for mothers to exclusively breastfeed their infants until age 6 months as they need to go back to work. A number of studies also found similar negative association between employment status of the mother and exclusive breastfeeding. Employed mothers may be relatively overloaded with their office activities so may have limited time with infants and hence forced to introduce supplementary feeding earlier (Tembo *et al.*, 2015). Wealthier mothers are more likely to be educated and also employed and the study shows that these women are less likely to practice exclusive breastfeeding (Asemahagn, 2016). This however contradicts with findings of Agho *et al.* (2011)

who reported that infants from the poorest households were less likely to be exclusive breastfeeding compared to infants from middle level and wealthiest households.

However, Radwan (2013) reported that education as a predictor differs between developing and developed countries, and also reported that educated mothers in most developed countries have returned to breastfeeding while mothers with high education level in developing countries have increasingly switched to bottle feeding or mixed feeding. This implies that higher education in developing countries is associated with the adoption of modern ideas, often leading to the abandonment of traditional practices. The findings however contradict with a number of other researches (Kimane-Murage, *et al.*, 2011; Ukegbu *et al.*, 2011) that found a positive association between exclusive breastfeeding and age of mother. Other studies (Ukegbu *et al.*, 2011; Kimane-Murage, *et al.*, 2011; Zhou *et al.*, 2012) found that older mothers practice exclusive breastfeeding more than younger ones. They argued that older mother women probably know more about the benefits of breastfeeding and have more experience in infant management. This study however found that young mothers are more likely to practice exclusive breastfeeding and this is also perhaps related with results of first born who are more likely to be exclusively breastfed.

The multivariable analysis showed a significant association between exclusive breastfeeding and antenatal and as well as with postnatal care. The possible explanation could be the increased knowledge and attitudinal changes due to the information provided at antenatal care clinics on infant feeding and nutritional values

of breast milk (MoHSS, 2012). Another explanation for this variation could be the increased Namibian government efforts to improve maternal and child health through a community based health extension programme. It may also be due to community involvement, increased number of health facilities, and the high use of delivering at a health care facility with 87% infants aged 0-6 months delivered at health facility (MoHSS, 2012). This argument supports the findings of Agho *et al.* (2011) who reported that mothers who did not attend antenatal care during pregnancy had lower odds for exclusive breastfeeding than those mothers who attend at least one antenatal visit.

5.2 DISCUSSION: SECTION II: FEEDING PRACTICES AND NUTRITIONAL STATUS OF INFANTS AND YOUNG CHILDREN

5.2.1 Feeding practices and nutritional status of infants and young children

WHO recommends exclusive breastfeeding for a period of 6 months and advised that complementary feeding must be delayed till 6 months if the child is born healthy. Udoh & Amodu (2016) reported that early introduction to solid food is a risk factor for infection and early cessation of breastfeeding. The results from this study show that Namibia does not fully comply to WHO recommendation of exclusive breastfeeding. The study shows that 35.3% of infants were given water and some were introduced to foods between ages 0 and 6 months. The possible reason for poor exclusive breastfeeding is the conception that mothers feel that their babies get thirst if not given anything to drink beside breastmilk. These findings concur with other studies where it has been found that water and sugar water are offered even to newborns and thin porridge is offered to the infants as young as two months (Katepa-Bwalya *et al*, 2015). The early introduction of complementary feeds and other liquids put the child at a high risk of bacteria and other infections that may compromise the child's health. Thus a child may have had a good start to life with breastfeeding and later on this is compromised and may translate to frequent ill health and malnutrition.

Timely introduction of solid foods remains an important factor for healthy infant growth. The premature introduction of complementary food was of great concern in this study as well as in other earlier studies as many mothers still

introduced complementary food before the baby reached six months of age (Radwan, 2013, Udoh & Amodu, 2016). The high rate of introducing complementary feeding at 6-9 months is encouraging, however, not surprising since a large percentage of mothers already begun feeding complementary foods to their infants before the age of 6 months. As a hygiene concern the practice of feeding infants with feeding bottles has been discouraged by WHO because of the difficulties in maintaining feeding bottles that are free of pathogens which can cause infections (WHO, 2012). However, this study shows that employed mothers, mothers with higher levels of education and rich wealth status continue to practice bottle feeding more. This could be due to the fact that employed mothers, mothers with higher levels of education and rich wealth status may not have adequate time to feed breast milk to their infants during working hours or busy schedules (Mekuria & Edris, 2015).

The study further indicated that mother with multiple births, employed mothers and those of mothers who are rich are the most vulnerable group who are at risk of not breastfeeding and introduce solid foods before the recommended age of six months. Proper advice and breastfeeding management are required to increase awareness of breastfeeding benefits and to ensure that the problems mothers face during breastfeeding do not lead to the cessation of breastfeeding (Radwan, 2013).

The results further indicate that the age of the mother, the place of residence and the prenatal attendance by a nurse/midwife are factors that are significantly associated with breastfeeding. It was found that children whose mothers were from rural areas were more likely to breastfeed for a longer time period even while giving solid foods as well as the mothers who had prenatal attendance by nurse/midwife.

Abada *et al.* (2001) in their study also found that at each point of duration, urban women have a lower probability of continuing to breastfeed relative to rural women.

5.3 Limitations of the study

Like any other studies using secondary data, this study has some limitations; although the study was carefully planned there are some inevitable limitations. For instance, the data was not collected for the purpose of this study and hence some variable and information of interest might not be covered, therefore limiting the findings. The researcher also has no control of what is contained in the dataset, often this can limit the analysis or alter the original objectives the researcher wishes to answer. There is a possibility that some of the responses might suffer from reporting and recall bias as well as socially desirable response, since these are self-reported data relying on memory of past events. Another related limitation of using secondary data (NDHS) is that the variables may have defined or categorised differently than the researcher would have wanted. Then data used for the study was collected in 2013, thus the finding might give a different picture on the infant and young feeding practices from the current situation in the country.

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusion

Based on the findings of this study, it is concluded that although breastfeeding remains a universal practice by women, infant and young children feeding practices observed are far from optimal. It is apparent that exclusive breastfeeding in Namibia is still low. The present study found that the proportion of children aged 0-6 months who were being breastfed at the time of survey was 35.1% and only 19% of the children in the same age range were exclusively breastfed. The median duration of exclusive breastfeeding was three months and exclusive breastfeeding decreases with increasing age of a child.

The Age of mother, her employment status and birth order are highly significantly influence the practice of exclusive breastfeeding in Namibia. The results showed that exclusive breastfeeding practice among children aged 0-6 months, decreases with age of the child (OR=0.76, 95%CI: 0.71-0.81), the older once have a 24% less likelihood of been exclusively breastfed compared to the once who are younger. The mothers with a secondary or higher educational level are 15% (OR=0.85, 95%CI: 0.71-1.01) less likelihood of exclusive breastfeeding practice respectively, when compared to those with a mothers with a primary or lower educational level. The mothers that were employed had an odds 54% (OR=0.55, 95%CI: 0.46-0.66) less likelihood of exclusive breastfeeding practice when compared to those that that were unemployed. There is need for large more detailed

study following women from before birth until they stop breastfeeding their babies to fully understand the constraints, hindrance and influencing factors

The findings of this study should be the foundation of future studies that investigate feeding patterns among infants in Namibia and eventually assist in the implementation of the WHO infant and young children feeding practices. Since, the patterns of breastfeeding and complementary feeding among infants and young children aged 0-24 months showed that The study showed that about 77% of infants were put to breast within one hour after birth but most mothers did not continue to breastfeed to 24 months. Among children aged between 0 and 24 months, only 28.2% were still breastfed, and continued breastfeeding was lowly practiced with only 6.1% of children between age 20 and 24 months still breastfed. The study indicated that the proportion of infants less than 12 months of age who received any food or drink from a bottle in the previous 24 hours was 18.6%.

The examination factors associated with breastfeeding and bottle feeding among young children (0-24 months showed that both breastfeeding and bottle feeding had significant association with education level of mother, her employment status, her age, prenatal care status, wealth status and place of residence. It also showed relationship between bottle feeding status with a number of socio-economic and demographic characteristics. The study revealed that breastfeeding decreases with increasing level of education of mother. Only 19.6% mothers of children aged 0-24 months were currently breastfeeding. A lower proportion of employed mothers (23.5%) were also currently breastfeeding compared to 33.6% of the unemployed. The study also showed that current breastfeeding is low among mothers with high

wealth status and those living in urban areas compared to the poor and those in rural areas.

The analysis of duration of breastfeeding among young children (0-24 months) showed that the probability of breastfeeding decreases as children were given solid foods, indicating that mothers were more likely to stop breastfeeding as the months of breastfeeding increases. The majority of the children in the study were introduced to solid foods before the recommended age of six month. The survival curves of duration of breastfeeding identified mothers with multiple births, employed mothers and those of mothers who are of rich status as the most vulnerable group who are at risk of not breastfeeding and introduce solid foods before the recommended age of six months. The study found that children whose mothers were from rural areas were more likely to breastfeed for a longer time period while giving solid foods as well as the mothers who had prenatal attendance by nurse/midwife.

The study also found that 85.3% of infants aged between 6 and 9 months were introduced to some complementary feeding, whereby 83% were given liquids other than breastmilk and 68% were given solid foods. Bread (grains) and meat are the most common foods given to infants aged between 0 and 6 months, while most infants were given water. The finding of this study also provide a basis for programmatic interventions that ensure a focus on complementary feeding while also sustaining a focus on exclusive breastfeeding, if improvements in malnutrition are to be achieved. It is known that beyond the age of 6 months, a diet of breastmilk alone is inadequate to maintain child growth and development, and that adequate complementary feeding is critical. Thus, interventions addressing the full spectrum

of infant and young child feeding are essential from birth until 24 months of age to reduce infant mortality as well as to improve overall undernutrition rate.

6.2 Recommendations

The Government of the Republic of Namibia through the Ministry of Health and Social services has embraced the WHO recommendations and issued guidelines that recommend six months of exclusive breastfeeding. However, translating these guidelines into action would require immense planning and strong implementation programme and strategies.

The findings of this study suggest that (1) there is need to have clear national targets, strategies or action plans to protect, promote and support appropriate feeding practices of infants and young children. (2) There is need for the Government of the Republic of Namibia, through the Ministry of Health and Social Services to implement an infant feeding policy in the context of WHO/UNICEF Global Strategy for infant and Young Children feeding taking into account all socio-economic and demographic as well as behavioural factors that influence or hinder practice of exclusive breast feeding. This is due to the fact that this study showed that most women from rich households, who are employed and have high levels of education, starting solid foods as early within 3 months compared to poor women who started solid feeding later after 3 months or later.

(3) Recommendations for improving exclusive breastfeeding practices should also include better support for working mothers by extending maternal leave and/or establish work-site day care centres for infants. The working mothers find it difficult

to exclusively breastfeed because they are away from their children during the working hours. (4) Emphasis should also be on the need to strengthen existing programmes to promote exclusive breastfeeding and the continuous of breastfeeding into the second year and beyond. (5) Furthermore, there is urgent need for the MoHSS and other agencies working on improving child health through feeding practices to develop satisfactory, cheap and culturally acceptable complementary recipes that can be prepared from locally available foods.

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ANNEXURE: SPSS Syntax

Below is some of the SPSS syntax used for recoding and computing variables used in the analysis for this study:

```
RECODE V190 (MISSING=SYSMIS) (1 thru 2=0) (3 thru 5=1) INTO  
Wealth_Status.
```

```
VARIABLE LABELS Wealth_Status 'Wealth status'.
```

```
EXECUTE.
```

```
RECODE V201 (MISSING=SYSMIS) (1 thru 2=1) (3 thru 4=2) (5 thru Highest=3)  
INTO Parity.
```

```
VARIABLE LABELS Parity 'Total children ever born'.
```

```
EXECUTE.
```

```
RECODE V218 (MISSING=SYSMIS) (1 thru 2=1) (3 thru 4=2) (5 thru Highest=3)  
INTO Living_children.
```

```
VARIABLE LABELS Living_children 'Number of living children'.
```

```
EXECUTE.
```

```
RECODE V501 (MISSING=SYSMIS) (0=0) (1 thru 2=1) (3 thru 5=2) INTO  
Marital_Status.
```

```
VARIABLE LABELS Marital_Status "Mother's marital status".
```

```
EXECUTE.
```

```
RECODE V704 (0=Copy) (ELSE=1) INTO Partners_Employment_Status.
```

```
VARIABLE LABELS Partners_Employment_Status "Partner's employment status".
```

EXECUTE.

RECODE BORD (MISSING=SYSMIS) (1=1) (2=2) (3 thru Highest=3) INTO

Birth_Order.

VARIABLE LABELS Birth_Order 'Birth order'.

EXECUTE.

RECODE B8 (MISSING=SYSMIS) (0 thru 1=1) (2 thru 3=2) (4 thru 5=3) INTO

EBF_Child_Age_group.

VARIABLE LABELS EBF_Child_Age_group "Child's age in months".

EXECUTE.

RECODE B8 (MISSING=SYSMIS) (0 thru 1=1) (2 thru 3=2) (4 thru 5=3) (6 thru

8=4) (9 thru 11=5) (12 thru 14=6) (15 thru 17=7) (18 thru 20=8) (21 thru 24=9)

INTO CF_Child_Age_groups.

VARIABLE LABELS CF_Child_Age_groups "Child's age groups in months".

EXECUTE.

RECODE M14 (MISSING=SYSMIS) (0=0) (ELSE=1) INTO Antenatal_Care.

VARIABLE LABELS Antenatal_Care "Attended antenatal care".

EXECUTE.

RECODE M15 (MISSING=SYSMIS) (11 thru 12=1) (ELSE=0) INTO

Place_Delivery_Home.

VARIABLE LABELS Place_Delivery_Home " Home delivery".

EXECUTE.

RECODE M15 (MISSING=SYSMIS) (21 thru 36=1) (ELSE=0) INTO

Place_Delivery_Hospital.

VARIABLE LABELS Place_Delivery_Hospital "Hospital delivery".

EXECUTE.

RECODE M19 (MISSING=SYSMIS) (Lowest thru 2499=0) (ELSE=1) INTO

Birth_Weight.

VARIABLE LABELS Birth_Weight 'Birth weight of the child at birth'.

EXECUTE.

RECODE M34 (MISSING=SYSMIS) (0=0) (199=SYSMIS) (299=SYSMIS)

(999=SYSMIS) (ELSE=1) INTO

Initiation_breastfeeding.

VARIABLE LABELS Initiation_breastfeeding 'Initiation of breastfeeding'.

EXECUTE.

COMPUTE EBF= V404=1 &V409 = 0 &V410=0 &V411=0 &V411A=0

&V412A=0 &V412C=0 &V413=0 &V414E=0 &V414F=0 &V414G=0

&V414H=0 &V414I=0 &V414J=0 &V414K=0 &V414L=0 &V414M=

0 &V414N=0 &V414O=0 &V414P=0 & V414S=0 &V414V=0 &V415=0.

VARIABLE LABELS EBF 'Exclusive breastfeeding'.

EXECUTE.

```
COMPUTE Solid_Foods_1=V412A + V412C + V414E + V414F + V414G +  
    V414H+ V414I + V414J + V414K +  
    V414L + V414M + V414N + V414O + V414P + V414S + V414V .
```

```
EXECUTE.
```

```
RECODE Solid_Foods_2 (MISSING=SYSMIS) (0=0) (1 thru 16=1) INTO  
    Solid_Foods_2.
```

```
VARIABLE LABELS Solid_Foods_2 "Solid foods".
```

```
EXECUTE.
```

```
COMPUTE Other_Liquids=V409 + V410 + V411 + V413.
```

```
EXECUTE.
```

```
RECODE Other_Liquids_2 (MISSING=SYSMIS) (0=0) (1 thru 4=1) INTO  
    Other_Liquids_2.
```

```
VARIABLE LABELS Other_Liquids_2 " Other Liquids".
```

```
EXECUTE.
```

```
COMPUTE InfantFormula= V411A=1.
```

```
EXECUTE.
```

```
COMPUTE Complementary=V411A=1|Other_Liquids_2=1| Solid_Foods_2=1.
```

```
EXECUTE.
```