

**GROWTH AND DEVELOPMENT OF BREASTFED AND NON-  
BREASTFED CHILDREN (0 - 23 MONTHS) AT THE YOUNG CHILD  
CLINIC, KABALE HOSPITAL, UGANDA**

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SCHOOL HEALTH SCIENCES OF KENYATTA UNIVERSITY**

**NOVEMBER, 2022**

**DECLARATION**

This thesis is my original work and has not been presented for an award degree in any other University or any other award.

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## **DEDICATION**

I dedicate this work to my parents for their unwavering support in my academics and nutrition career.

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**LIST OF ABBREVIATIONS AND ACRONYMS**

<b>ASQ</b>	Ages and Stages Questionnaire
<b>EBF</b>	Exclusive Breastfeeding
<b>FFQ</b>	Food Frequency Questionnaire
<b>LMIC</b>	Low- and Middle-Income Countries
<b>SPSS</b>	Statistical Package for the Social Sciences
<b>UBOS</b>	Uganda Bureau of Statistics
<b>UDHS</b>	Uganda Demographic and Health Survey
<b>UNCST</b>	Uganda National Council for Science and Technology
<b>WHO</b>	World Health Organization
<b>MDD</b>	Minimum Dietary Diversity Score
<b>MMF</b>	Minimum Meal Frequency
<b>MAD</b>	Minimum Acceptable Diet
<b>CCA</b>	Canonical correlation analysis
<b>AOR</b>	Adjusted odds ratio

## OPERATIONAL DEFINITION OF TERMS

**Breastfeeding:** providing an infant with breast milk from the mother directly from the breast or through expressing and feeding by cup

**Child growth:** the increase in the body size as a whole and of its parts determined as weight and length

**Developmental milestones:** skills developed by a child as they grow; these include gross motor, fine motor, personal social and problem-solving skills.

**Exclusive Breastfeeding:** This is giving an infant breast milk only, except for vitamin syrups or drops for the first six months of life.

**Feeding practices:** Include the frequency, amount and type of food a child eats in addition to breastfeeding.

**Breastfed infants and children:** exclusively breastfed for six months, continued breastfeeding for up to 2 years in addition to solid foods.

**Non-breastfed infants and children:** not exclusively breastfed for six months and not continually breastfed for up to 2 years in addition to solid foods

**Predictors of developmental milestones:** these are variables associated with achieving developmental milestones.

## ABSTRACT

Rapid growth and development are expected in the first two years of a child's life. During this period, breastfeeding plays an important role. Poor optimal breastfeeding practices interfere with the intake of essential nutrients from breast milk leading to poor growth and development. In Uganda, 66% of children below six months are exclusively breastfed. Rapid growth during this time requires nutrient-dense foods like breast milk; without these foods, a child is prone to stunting, poor brain development, delayed achievement of milestones and malnutrition. The Uganda Demographic and Health Survey report indicates a decrease in the proportion of breastfed children from 82% to 50% among children 18-23 months. In Kabale, this manifests through increased malnutrition rates, specifically stunting (47%). This research focused on the growth and development of breastfed and non-breastfed children 0-23 months of age at the young child clinic, Kabale Hospital. A comparative cross-sectional study was used with both quantitative and qualitative approaches in data collection, analysis and presentation. The study targeted a sample of 250 children (0-23 months) and their caregivers, 125 breastfed children and 125 non-breastfed children. Structured researcher-administered questionnaires were used to determine socio-demographic characteristics and morbidity. Anthropometric measurements such as weight, length and MUAC were assessed using anthropometric measurements while the ages and stages questionnaire was used to cumulate information on developmental milestones. Data was analysed using SPSS version 22.0, and ENA for smart was used to analyse anthropometry. Data was presented in tables, and descriptive statistics were used to describe the different variables of the study. Bivariate analysis was used to establish the association of different variables in breastfed and non-breastfed children. The prevalence of undernutrition based on the three indices was wasting (5.2%), underweight (12%) and stunting (49.6%). Regression analysis revealed a significant relationship between the caregiver's education level and fine motor skills (AOR=0.29, p=0.04), caregiver's age and gross motor skills (AOR=15.34, p=0.020), child's age and fine motor skills (AOR=7.594, p=0.002), weight for age and problem-solving skills (AOR=3.91, p=0.042), length for age and communication skills (AOR=3.68, p=0.033). Findings from the study showed that breastfed children had a better minimum dietary diversity score and nutritional status than non-breastfed children; however, there was no significant difference in morbidity and developmental milestones between the study groups. In addition, breastfeeding was not a predictor of developmental milestones. Factors like the caregiver's age, education, child's age, weight for age, length for age, and minimum dietary diversity score determined early childhood development. Caregivers should be encouraged to meet the minimum meal frequency. Mothers should receive continuous support and counselling on breastfeeding so their children can have a normal nutritional status, ultimately contributing to the achievement of developmental milestones. The government of Uganda should implement effective interventions like growth monitoring and promotion to decrease the high prevalence of stunting. Similar studies should be done with the inclusion of the home environment to observe its effect on developmental milestone.

## CHAPTER ONE: INTRODUCTION

### 1.1 Background to the study

Rapid growth and development are expected in infants (Nurliyana, Shariff, Taib, Gan, and Tan, 2016). According to Balasundaram & Avulakunta (2022), childhood growth is the constant increase in size (weight and length), and development enhances a child's coordination and cognitive skills. Breastfeeding is essential in providing infants with the nutrients they need for growth and development during this period. Breastfeeding can be exclusive or simultaneous with complementary feeding (Prell & Koletzko, 2016). Growth entails an increase in the size of the body as a whole and of its parts as determined by the use of measurements like length, weight and Mid Upper Arm Circumference (MUAC), among others. Child development includes the motor, social, communication, and cognitive domains (Olsen et al., 2020).

Globally, at least 144 million children were stunted in 2020, and 47 million children were wasted (UNICEF, WHO, and World Bank Group, 2020). Children that survived malnutrition were less productive physically and intellectually and more prone to disability in their adult life (Glover-Amengor et al., 2016). According to previous estimates, 38% of children younger than five years in Sub-Saharan African countries were prone to poor development due to inadequate nutrition (Black et al., 2017).

Long-term malnutrition manifesting as stunting has also been linked to reduced cognitive development (Soliman et al., 2021). A study done in Korea demonstrated the importance of breastfeeding in cognitive development. Infants who were breastfed for  $\geq 9$  months developed better than non-breastfed infants (H. Lee et al., 2016). Another

study demonstrated the importance of breastfeeding in motor development during the first twelve months of life, indicating that children who breastfed for at least four months developed better (Jardí et al., 2018). Another study in Greece demonstrated a relationship between prolonged breastfeeding and better motor, communication, and cognitive scores at 18 months (Leventakou et al., 2015).

One-third of all malnourished children under five years are from Sub-Saharan Africa; about 39% are stunted, 10% are wasted, and 25% are underweight (Akombi et al., 2017). This prevalence is evident in children's suboptimal physical growth and detrimental health. In some African countries, such as Niger, Burundi, and Burkina Faso, children in rural areas are more prone to malnutrition than their urban counterparts. Poor growth of rural children is attributed to limited sufficient nutritious foods, like suboptimal feeding practices and loss of nutrients during sickness (Sarrassat et al., 2019). In Kenya, the prevalence of chronic undernutrition, as measured by stunting in children under five, was 26% in 2014, leading to increased mortality, illnesses, and long-term adverse effects on cognitive abilities (Eberwein et al., 2016).

According to UNICEF (2022), previous global statistics show that the number of children who are on track to achieving their developmental milestones varies widely across countries, with the lowest being the Central African Republic (36%) and the highest being Serbia (97%). 65% of Ugandan children aged 3 to 5 years are on track to achieving developmental milestones compared to 82% of children in Rwanda. Uganda ranks high among countries with the burden of stunting; two in every 50 Ugandan children die before their first birthday. The southwest region ranks second highest in infant mortality rate in Uganda, at 76 per 1000 live births, and the prevalence of stunting

in the same region is 42% (Bukusuba et al., 2018). The study also reported that IYCF knowledge and practices like breastfeeding in rural Uganda remained very poor.

## **1.2 Problem statement**

Exclusive breastfeeding (EBF) is recommended for up to 6 months, and breastfeeding with complementary feeding is recommended for a minimum of 23 months for optimal growth and attainment of developmental milestones (social skills, problem-solving, language, and motor skills). However, a study conducted in Kilifi county, Kenya, reported that many infants below six months of age are given other foods like water, non-milk liquids, and animal milk (Talbert et al., 2020). This practice is attributed to the inability of mothers to exclusively breastfeed due to factors like employment, lack of knowledge, cultural beliefs, and mode of child delivery. According to Victora et al. (2016), 37% of children below six months are exclusively breastfed in low- and middle-income countries. This percentage means most children are susceptible to morbidity and a decrease in child intelligence, all of which affect growth and development. Globally, less than 40% of children below six months are exclusively breastfed (Gupta, Dadhich, and Suri, 2013), while the percentage is about 40% in developing countries. In Uganda, 66% of infants below six months are breastfed exclusively, 7% of infants consume water, 6% consume other liquids, 8% consume other types of milk, and 11 % consume other foods with breast milk (Uganda Bureau of Statistics, 2016). The prevalence of complementary feeding among Ugandan children between 6-8 months is 78.8%, while in Kenya, 80% of breastfed children between 6-8 months receive complementary foods (Ministry of Health/Kenya, 2015). The effect of these practices on developmental milestones has not been explored to a large extent.

New studies show that poor development is high. Children at risk of poor attainment of developmental milestones due to stunting are likely to go without about a quarter of expected adult income per year (Richter et al., 2017). In the Rwenzori region (which includes Kabale), 41% of children under five years are stunted, and poor nutrition has contributed to this worrying situation (Uganda Bureau of Statistics, 2016). The Ministry of Health in Uganda promotes Maternal Infant and Young Child nutrition, focusing on the first 1000 days. Its goal is to improve and promote optimal maternal, infant and young child health. Despite the assumption that maternal factors before, during and after pregnancy affect early child development, most studies demonstrate a weak correlation (Kingston, McDonald, Austin, and Tough, 2015). Early childhood development research is essential in improving the achievement of milestones to address the global burden of children in developing countries at risk of life disparities later in life (Black et al., 2017). There is an urgent need for population-level indicators of child development, especially for young children, to enable ongoing monitoring and improvement in quality. This research will provide the tools to guide policies and service delivery, particularly in developing countries (Ertem et al., 2018). The research focused on assessing the growth and development of breastfed and non-breastfed children 0-23 months at the Young Child Clinic, Kabale Hospital

### **1.3 Purpose of the study**

This study compared the growth and developmental milestones of breastfed and non-breastfed children 0-23 months attending the Young Child Clinic at Kabale Hospital in Uganda. The hospital is in the Southwestern region of Uganda and serves approximately two million people. According to the Uganda Bureau of Statistics (2016), the rate of

stunting in the region stands at 42%, which is relatively high.

#### **1.4 Objectives of the study**

1. To determine the characteristics of breastfed and non-breastfed children 0- 23 months of age and the socio-demographic characteristics of their caregivers at the Young Child Clinic, Kabale Hospital.
2. To determine the feeding practices of breastfed and non-breastfed children 0-23 months of age at the Young Child Clinic, Kabale Hospital.
3. To assess the morbidity of breastfed and non-breastfed children 0-23 months of age at the Young Child Clinic, Kabale Hospital.
4. To assess the nutritional status of breastfed and non-breastfed children 0-23 months of age at the Young Child Clinic, Kabale Hospital.
5. To assess the developmental milestones of breastfed and non-breastfed children 0-23 months of age at the Young Child Clinic, Kabale Hospital.
6. To establish predictors of developmental milestones among children aged 0-23 months attending the Young Child Clinic at Kabale Hospital, Uganda.

#### **1.5 Hypotheses**

H<sub>01</sub>: There is no significant difference in socioeconomic characteristics of caregivers of breastfed and non-breastfed children aged 0- 23 months.

H<sub>02</sub>: There is no significant difference in nutritional status between breastfed and non-breastfed children aged 0- 23 months.

H<sub>03</sub>: There is no significant difference in the attainment of development milestones

between breastfed and non-breastfed children aged 0- 23 months.

### **1.6 Significance of the study**

The study will inform policy decisions by the Ministry of Health and stakeholders like nutritionists and other health workers on the appropriate strategies for promoting breastfeeding in Western Uganda. It will contribute to the alleviation of malnutrition and hence improve developmental milestones among children in Uganda. It will also serve as a reference for future research. The audiences during dissemination included; the medical staff of Kabale Hospital, participants in the research, the Ministry of Health and the academia.

### **1.7 Delimitations of the study**

The research focused on children 0-23 months attending the Young Child Clinic at Kabale Hospital. The findings will apply to rural hospitals in low and middle-income countries.

### **1.8 Limitations of the study**

The study adopted a cross-sectional comparative design that obtained information on a recall basis, and children were not followed up for further observation.

Well-trained interviewers were used to minimise recall bias and to do proper probing during interviews aided by various tools. Health-seeking behaviour was not determined. The study was carried out in a hospital setting to enhance patient care and provide various treatment options.

## 1.9 Conceptual Framework

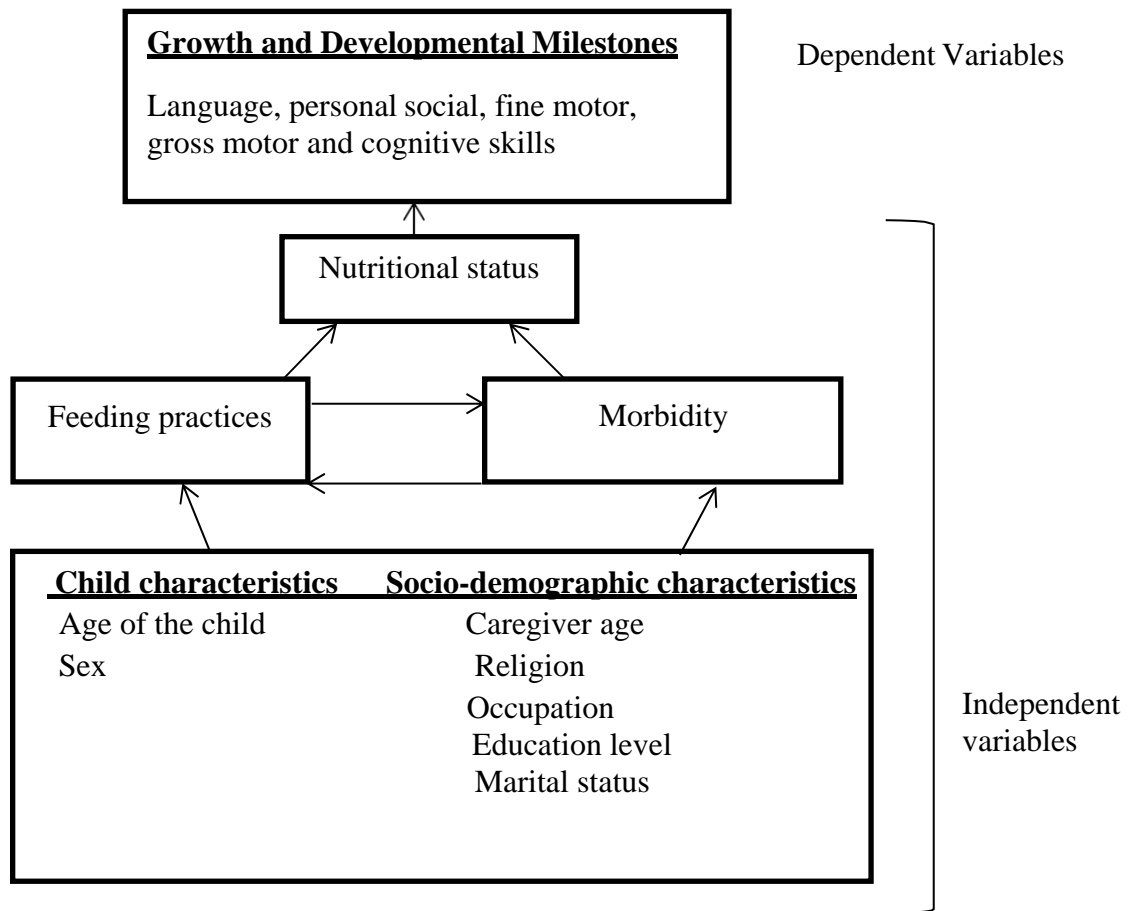


Figure 1: Conceptual framework on growth and development of children 0-23months

The Conceptual framework is an adaptation of the UNICEF conceptual framework on the factors contributing to good nutrition (UNICEF, 2021).

Feeding practices can be influenced by the child's characteristics and socio-demographic characteristics of the caregiver like age, marital status, religion, education level and occupation. These may also influence morbidity; for example, household income determines food purchasing power; therefore, a low-income household increases the occurrence of malnutrition. Feeding practices, in turn, affect morbidity and nutritional status. Nutritional status determines the attainment of developmental milestones, including gross motor, fine motor, communication, and problem-solving skills (Shrestha, Weissman, Thapa, Adhikari, and Perry, 2021).

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 Introduction**

Growth and developmental milestones in children are due to optimal feeding practices, including breastfeeding, timely introduction of complementary foods, and a balanced diet. Children can grow at the expected rate, increase in weight and height, and achieve developmental milestones. Breast milk contains almost all the nutrients and protective factors that fight against infections (Kim & Yi, 2020), contributing to healthy growth and development. Studies show that breastfed children develop better motor and psychosocial skills than non-breastfed children (Kuchenbecker et al., 2015). The available scientific studies on growth, early childhood development and nutrition are scarce, especially in Uganda. This research assessed the factors associated with the growth and development of breastfed and non-breastfed children aged 0-23 months attending the young child clinic of Kabale Hospital. The study determined the socio-demographic characteristics of caregivers and the characteristics of children 0-23 months, their nutritional status, feeding practices, developmental milestones and morbidity.

### **2.2 Socio-demographic factors of caregivers and characteristics of children 0-23 months**

A study in Brazil established a relationship between maternal education, lack of employment, inadequate support, and the increased occurrence of delayed development in children less than 24 months (Kofke, Pérez-Escamilla, Gubert, & Buccini. 2022). The current study analyzed the socio-demographic characteristics of Ugandan caregivers of

children below two years. According to Tariku et al. (2017), a mother's highest level of education, antenatal care during pregnancy, and assistance during delivery contribute to optimal breastfeeding, which contributes to development. The study was done in the urban areas of Ethiopia, allowing this current study to concentrate on a rural area like Kabale, Uganda.

According to Ickes, Hurst, & Flax (2015), Ugandan mothers who lacked formal education and had home births were at risk of poor child feeding. Data used in this research is from 2006 to 2011, which may be considered outdated since living patterns keep changing. This current study will add to the existing knowledge on the growth and development of breastfed and non-breastfed children.

A study done in Germany showed that children seven to thirteen months were more likely to demonstrate interpersonal skills compared to children below seven months; the development of interpersonal skills resulted from the children's increasing need to copy actions, evaluate others and engage in competitive activities (Thiele, Hepach, Michele, & Haun, 2021). The current study analysed the relationship between a child's age, growth, and achievement of gross motor, fine motor, communication, and problem-solving skills.

A review of published research found that infant females had better communication skills compared to infant males, and these results were attributed to biological and cultural factors (Rinaldi, Pasqualetti, Volterra, & Caselli, 2021). However, there was no correlation between gender and other developmental skills (cognitive, problem-solving and personal social skills). The current study compared the above data to the current data

regarding the relationship between gender and a child's developmental milestones.

A study on undernutrition found that boys were more likely to display poor growth and development outcomes because they are more prone to infections resulting from suboptimal breastfeeding (Asfaw et al., 2015). The study also mentioned poor child spacing as a contributing factor to poor growth and development. The study, however, left out children below six months of age, and yet optimum breastfeeding is expected as soon as a child is born. This study concentrated on children's growth and development from birth to 23 months.

### **2.3 Feeding practices of children 0-23 months**

According to Molla, Ejigu, & Nega (2017), feeding practices such as breastfeeding, timely introduction of soft foods, and feeding frequency all contribute to the growth and development of children. The study explained that if soft foods are introduced before six months of age, the child cannot receive the required breast milk for proper development, and stopping breastfeeding earlier than 23 months increases the occurrence of underweight, wasting, and delayed achievement of milestones. This current study analysed how feeding practices are essential to the development of both breastfed and non-breastfed children.

Breastfeeding practices like early initiation, giving breast milk only for the first six months of life and breastfeeding continuously for up to 2 years. Chakrabort et al. (2016) demonstrated their high prevalence but did not give a relationship between these feeding practices and growth. The current study was, however, able to relate these variables.

Das, Salam, Imdad, & Bhutta (2016) identified the minimum acceptable diet as a factor

contributing to the growth and development of children below two years. The minimum acceptable diet for children entails breastfeeding and other components (dietary diversity, meal frequency). This study assessed how a minimum acceptable diet contributes to the development of children.

Feeding practices like introducing thin porridge to children below six months have been proven to increase incidences of diarrhoea due to unhygienic conditions, poor storage, and poor handling (Gizaw, Woldu, & Bitew, 2017). Diarrhoea has been found to affect growth and development in children and, if severe, can lead to failure to thrive in children. This study assessed how suboptimal feeding practices affected growth and development in children 0-23 months.

According to Woodward & Liberty (2017), breastfeeding was related to psychosocial development as breastfed infants were more alert, cried less, and interacted more with their parents than non-breastfed children. The research, however, noted that further research was needed to clarify the extensive benefits of breastfeeding. The current study looked into the benefits of breastfeeding up to under two years of age and the different domains of development.

A study in India aimed at assessing the gross motor achievements and related factors among children; the researchers found that there was delayed attainment of gross motor milestones among healthy children according to the WHO guidelines (Gupta, Kalaivani, Gupta, Rai, & Nongkyrih, 2016). However, not all milestones were assessed, and no further evaluation of the problem led to delayed milestones was done. The current study assessed the growth and development of children 0-23 months and evaluated whether breastfeeding was the cause of the poor achievement of developmental milestones.

A study comparing early developmental milestones to adult intelligence demonstrated that factors like sex, parental social status, and birth weight contributed to the achievement of milestones and applied within the full range of development (Flensburg-Madsen & Mortensen, 2018). It did not emphasize the aspect of nutrition, yet nutrition services offered to pregnant mothers and children up to 2 years are perfectly timed to address early childhood development. The current study focused on the association of nutrition, specifically breastfeeding, with early childhood development.

### **2.3.1 Exclusive breastfeeding among children aged 0-6 months.**

A study in Uganda and Burkina Faso did not find a relationship between exclusive breastfeeding between 0-6 months and the development of social, cognitive, interpersonal, and problem-solving skills and linear growth in the later years (Tumwine et al., 2018). A different study in Eastern Uganda assessed the effects of exclusive breastfeeding on children. The intervention involved counselling in promoting exclusive breastfeeding for six months; after six months, there was no further intervention (Fadnes et al., 2016). At the two-year mark, nutrition assessment showed that 45% of exclusively breastfed children were stunted compared to 37% of children who were not exclusively breastfed. These results were attributed to the fact that the study participants were older during reassessment; therefore, environmental factors could have contributed to the outcomes. The current study assessed exclusively breastfed and non-breastfed children between 0-6 months to identify the implications of exclusive breastfeeding during the given period.

A study done in Siaya county, Kenya, established a relationship between exclusively breastfed children aged three to six months and attainment of language, gross motor and

cognitive skills. However, there was no correlation between exclusive breastfeeding and the achievement of fine motor and interpersonal skills. (Onyango et al., 2022). A different study in Kahawa, Nairobi, Kenya, did not find a relationship between exclusive breastfeeding and cognitive functioning among children aged 10-14 months. The current study assessed these developmental milestones among exclusively breastfed and non-breastfed children in Kabale Hospital, Uganda.

### **2.3.2 Complementary feeding among children aged 6-23 months.**

A study done in Marsabit county, Kenya, found a relationship between the nutritional status of children 6-23 months and complementary feeding practices like the introduction of solid foods at six months and minimum dietary diversity (Mutuku, Ochola, & Osero, 2020). A study in Kahawa West, Nairobi, Kenya, established a relationship between minimum meal frequency and nutritional status among breastfed children (Kimwele & Ochola, 2017). However, most of the children were breastfed. The current study compared the nutritional status of breastfed and non-breastfed children between 6-23 months. A study in Nepal found that 70% of children started solid foods at six months and 27% were underweight, 34.2% were stunted, and 10.8% were wasted (Pokharel Adhikar, Lamsal, & Adhikar, 2017). The study showed that only 18% of the mothers had sufficient knowledge of optimal breastfeeding, which contributed to the high levels of malnutrition. The current study analyzed the relationship between optimal feeding practices and growth among children attending the young child clinic. Kabale Hospital.

Different studies analysed the relationship between the methods of introducing solid foods to children and the development of motor and language skills. A study in Italy

found that breastfed children started solid foods through baby-led weaning, which enabled the development of their motor skills (Addessi et al., 2021), while another study in Spain found that baby-led weaning contributed to the development of a child's language skills during the second year of life (Pérez-Ríos et al., 2020). The current study observed the relationship between complementary feeding and developmental milestones among breastfed and non-breastfed children in Uganda, a low-income country.

#### **2.4 Morbidity in children 0-23 months**

According to the Ethiopian demographic survey, exclusive breastfeeding lowers the risk of diarrhoea, fever and coughing (Mulatu, Yimer, Alemnew, Linger, & Liben, 2021), which is similar to the findings in Bangladesh demographic survey that established a lack of exclusive breastfeeding between 0-6 months as the cause for respiratory infections and diarrhoea (Abdulla, Hossain, Karimuzzaman, & Rahman, 2022). A study done in Indonesia found that diarrhoea contributed to a child's poor nutritional status (Supriadi, Nurhayati, Khaerunnisa, & Suhandi, 2020), and another study done in Uganda found a weak association between breastfeeding and poor nutritional status (Bbaale, 2020). The current study investigated the effect of morbidity on the growth and development of breastfed and non-breastfed children.

According to Britto et al. (2017), health interventions reduced morbidity and advanced child growth. However, direct evidence of the effects of health interventions on developmental milestones was still lacking. This study explored whether morbidity affected children's development from 0-23 months.

A study in Kenya showed that diarrhoea had a short-term negative association with weight, and diarrhoea for long periods also affected linear growth for the first 24 months of age (Deichsel et al., 2020). This current study compared these findings to the morbidity of both study groups.

Morbidity, including nutritional deficiencies and severe diarrhoea, contributed to poor early childhood development in low-income countries (Britto et al., 2017). The current study analysed the association of disease with developmental milestones of children 0-23 months.

### **2.5 Nutritional status of children 0-23 months.**

According to studies done in Bangladesh, exclusive breastfeeding for the first six months of life lowered the risk of poor nutritional status among children. The lack of exclusive breastfeeding for the first six months contributed to low weight-for-age among children below six months (Aktar, 2021) and low length-for-age among children 6-24 months old (Ahmed, Sultana, Al-fuad, & Islam, 2017). A study in East and Central Uganda found that 68% of the children were exclusively breastfed for the first six months, and only 3% had a poor nutritional status (Asiimwe et al., 2021). The current study analyzed the nutritional status of exclusively breastfed and non-breastfed children in the Western part of Uganda for comparison purposes.

According to a study done in Southwestern Uganda, development domains (problem-solving, communication, and motor) were positively and significantly predicted by nutritional status (Muhoozi, Atukunda, Mwadime, Iversen, & Westerberg, 2016). This outcome was mainly attributed to nutrition among the children. However, the study only included children 6-8 months, a smaller scope than the current study comprising children

aged 0-23 months.

According to Nguyen et al. (2018), stunting in the first 12 months affects child development at 24 months. The study emphasized that early interventions with a good home environment promote optimal development. This study explored breastfeeding as an intervention for the growth and development of children 0-23 months visiting the hospital.

A study done in Nigeria revealed that nutritional status determines child development in communication and personal social skills (Jimoh, Anyiam, & Yakubu, 2018). Underweight children explore their environment less, and the maturation of their auditory pathway is delayed affecting their communication. The study consisted of children 6-59 months and used the Schedule of Growing Skills II (SGS II) tool for developmental assessment. The current study focused on children 0-23 months of age and used the Ages and Stages Questionnaires for assessing development.

A study showed the effect of nutrition and child development interventions on nutritional status and child development and found that nutrition is essential for development and growth. Child development interventions only aid developmental outcomes (Hurley, Yousafzai, & Lopez-Boo, 2016). The current study continued to examine the connection between nutrition, specifically breastfeeding and growth and development in children.

## **2.6 Predictors of developmental milestones among children aged 0-23 months**

A study done in Bangladesh, Costa Rica, and Ghana found that maternal education, child age, sex of the child, play and nutritional status affected early childhood development (Haq, Hossain, Zinnia, Hasan, & Chowdhury, 2021). These results are similar to a study

done in Tanzania among children at six months and fifteen months that established a relationship between a child's nutritional status and gross motor development and a caregiver's economic status and their child's cognitive development (Ribe, Svensen, Lyngmo, Mduma, & Hinderaker, 2018). These studies' results can offer general information on the predictors of childhood development. However, none of the studies was done in Uganda. This current study looked at the predictors of childhood development among Ugandan children aged 0-23 months.

Two studies in Brazil established a relationship between breastfeeding and the likelihood of attainment of developmental milestones. One of the studies was done in Ceará, Brazil, among children 0-59 months (Venancio, Teixeira, Bortoli, & Bernal, 2022). The results showed that responsive care and breastfeeding played a significant role in child development. Another study was done in São Paulo, Brazil and found that exclusive breastfeeding for six months, followed by complementary feeding, contributed to an increase in development among children below the age of two years (Wallenborn et al., 2021). There is scarce data on breastfeeding and early childhood development in Sub-Saharan Africa. Therefore, the current study on breastfeeding and development will contribute to this body of literature in the region.

## **2.7 Summary of the literature review**

Growth and development in children are due to several factors, as shown by the different studies. The socio-demographic factors highlighted in these studies were similar: maternal education, marital status and income. However, none of these studies was among children 0-23 months in Uganda. Different studies emphasized the consequences of poor nutritional status on developmental milestones, and the current research

examined similar effects in children 0-23 months. According to the above studies, feeding practices influenced nutrient intake and growth and development. The current study analysed the association of feeding practices like dietary diversity, meal frequency, and minimum acceptable diet on growth and development.

Global studies have shown a correlation between morbidities like diarrhoea and malnutrition and early childhood development. This study examined the correlation between breastfeeding, morbidity, and early childhood development. The studies in Brazil highlighted breastfeeding as a predictor of early childhood development. In addition, studies also found maternal education, child age and the caregiver's economic status to be a predictor of early childhood development. The current study identified the predictors of child development among children 0-23 months who attended the young child clinic at Kabale Hospital.

## **CHAPTER THREE: METHODOLOGY**

### **3.1 Research design**

A comparative cross-sectional design was employed to identify growth and development in breastfed and non-breastfed children (Haliu, 2021). Breastfed infants and children are breastfed exclusively for six months and breastfed for up to 2 years in addition to solid foods, while non-breastfed infants and children are not exclusively breastfed for six months and not continually breastfed for up to 2 years in addition to solid foods.

Quantitative and qualitative techniques were applied in data collection, analysis, and presentation.

### **3.2 Study variables**

#### **3.2.1 Dependent variables**

The dependent variables were nutritional status, determined using z-cores and MUAC and developmental milestones, determined using the ages and stages questionnaires.

#### **3.2.2 Independent variables**

The independent variables of the study were socio-demographic characteristics of caregivers and child characteristics such as age, feeding practices (breastfeeding, complementary feeding and continued feeding) and morbidity.

### **3.3 Study area**

The study was carried out in Kabale Hospital, located in the Central Business District of Kabale in South Western Uganda. The hospital coordinates are 1°15'04.0"S, 29°59'21.0"E (Latitude: -1.251111; Longitude: 29.989167). The hospital serves the

districts located in South Western Uganda. It serves about 2 million people in Kabale, Kisoro, Rukungiri, Kanungu, and Ntungamo (Ministry Of Health | Government Of Uganda, 2019). It also receives patients from the neighbouring countries of Congo and Rwanda. The hospital receives more than 50 children per day attending the young child clinic for immunization, outpatient services or inpatient admissions for illnesses like malnutrition.

### **3.4 Target population**

The target population was children between 0-23 months of age and their caregivers attending the Young Child Clinic at Kabale Hospital.

#### **3.4.1 Inclusion criteria**

Children 0 - 23 months and their caregivers attending the Young Child Clinic at Kabale hospital were willing to participate fully in the study.

#### **3.4.2 Exclusion criteria**

The study did not include disabled children, children with chronic disease conditions, and severely malnourished children receiving medical care.

### **3.5 Sample size determination**

For this particular study, breastfed children are all optimally breastfed according to WHO standards (WHO, 2021), meaning children exclusively breastfed for the first 6 months and children receiving breastmilk in addition to complementary foods from 6 months to 23 months of age.

Non-breastfed children are all those who are sub-optimally breastfed, meaning they are

not exclusively breastfed for the first six months of life and are not receiving breast milk in addition to complementary foods from 6 months to 23 months of age.

Participants were recruited after screening, and two sub-samples were established. The sample size was determined using the formula  $n=2z^2pq/d^2$  (Araoye, 2004)

Where: n is the desired sample

z is the normal deviation at the desired confidence interval. In this case, it was taken at 95%, Z value at 95% is 1.96

p estimated proportion in the target population practising optimal breastfeeding that is 20% (0.2)

q 1-p (proportion in the target population not practising optimal breastfeeding)

d Degree of precision, which was taken to be 10%.  $n=2(1.96)^2(0.2)(0.8)/0.12 = 125$

Therefore 125 breastfed children and 125 non-breastfed children.

### **3.6 Sampling technique**

A sample frame of 1000 children 0-23 months that attend the Young Child Clinic at Kabale Hospital was drawn, and a sampling interval was calculated (1000/250). The reference child was chosen randomly, and the subsequent ones were selected at a calculated interval (4) until the sample size of 250 was achieved.

The recruitment of the participants was done in two stages

The general population of all children attending the clinic was screened for at least one month, which helped determine the two arms. The caregivers answered questions related to the child's age and whether the child was exclusively breastfed or if they were receiving complementary foods after they turned six months. This process determined

the two subsamples in which each child-caregiver pair was placed to create the two comparison groups. It also assisted in placing the children into different age groups (WHO, 2016) for infant and young children feeding practices and for the ages and stages questionnaire (see Appendix G and H).

### **3.7 Research instruments**

#### **3.7.1 Questionnaires**

A researcher-administered questionnaire was used to collect data on the socio-demographic characteristics of the caregiver and the children's characteristics. It was adopted and modified from WHO.

#### **3.7.2 Anthropometric assessment**

A stadiometer was used to measure the length of the children to the nearest centimetre. During length measurements, the child was placed in a fully erect horizontal position facing upwards, until the back of the head, spine, buttocks, and heels touched the vertical axis of the stadiometer, and the heels were placed together (Melmed et al., 2020). The caregiver held their head while the trained researcher adjusted the stadiometer to read the child's length.

A digital scale, SECA scale model 874, was used to determine the weight of children dressed in minimum clothing. The process included weighing the caregiver, taring the scale, and handing them the child, ensuring that only the child's weight appeared on the scale.

Nutritional status was determined using z-scores obtained from WHO child growth standard charts. If a child's weight deviated further from the mean weight of the standard group, the child was considered to have low weight for length. The weight for length cut-offs were;  $3SD \geq WHZ < -2SD$  Moderate acute malnutrition, and  $WHZ < -3SD$  Severe acute malnutrition.

MUAC tapes were also used to determine nutritional status. The tapes use the latest WHO Growth Standard cut-offs for acute malnutrition and have three colours (red, yellow, green) with different colour cut-offs. Children whose MUAC was  $<11.5$  cm were considered to have severe acute malnutrition, those whose MUAC was between  $11.5$  cm and  $12.5$  cm were considered moderately malnourished, and those whose MUAC was  $>12.5$  cm were considered normal.

The children's ages were obtained from immunization cards and birth certificates.

### **3.7.3 Ages and stages questionnaire (ASQ)**

The ages and stages questionnaires were used to determine the children's communication, motor, fine motor, problem solving and personal social skills (Garrin & Marcketti, 2018). The questionnaire is a globally approved tool, valid, authentic, and reliable compared to all other tools. The assessment was carried out by directly testing the child and registering the child's skills as observed by the mother/caregiver.

The ages and stages questionnaires comprised three sections, including YES=10, SOMETIMES=5, and NOT YET=0. The researcher ticked the Yes box if a child demonstrated a skill with ease and efficiency. If the child performed a skill with some difficulty, the researcher ticked the Sometimes box, and if the child did not participate in a given skill, the researcher ticked the Not yet box. The scores for each child's skill

were totalled and compared against the standard cut-off values. If the child's total was above the standard cut-off value, then they met the cut-off value; if the child's total was below the cut-off value, they did not meet the cut-off value.

#### **3.7.4 24-hour dietary recall**

Caregivers listed all the food consumed and if the child was breastfed within the past 24 hours. The 24 hours were defined as starting from waking up until the time the infants went to sleep at night. The researcher asked what was eaten (solids and liquids) and how much food the child had eaten (Carpenter, 2006)

### **3.8 Feeding practices**

Caregivers were asked to state how often particular foods and breast milk were given in the last seven days before the interview. They were also asked if they fed their children from the recommended food groups, including breast milk, grains and tubers, legumes and nuts, dairy products, meat and fish, eggs, vitamin A-rich fruits and vegetables and other fruits and vegetables. This probing was done following the WHO (2008) protocol. Exclusive breastfeeding was considered for children aged 0-5 months, and complementary feeding was considered for children aged 6-23 months.

The following indicators were used to determine the feeding practices among children 6- 23 months(WHO, 2010);

#### **Minimum Dietary Diversity**

The proportion of children 6–23 months of age who receive foods from 4 or more of the recommended food groups during the previous day.

**Minimum meal frequency:** The proportion of breastfed and non-breastfed children 6–

23 months of age, who receive solid, semi-solid, or soft foods (including milk feeds for non-breastfed children) the minimum number of times or more.

**Minimum acceptable diet;** children 6–23 months of age with at least the minimum dietary diversity and minimum meal frequency during the previous day.

### **3.9 Pretesting of study instruments**

Pre-testing was done on 10% of the calculated sample size to ensure accuracy and clarity (Mugenda, 1999). Twenty-five (25) respondents were selected from Mbarara Hospital with similar characteristics to the study site. This pretesting provided clarity and feasibility of the instruments before the data collection. Modifications to the questionnaire were made, and the trained research assistants were able to practice data collection before the start of the research.

### **3.10 Validity of instruments**

A globally validated questionnaire (ASQ) was used to collect data on developmental milestones. Questionnaires on socio-demographics, dietary practices, child morbidity, and anthropometry were adopted from the existing validated questionnaires. My research supervisors further evaluated the study instruments. This evaluation ensured that the data obtained represented the study objectives to ensure accuracy and meaningfulness.

### **3.11 Reliability of instruments**

The test-retest method with a difference of 7 days was used to determine the instruments' reliability. The questions were checked for consistency and ability to measure the study variables. A reliability coefficient was calculated using Cronbach's Coefficient Alpha

(CCA). ACCA value of 0.70 and above was considered adequate.

### **3.12 Selection and training of the research team**

Two research assistants with a nutrition background were trained for three days on questionnaire administration, interview skills, data collecting techniques, and proper data documentation. One of the researchers, Nkurikiyinka Christopher, had a diploma in nutrition while Kiconco Clare had experience in community nutrition from her placement at Kabarole Research and Resource Centre. Both assistants were born and raised in Kabale town.

### **3.13 Data collection procedure**

A questionnaire was administered, and anthropometric measurements of the child were taken from a secluded room to maintain privacy. The caregiver was given an explanation regarding the study's objectives, and any clarification was addressed.

Feeding practices were assessed with a 24-hour dietary recall for the day before. The foods eaten by the child were noted (from waking up to bedtime at night). A food frequency questionnaire (FFQ) was used to collect data on the number of meals consumed by the child. It consisted of foods like milk, grains, and pulses and was presented to the caregiver to identify if the child ate that particular food and how many times the food was consumed in the last seven days.

An Ages and Stages Questionnaire was administered; the researcher read out loud the different developmental milestones, and the caregiver responded. For some milestones, observation was required with toys that acted as stimulants to the children.

### 3.14 Data analyses

Data was entered into SPSS version 22 for analysis at all levels. Detailed analysis per objective is presented in Table 3.1.

**Table 3. 1 Data analysis per objective**

<b>Objectives</b>	<b>Indicators</b>	<b>Statistical test</b>
1. Determined socio-demographic characteristics	Marital status, education level, occupation, sex and child's age	chi-squares and percentages
2. Assessed the nutritional status of children	<p><b>Weight for height and length for age using Z scores.</b>            Z scores &gt;-2SD normal nutrition status            -3SD <math>\geq</math> Z scores &lt; -2SD moderate acute malnutrition            Z scores &lt; -3SD severe acute malnutrition</p> <p><b>Weight for age using MUAC</b>            MUAC <math>\geq</math>12.5 cm normal nutrition status            11.5 cm <math>\geq</math> MUAC &lt; 12.5 cm moderate acute malnutrition            MUAC &lt; 11.5 cm severe acute malnutrition</p>	Percentages and chi-squares
3. Assessed feeding practices	Food groups, dietary diversity, meal frequency and acceptable diet	Percentages and chi-squares
4. Assessed morbidity	Presence of illness, acute respiratory infections, diarrhoea, vomiting, eye infections, ear infections	Percentages and chi-square
5. Assessed developmental milestones	Communication, fine motor, grosses motor, problem-solving, and personal-social skills using ages and stages questionnaire cut-off values for various age groups	Percentages and chi-squares
6. Predictors of developmental milestones	All indicators verse ASQ scores	Regression analysis

### 3.15 Logistical and ethical considerations

Clearance was sought from Kenyatta University Graduate School. Approval to conduct research was obtained from Kenyatta Ethical Review Committee. A research permit was also obtained from the Uganda National Council for Science and Technology.

Permission was sought from the superintendent in charge of Kabale Hospital. Participants gave informed consent after sensitization about the study and their role. The participants were assured of confidentiality, and participation was voluntary.

## CHAPTER FOUR: RESULTS

### 4.1 Introduction

The results of this study were obtained from the Young Child Clinic, Kabale Hospital. The participants were 250, with 125 being caregivers of breastfed children and 125 being caregivers of non-breastfed children.

### 4.2 Socio-demographic characteristics of caregivers

The highest proportion (63.6%) of participants was 21-30 years old. There was a significant difference in the age range between the study groups ( $\chi^2=10.665$ ;  $p=0.031$ ). Overall, more than half the participants (50.4%) had completed primary education, while 26.8% completed secondary education. There was no contrast in education levels between caregivers of the breastfed and non-breastfed children ( $\chi^2=2.135$ ;  $p=0.545$ ). Most participants were married at the time of the study and living with their spouses (91.2%), which was similar across the study groups ( $\chi^2=1.269$ ;  $p=0.530$ ). Most of the participants (96.4%) in both breastfed and non-breastfed were Christians. There was no significant difference in the religion of the caregivers based on their breastfeeding status.

**Table 4. 1 Socio-demographic characteristics of caregivers of breastfed and non-breastfed children**

Characteristics	Study Groups			Chi-square value	p-value (2 sided)
	Breastfed N=125 n (%)	Non-breastfed N=125 n (%)	Total N=250 n (%)		
<b>CAREGIVER CHARACTERISTICS</b>					
<b>Age (years)</b>					
≤20	12(9.6)	18(14.4)	30(12.0)	10.665	<b>*0.031</b>
21-30	84(67.2)	75(60.0)	159(63.6)		
31-40	28(22.4)	23(18.4)	51(20.4)		
41-50	1(0.8)	5(4.0)	6(2.4)		
51-60	0(0.0)	4(3.2)	4(1.6)		
<b>Education level</b>					
Primary	61(48.8)	65(52.0)	126(50.4)	2.1350	0.545
Secondary	36(28.8)	31(24.8)	67(26.8)		
Tertiary/ University	20(16.0)	16(12.8)	36(14.4)		
No education	8(6.4)	13(10.4)	21(8.4)		
<b>Marital status</b>					
Single	10(8.0)	8(6.4)	18(7.2)	1.269	0.530
Married	114(91.2)	114(91.2)	228(91.2)		
Divorced/ Widowed	1(0.8)	3(2.4)	4(1.6)		
<b>Religion</b>					
Christian	122(97.6)	119(95.2)	241(96.4)	1.057	0.500
Muslim	3(2.4)	6(4.8)	9(3.6)		
<b>Main occupation</b>					
Formal employment	14(11.2)	8(6.4)	22(8.8)	6.746	0.240
Casual employment	17(13.6)	20(16)	37(14.8)		
Commercial farming	4(3.2)	2(1.6)	6(2.4)		
Peasant farming	54(43.2)	47(37.6)	101(40.4)		

\*Significant at P value&lt;0.05

### 4.3 Child Characteristics

There were slightly more males (51.2%) than females (48.8%). There was no significant difference in the children's gender between the study groups ( $\chi^2=1.025$ ;  $p=0.376$ ). From both groups, the highest proportion (37.2%) of the children was within the age ranges; of 12-18 months and 2-6 months (23.2%). There was a significant difference in the age range between the study groups ( $\chi^2=18.385$ ;  $p=0.001$ ), as seen in Table 4.2.

**Table 4. 2 Characteristics of children 0-23 months**

<b>CHILD CHARACTERISTICS</b>	<b>Breastfed N=125 n (%)</b>	<b>Non-breastfed N=125 n (%)</b>	<b>Total N=250 n (%)</b>	<b>Chi-square value</b>	<b>p-value (2-sided)</b>
<b>Sex of the child</b>					
Male	68(54.4)	60(48.0)	128(51.2)	1.025	0.376
Female	57(45.6)	65(52.0)	122(48.8)		
<b>Age of child</b>					
2-6 months	35(28)	23(18.4)	58(23.2)	18.385	<b>0.001*</b>
7-8 months	15(12)	11(8.8)	26(10.4)		
9-11 months	27(21.6)	21(16.8)	48(19.2)		
12-18 months	45(36)	48(38.4)	93(37.2)		
19-23 months	3(2.4)	22(17.6)	25(10)		

\*Significant at  $P<0.05$

### 4.4 Feeding practices

The intake of grains, roots, and tubers was high (89.8%), and the difference in intake among the study groups was insignificant ( $\chi^2=0.855$ ;  $p=0.368$ ). Intake of legumes and nuts was comparatively higher among non-breastfed children (88%) than the breastfed children (86.7%), with no significant difference between the study groups ( $\chi^2=0.070$ ;  $p=0.836$ ). Most children did not consume dairy products (61.2%), and there was no statistically significant difference among study groups ( $\chi^2=2.805$ ;  $p=0.102$ ). Most

children did not consume meat, fish, and poultry (89.8%), and there was no major variation between the study groups ( $\chi^2=0.217$ ;  $p=0.653$ ). 52.4% of the children had ate less Vitamin A-rich foods. Consumption was not significantly different between the groups ( $\chi^2=0.011$ ;  $p=0.916$ ). Consumption of other fruits and vegetables was higher among the non-breastfed children (38.9%), even though most children (65%) did not consume these foods. (Table 4.3)

**Table 4. 3 Distribution of breastfed and non-breastfed children that consumed the recommended food groups**

Food groups	Study Groups			Chi-square value	p-value (2-sided)
	breastfed N=98 n (%)	Non-breastfed N=108 n (%)	Total N=206 n (%)		
Grains, roots, and tubers	86(87.8)	99(91.7)	185(89.8)	0.855	0.836
Legumes and nuts	85(86.7)	95(88)	180(87.4)	0.070	0.836
Dairy products	42(33.6)	55(44)	97(38.8)	2.805	0.102
Meat, fish, poultry	11(11.2)	10(9.3)	21(10.2)	0.217	0.653
Vitamin A rich fruits and vegetables	47(48)	51(47.2)	98(47.6)	0.011	0.916
Other fruits and vegetables	30(30.6)	42(38.9)	72(35)	1.548	0.243
Breastmilk	98(100)	63(58.3)	161(78.2)	52.246	<0.001
Eggs	7(7.1)	14(13)	21(10.2)	1.901	0.249

**\*Significant at P value<0.05**

More than half of the children in both groups did not meet the Minimum Dietary Diversity Score (MDDS) (69.4%). Most (75.9%) of the children who did not meet the minimum dietary diversity were non-breastfed. The study further revealed significant differences in meeting minimum dietary diversity between those who breastfed and

those who did not ( $\chi^2=4.530$ ;  $p=0.035$ ). Most of the children met the minimum meal frequency (MMF) (56.3%), with more non-breastfed children meeting the minimum meal frequency (64.8%) compared to the breastfed children (46.9%). There was a significant contrast in meeting the minimum meal frequency between the study groups ( $\chi^2=6.674$ ;  $p=0.011$ ). Most children did not meet the minimum acceptable diet (MAD) (81.6%). There was no correlation in meeting the minimum acceptable diet between the study groups ( $\chi^2=4.538$ ;  $p=0.047$ ). (Table 4.4)

**Table 4. 4 Distribution of children meeting WHO requirements for MDD, MMF, and MAD**

	<b>Breastfed N=98 n (%)</b>	<b>Non-breastfed N=108 n (%)</b>	<b>Total N=206 n (%)</b>	<b>Chi-square value</b>	<b>p- value (2- sided)</b>
<b>Minimum dietary diversity score</b>	37(37.8)	26(24.1)	63(30.6)	4.530	<b>*0.035</b>
<b>Minimum meal frequency</b>	46(46.9)	70(64.8)	116(56.3)	6.674	<b>*0.011</b>
<b>Minimum acceptable diet</b>	24(24.5)	14(13.0)	38(18.4)	4.538	0.047

**\*Significant at P value<0.05**

#### **4.5 Morbidity**

During data collection, almost half of the children (47.6%) had been sick in the last two weeks. However, there was no significant difference in both study groups ( $\chi^2=0.144$ ;  $p=0.800$ ). Diarrhoea, malaria, and cough were the most common diseases among the participants. There was a significant difference in skin infections between the study groups ( $\chi^2=4.640$ ;  $p=0.038$ ), with more non-breastfed children (17.2%) having skin infections compared to breastfed children (4.1%). There was also a significant difference

in influenza between the study groups ( $\chi^2=4.558$ ;  $p=0.038$ ). There was no significant difference in seeking medical seeking behaviour between the study groups ( $\chi^2=2.791$ ,  $p=0.120$ ) (Table 4.5)

**Table 4. 5 Distribution of children with morbidity in the last two weeks**

	Breastfed	Non-breastfed	Total	Chi square	p-value
<b>Has the child been sick in the last 2 weeks?</b>					
<b>Yes</b>	61(48.8)	58(46.4)	119(47.6)	0.144	0.800
<b>Diarrhea</b>	16(26.2)	11(19.0)	27(22.7)	0.894	0.387
<b>Vomiting</b>	16(26.2)	11(19)	27(22.7)	0.894	0.387
<b>Malaria with fever</b>	4(6.6)	4(6.9)	8(6.7)	0.005	0.941
<b>Cough with difficulty in breathing</b>	31(50.8)	20(34.5)	51(42.9)	3.240	0.095
<b>Eye infections</b>	1(1.6)	1(1.7)	2(1.7)	0.001	0.971
<b>Skin infections</b>	3(4.9)	10(17.2)	13(10.9)	4.640	*0.031
<b>Accident</b>	3(4.9)	0(0.0)	3(2.5)	4.083	0.244
<b>Influenza</b>	21(34.4)	10(17.2)	31(26.1)	4.558	*0.038
<b>Stomachache</b>	3(4.9)	2(3.4)	5(4.2)	0.161	0.688

\*Significant at P value<0.05

#### **4.6 Nutritional status of breastfed and non-breastfed children aged 0-23 months**

Most children (94.8%) had a normal weight for length. Severe wasting was more prominent in non-breastfed children (2.4%) than in breastfed children (0.8%). A similar trend was observed in weight for length, where 3.2% and 4% of the children were moderately wasted; the breastfed and non-breastfed children, respectively. However, these differences were not statistically significant( $\chi^2=1.196$ ;  $p=0.550$ ). The study found significantly high malnutrition cases with weight for age( $\chi^2=7.855$ ;  $p=0.020$ ). 7.2% of non-breastfed children (7.2%) were underweight compared to the

breastfed children (0.8%). Stunting was significantly higher in the non-breastfed children ( $\chi^2=9.477$ ;  $p=0.009$ ). There was a higher percentage of non-breastfed children (28.8%) than breastfed children (13.6%) who were severely stunted. Despite the significant differences in length for age and weight for age between the study groups, MUAC indicated no significant differences, with overall 89.8% of the children having a normal nutritional status. However, more non-breastfed children (11.1%) were moderately malnourished compared to breastfed children (4.1%), as presented in Table 4.7

**Table 4. 6 Nutritional status of breastfed and non-breastfed children**

Anthropometry	Study Groups			Chi-square	p-value
	breastfed N=125 n (%)	Non-breast fed N=125 n (%)	Total N=250 n (%)		
<b>Weight for length</b>					
Normal	120(96.0)	117(93.6)	237(94.8)	1.196	0.550
Moderate wasting	4(3.2)	5(4.0)	9(3.6)		
Severe wasting	1(0.8)	3(2.4)	4(1.6)		
<b>Weight for age</b>					
Normal	116(92.8)	104(83.2)	220(88.0)	7.855	<b>*0.020</b>
Moderate underweight	8(6.4)	12(9.6)	20(8.0)		
Severe underweight	1(0.8)	9(7.2)	10(4.0)		
<b>Length for age</b>					
Normal	66(52.8)	60(48.0)	126(50.4)	9.477	<b>*0.009</b>
Moderate stunting	42(33.6)	29(23.2)	71(28.4)		
Severe stunting	17(13.6)	36(28.8)	53(21.2)		
<b>MUAC</b>					
Severe malnutrition	2(2.0)	3(2.8)	5(2.4)	3.907	0.142
Moderate malnutrition	4(4.1)	12(11.1)	16(7.8)		
Normal	92(93.9)	93(86.1)	185(89.8)		

**\*Significant at P value<0.05**

#### 4.7 Developmental milestones

A majority (92.4%) of the children met the cut-off value for communication score, and there was no significant difference in communication between the two study groups ( $\chi^2=0.057$ ;  $p=0.812$ ). Similarly, a high number of children met the cut-off for gross motor scores (82.8%). There was no correlation in gross motor scores between the two study groups ( $\chi^2=0.702$ ;  $p=0.812$ ). More children were able to meet the cut-offs for the fine motor score (74.8%), problem-solving score (69.6%), and personal social score (84.4%). There were no significant differences in these scores between the study groups ( $\chi^2=0.021$ ;  $p=0.884$ ,  $\chi^2=1.210$ ;  $p=0.336$ ,  $\chi^2=0.273$ ;  $p=0.728$  respectively) (Table 4.6)

**Table 4. 7 Distribution of breastfed and non-breastfed children that met the cut-off value for the different developmental milestones**

Scores	Study Groups			Chi-square value	p-value (2-sided)
	Breastfed N=125 n (%)	Non-breastfed N=125 n (%)	Total N=250 n (%)		
<b>Communication score</b>					
Met cut-off value	116(92.8)	115(92)	231(92.4)	0.057	0.812
<b>Gross motor score</b>					
Met cut-off value	106(84.8)	101(80.8)	207(82.8)	0.702	0.503
<b>Fine motor score</b>					
Met cut-off value	93(74.4)	94(75.2)	187(74.8)	0.021	0.884
<b>Problem-solving score</b>					
Met cut-off value	91(72.8)	83(66.4)	174(69.6)	1.210	0.336
<b>Personal social score</b>					
Met cut-off value	107(85.6)	104(83.2)	211(84.4)	0.273	0.728

\*Significant at P value<0.05

## **4.8 Predictors of developmental milestones**

Communication, gross motor, fine motor, problem-solving, and personal social milestones are addressed. The factors considered in the adjusted regression equation had significant associations in the bivariate analysis.

### **4.8.1 Predictors of communication skills**

The predictors of communication skills were the caregiver's education level, age, and length for age. Children whose caregivers had primary education were 3.13 times more likely to meet the cut-off value than those whose caregivers attended college (AOR=3.13,  $p<0.001$ ). Those whose caregivers had secondary education were 1.07 times more likely to meet the cut-off than those whose caregivers had college education (AOR=1.07,  $p<0.001$ ). Children whose caregivers were in the age group 21-30 years were 16.66 times more likely to meet the cut-off value compared to those whose caregivers were 51-60 years (AOR=16.67,  $p=0.008$ ), while children whose caregivers were 41-50 years were 14.90 times more likely to meet than those whose caregivers were 51-60 years (AOR=14.90,  $p=0.015$ ). Children with a normal length for age were 3.68 times more likely to meet the cut-off value than children with severe stunting (AOR=3.68,  $p=0.033$ ).

**Table 4. 8 Predictors of communication skills in children 0-23 months**

Characteristics		Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
				Lower Bound	Upper Bound
<b>Met Cut-off Value</b>	<b>Education level</b>				
	Primary	.000*	3.135E-9	6.805E-10	1.444E-8
	Secondary	.000*	1.073E-8	1.021E-8	2.045E-8
	College	Ref			
	<b>Caregiver's Age (years)</b>				
	≤20	0.061	9.000	0.907	89.265
	21-30	0.008*	16.667	2.099	132.368
	31-40	0.045	9.200	1.054	80.286
	41-50	0.015*	14.903	1.679	132.271
	51-60	Ref			
	<b>Age of child</b>				
	2-6 months	0.615	0.562	0.060	5.302
	7-8 months	0.582	0.500	0.042	5.889
	9-11 months	0.691	0.625	0.062	6.339
	12-18 months	0.381	0.389	0.047	3.224
	19-23 months	Ref			
	<b>Weight for age</b>				
	Normal	0.652	1.635	0.193	13.837
	Moderate underweight	0.497	0.444	0.043	4.607
	Severe underweight	Ref			
	<b>Length for age</b>				
	Normal	0.033*	3.683	1.113	12.188
	Moderate stunting	0.561	1.391	0.457	4.239
Severe stunting	Ref				
<b>Minimum dietary diversity score</b>					
Met	0.069	0.149	0.019	1.156	
Un-met	Ref				
<b>Minimum meal frequency</b>					
Met	0.437	1.519	0.529	4.359	
Un-met	Ref				
<b>Minimum acceptable diet</b>					
Met	0.249	3.364	0.429	26.398	
Unmet	Ref				
<b>Child sick in the last 2 Weeks?</b>					
Yes	0.619	1.272	0.494	3.277	
No	Ref				
<b>Breastfeeding status</b>					
Breastfed	0.811	1.121	0.439	2.860	
Not breastfed	Ref				

- significant at P value<0.05, Ref-reference category

#### **4.8.2 Predictors of gross motor skills**

Gross motor skills are the abilities required to control the large body muscles for head control, sitting, walking, crawling, and running; they were assessed by observing the child's activity and questioning the caregiver. The predictors included the caregiver's age, weight for age, and length for age. Children whose caregivers were 21- 30 years were 15.34 times more likely to meet the cut-off value than those whose caregivers were 51-60 years (AOR =15.34, p=0.020). Children with a normal weight for age were 5.87 times more likely to meet the cut-off value than those severely underweight (AOR =5.87, p=0.007). Children with a normal length for their age were 2.97 times more likely to meet the cut-off value than those who were stunted (AOR =2.97, p=0.007).

**Table 4. 9 Predictors of gross motor skills among children 0-23 months**

Characteristics		Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
				Lower Bound	Upper Bound
<b>Met Cut-off Value</b>	<b>Education level</b>				
	Primary	.202	0.481	0.156	1.481
	Secondary	.725	1.271	0.334	4.832
	College	Ref			
	<b>Caregiver's Age (years)</b>				
	≤20	0.063	9.857	0.880	110.425
	21-30	0.020*	15.346	1.536	153.351
	31-40	0.012	22.500	2.004	252.570
	41-50	0.089	15.000	0.663	339.548
	51-60	Ref			
	<b>Age of child</b>				
	2-6 months	0.993	0.994	0.235	4.201
	7-8 months	0.303	3.409	0.330	35.199
	9-11 months	0.150	0.367	0.094	1.436
	12-18 months	0.343	0.531	0.144	1.963
	19-23 months	Ref			
	<b>Weight for age</b>				
	Normal	0.007*	5.875	1.609	21.450
	Moderate underweight	0.289	2.333	0.488	11.167
	Severe underweight	Ref			
	<b>Length for age</b>				
	Normal	0.007*	2.973	1.354	6.529
	Moderate stunting	0.053	2.359	0.988	5.631
	Severe stunting	Ref			
	<b>Minimum dietary diversity score</b>				
	Met	0.688	1.178	0.530	2.617
	Un-met	Ref			
	<b>Minimum meal frequency</b>				
	Met	0.402	1.361	0.662	2.798
	Un-met	Ref			
	<b>Minimum acceptable diet</b>				
	Met	0.762	1.159	0.445	3.019
	Unmet	Ref			
	<b>Child sick in the last 2 Weeks?</b>				
	Yes	0.396	0.752	0.389	1.453
	No	Ref			
	<b>Breastfeeding status</b>				
	Breastfed	0.403	1.326	0.685	2.567
	Not breastfed	Ref			

\*significant at P value&lt;0.05, Ref-reference category

### **4.8.3 Predictors of motor skills**

Fine motor skills generally refer to the small movements of the hands, wrists, fingers, feet, toes, lips, and tongue. The predictors included the caregiver's education level, caregiver's age, age of the child, length for age, and minimum dietary diversity score. Children whose caregivers had secondary education were 0.29 times less likely to meet the cut-off compared to children whose caregivers went to college (AOR=0.29, p=0.039). Children whose caregivers were 41-50 years were 22.54 times more likely to meet the cut-off than those whose caregivers were 51-60 years (AOR=22.548, p=0.006). Children 2-6 months were 7.59 times more likely to meet the cut-off than those who were 19-23 months (AOR=7.59, p=0.002). Children with a normal length for age were 2.79 times more likely to meet the cut-off than those who were severely stunted (AOR=2.79, p=0.006). Those who met the MDD score were 2.54 times more likely to meet the cut-off than those who didn't meet the MDD (AOR=2.54, p=0.013).

**Table 4. 10 Predictors of fine motor skills in children 0-23 months**

<b>Characteristics</b>	<b>Sig.</b>	<b>Exp(B)</b>	<b>95% Confidence Interval for Exp(B)</b>	
			<b>Lower Bound</b>	<b>Upper Bound</b>
<b>Met</b>				
<b>Cut-off</b>				
<b>Values</b>				
<b>Education level</b>				
Primary	0.127	0.418	0.137	1.280
Secondary	0.039*	0.294	0.092	0.941
College	Ref			
<b>Caregiver's Age (years)</b>				
≤20	0.141	6.000	0.551	65.290
21-30	0.050	9.892	0.999	97.963
31-40	0.070	8.769	0.837	91.873
41-50	0.006*	22.548	0.956	196.436
51-60	Ref			
<b>Age of child</b>				
2-6 months	0.002*	7.594	2.063	27.954
7-8 months	0.185	2.362	0.662	8.430
9-11 months	0.327	1.688	0.593	4.802
12-18 months	0.962	1.023	0.407	2.568
19-23 months	Ref			
<b>Weight for age</b>				
Normal	0.205	2.327	0.631	8.574
Moderate underweight	0.606	0.667	0.143	3.107
Severe underweight	Ref			
<b>Length for age</b>				
Normal	0.006*	2.794	1.345	5.805
Moderate stunting	0.688	1.166	0.551	2.468
Severe stunting	Ref			
<b>Minimum dietary diversity score</b>				
Met	0.013*	2.542	1.218	5.304
Un-met	Ref			
<b>Minimum meal frequency</b>				
Met	0.303	1.371	0.752	2.501
Un-met	Ref			
<b>Minimum acceptable diet</b>				
Met	0.204	1.728	0.742	4.024
Unmet	Ref			
<b>Child sick in the last 2 Weeks?</b>				
Yes	0.997	0.999	0.564	1.769
No	Ref			
<b>Breastfeeding status</b>				
Breastfed	0.884	0.958	0.541	1.697
Non breastfed				

\* significant at P value<0.05, Ref-reference category

#### **4.8.4 Predictors of problem-solving skills**

Problem-solving skills involve thinking and understanding a child's world and decision-making. The predictors included the age of the child, weight for age, length for age, minimum dietary diversity score, and minimum acceptable diet. Children 7-8 months were 5.64 times more likely to meet the cut-off compared to those that were 19-23 months (AOR=5.64, p=0.042). Children with a normal weight for age were 3.91 times more likely to meet the cut-off than those severely underweight (AOR=3.91, p=0.040). Children with a normal length for age were 2.45 times more likely to meet the cut-off than those who were severely stunted (AOR=2.45, p=0.010). Those who met the minimum dietary diversity score were 2.70 times more likely to meet the cut-off than those who did not meet the MDDS (AOR=2.701, p=0.008).

**Table 4. 11 Predictors of problem-solving skills in children 0-23 months**

<b>Characteristics</b>		<b>Sig.</b>	<b>Exp(B)</b>	<b>95% Confidence Interval for Exp(B)</b>	
				<b>Lower Bound</b>	<b>Upper Bound</b>
<b>Met Cut-off Value</b>	<b>Education level</b>				
	Primary	0.154	0.532	0.224	1.267
	Secondary	0.849	0.911	0.347	2.392
	College	Ref			
	<b>Caregiver's Age (years)</b>				
	≤20	0.364	0.333	0.031	3.579
	21-30	0.972	0.959	0.097	9.482
	31-40	0.791	0.729	0.070	7.563
	41-50	0.437	0.333	0.021	5.329
	51-60	Ref			
	<b>Age of child</b>				
	2-6 months	0.931	1.046	0.382	2.865
	7-8 months	0.042*	5.647	1.064	29.981
	9-11 months	0.139	2.353	0.758	7.302
	12-18 months	0.322	0.624	0.245	1.589
	19-23 months	Ref			
	<b>Weight for age</b>				
	Normal	0.040*	3.910	1.066	14.334
	Moderate underweight	0.441	1.833	0.392	8.566
	Severe underweight	Ref			
	<b>Length for age</b>				
Normal	0.010*	2.453	1.242	4.845	
Moderate stunting	0.211	1.600	0.766	3.341	
Severe stunting	Ref				
<b>Minimum dietary diversity score</b>					
Met	0.008*	2.701	1.296	5.630	
Un-met	Ref				
<b>Minimum meal frequency</b>					
Met	0.442	0.789	0.432	1.442	
Un-met	Ref				
<b>Minimum acceptable diet</b>					
Met	0.033*	2.739	1.082	6.932	
Unmet	Ref				
<b>Child sick in the last 2 Weeks?</b>					
Yes	0.382	1.273	0.740	2.190	
No	Ref				
<b>Breastfeeding status</b>					
Breastfed	0.272	1.354	0.788	2.327	
Not breastfed					

\* significant at P value<0.05, Ref-reference category

#### **4.8.5 Predictors of personal social skills**

These are skills required for a child's ability to understand themselves and interact with others. They include responsive smiling, showing frustration, preferring their primary caregiver to others and recognizing themselves in the mirror. The predictors for these included the caregiver's age and weight for age. Children whose caregivers were  $\leq 20$  years were 3.78 times more likely to meet the cut-off than those whose caregivers were 51-60 years (AOR =3.78,  $p < 0.001$ ). Children whose caregivers were 21-30 years were 2.85 times more likely to meet the cut-off than those whose caregivers were 51-60 years (AOR =2.85,  $p < 0.001$ ). Children whose caregivers were 31-40 years were 3.13 times more likely to meet the cut-off than those whose caregivers were 51-60 years old (AOR =3.13,  $p < 0.001$ ). Children with a normal weight for age were 6.33 times more likely to meet the cut-off compared to those that were severely underweight (AOR =6.33,  $p = 0.005$ ).

**Table 4. 12 Predictors of personal social skills in children 0-23 months**

Characteristics	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
			Lower Bound	Upper Bound
<b>Met Cut-off Values</b>				
<b>Education level</b>				
Primary	0.549	1.421	0.451	4.479
Secondary	0.591	1.404	0.407	4.839
College	Ref			
<b>Caregiver's Age (years)</b>				
≤20	0.000*	3.789E-8	1.037E-8	1.384E-7
21-30	0.000*	2.850E-8	1.205E-8	6.739E-8
31-40	0.000*	3.133E-8	1.362E-8	2.341E-8
41-50	0.998	2.283E-8	1.029E-8	5.247E-8
51-60	Ref			
<b>Age of child</b>				
2-6 months	0.284	2.500	0.468	13.346
7-8 months	0.307	0.455	0.100	2.063
9-11 months	0.837	1.173	0.256	5.366
12-18 months	0.215	0.440	0.120	1.611
19-23 months	Ref			
<b>Weight for age</b>				
Normal	0.005*	6.333	1.729	23.193
Moderate underweight	0.101	4.000	0.765	20.920
Severe underweight	Ref			
<b>Length for age</b>				
Normal	0.531	1.310	0.563	3.044
Moderate stunting	0.475	1.419	0.543	3.703
Severe stunting	Ref			
<b>Minimum dietary diversity score</b>				
Met	0.077	2.214	0.918	5.342
Un-met	Ref			
<b>Minimum meal frequency</b>				
Met	0.114	1.772	0.872	3.603
Un-met	Ref			
<b>Minimum acceptable diet</b>				
Met	0.641	1.255	0.484	3.255
Unmet	Ref			
<b>Child sick in the last 2 Weeks?</b>				
Yes	0.124	0.581	0.290	1.162
No	Ref			
<b>Breastfeeding status</b>				
Breastfed	0.601	1.200	0.605	2.381
Not breastfed				

\* significant at P Value<0.05, Ref-reference category

## **CHAPTER FIVE: DISCUSSION**

### **5.1 Introduction**

The study investigated the growth and development of breastfed and non-breastfed children (0-23 months). Optimum breastfeeding has been noted to be essential for early childhood development. According to the WHO, children should be exclusively breastfed for the first six months of life and then given solids with continued breastfeeding for up to 2 years. There is limited literature on breastfeeding and its outcomes on growth and development in children 0-23 months, mainly in South Western Uganda (Muhoozi et al., 2016). This study focused on socio-demographic characteristics, nutritional status, morbidity, feeding practices, developmental milestones, and predictors of developmental milestones among children (0-23 months). This chapter discusses the findings.

### **5.2 Socio-demographic characteristics of caregivers and children 0-23 months**

A study in Morocco established an association between the mother's level of education and breastfeeding (Habibi et al., 2018). Those mothers with a higher education level knew the nutritional health outcomes of exclusive breastfeeding. In this study, the level of education among caregivers was generally low. However, there was no relationship with breastfeeding. Regarding maternal age, some studies established that older mothers were less likely to breastfeed than younger mothers, but younger mothers were susceptible to early cessation of breastfeeding (Colombo et al., 2018). The findings of this study showed similar results as more caregivers below 20 years had non-breastfed children.

Child age significantly influences the practice of breastfeeding. A study in Poland

showed more breastfed children below six months (68.6%); however, beyond infancy, the number of breastfed children declined greatly to 14% (Tracz & Gajewska, 2020). This outcome is different from a study done in Ghana (Asare et al., 2018), which showed high breastfeeding rates among children aged 12 months. Three studies; in Tudor sub-county hospital Mombasa (Machila et al., 2021), South-East Nigeria (Onah et al., 2014), and Kampala, Uganda (Nabunya et al., 2020) found that the level of maternal education, a child's age, and the caregiver's occupation contributed to the duration of optimum breastfeeding. However, the presence of knowledge about breastfeeding did not translate to practice. Increasing the duration of breastfeeding up to 2 years be done with support from primary health care providers and family; this would prevent mothers from concealing their breastfeeding practices for fear of being judged (Brockway & Venturato, 2016).

### **5.3 Feeding practices**

This study analysed the feeding practices of children 6-23 months, including the minimum dietary diversity, minimum meal frequency and minimum acceptable diet. Legumes, nuts, and grains were the most consumed by both study groups. The results were similar to a study in Brazil that showed beans and cereals as the primary diet of children 0-24 months (Bortolini et al., 2019). The results can be attributed to children's diets being mediated by their caregivers who consume the same food. Regarding the minimum dietary diversity score (MDD), research done in Mexico indicated that children who were breastfed the day before had lower proportions of MDD than those who had not been breastfed (Zaragoza Cortes et al., 2018). However, this is contrary to the current study, where more breastfed children (37.8%) met the MDD compared to

non-breastfed children (24.1%). These findings can be attributed to a general lack of nutrition knowledge on the timely introduction of adequate amounts of complementary food for the caregivers of non-breastfed children (Bimpong et al., 2020).

A study done in Amibara, Ethiopia, shows more breastfeeding infants met the minimum meal frequency compared to non-breastfeeding infants (Mohammed et al., 2019). The findings were connected to breastfed children having one meal less than what is required to meet the criteria for achieving minimum meal frequency (MMF). This current study defers from the above findings, as more non-breastfed children (64.8%) met the MMF compared to the breastfed (46.9%). The results can be attributed to an increase in meal frequency to compensate for the lack of breastfeeding among caregivers of non-breastfed children.

The children that met the minimum acceptable diet (MAD) were few (18.4%) but higher than that of another study in which children receiving the minimum acceptable diet was 6.1% (Abay et al., 2018). More breastfed children met the MAD (24.5%) compared to the non-breastfed children (13%). These findings could be due to a lack of nutrition knowledge for caregivers of non-breastfed children. During complementary feeding, children may develop diarrhoea due to poor hygiene, but caregivers relate it to introducing unfamiliar foods, preventing the continuous introduction of new foods.

#### **5.4 Morbidity in breastfed and non-breastfed children**

Optimum breastfeeding has long been known to boost immunity in children. Several studies have supported these findings stating the transfer of the mother's antibodies transfer to the baby prevents infection (Pandolfi et al., 2019). A systematic literature

review revealed that suboptimal breastfeeding elevated the occurrence of pneumonia in children (Lamberti et al., 2013). This current study found that less than half the children had been sick in the last two weeks; more of these were breastfed, and there was no significant difference in acute respiratory infections (ARI) between the two groups. These findings are similar to another study that emphasized breastfeeding in the first 45 days decreased acute respiratory infections (Bhatta & Basnet, 2019).

A study review in Asian countries showed that breastfeeding contributed to a reduced admission risk; however, the conclusion was that there was no relationship between the mode of feeding and hospital admission for illnesses (M. K. Lee & Binns, 2020). These results are similar to the current study, as there was no significant difference in sickness for breastfed and non-breastfed children. The findings can be attributed to maternal factors and the environment in which the child is raised. A different study in France was not able to highlight any association between breastfeeding and skin rash (Davisse-Paturet et al., 2020), which differs from the current research that shows a significant difference in skin infections between the two groups ( $p = 0.031$ ). The results could be due to allergic reactions that the early introduction of protein could have brought about into a child's diet.

### **5.5 Nutritional status of breastfed and non-breastfed children**

According to UDHS 2011, the prevalence of stunting in Western Uganda was 43% (Yang et al., 2018). The prevalence of stunting was 47.2%, underweight 7.2%, and wasting 4% among breastfed children; stunting was 52%, underweight 16.8%, and wasting 6.4% in non-breastfed children. The findings of this study are similar to a study done in Kaduna state, Nigeria (Onoja-Alexander et al., 2017), where they found that

65.5%, 32.3%, and 8.4% children were stunted, wasted, and underweight in the study community, and 71.9%, 31.7%, 8.4% were malnourished in the control community.

Findings from another study indicated stunting among children that did not receive adequate complementary foods even with optimum breastfeeding (Lohia & Udipi, 2014). These findings agree with the current study, as stunting among breastfed children was relatively high. A different study (Kumar & Singh, 2015) demonstrated that the severity of stunting, being underweight, and wasting all decreased with optimum breastfeeding, a trend similar to this current study. A study in Pakistan observed that children with longer durations of breastfeeding had better weight-for-age scores (Syeda et al., 2020). This finding is corroborated by the current study that indicates a significant difference in weight for age scores for breastfed and non-breastfed children. The groups had no significant difference in weight for length and MUAC scores. The results could be due to wasting being an acute form of malnutrition only present with absolute food shortage.

## **5.6 Developmental milestones of breastfed and non-breastfed children**

The study examined the milestones of breastfed and non-breastfed children. Previous studies have demonstrated the importance of breastfeeding on infant development; for example, a study done in Indonesia found that exclusively breastfed infants achieved developmental milestones earlier than those not exclusively breastfed (Ara et al., 2018). This is corroborated by another study indicating that children who were never breastfed had more chances of developing delay in communication, personal social, and cognitive (Sharma et al., 2019). However, another study demonstrated a slight advantage of exclusive over partial breastfeeding within the different developmental domains (McCrorry & Murray, 2013). This is in line with the current study, as there was no substantial difference in attaining developmental milestones between optimally breastfed and non-breastfed children. The difference in results could be due to differences in the studied population. Another study found that the relationship between breastfeeding and problem-solving skills weakened in the presence of parenting behaviour (Gibbs & Forste, 2014). This means to promote problem-solving skills at an early age, parenting style should be highly considered.

A study done in Poland supports the hypothesis that nutrients in breast milk have a biological effect on motor and problem-solving skills (Zielinska et al., 2019). This is similar to another study that related breastfeeding to improved performance in intelligence (Horta et al., 2015). The current study supports these findings as more breastfed children attained the recommended problem-solving skills than non-breastfed children.

Different studies have shown that the duration of optimum breastfeeding is not associated with developmental scores (Wallenborn et al., 2021) but that short-term breastfeeding promotes problem-solving abilities (Lenehan et al., 2020). This explains why there is no significant difference in the problem-solving skills of breastfed and non-breastfed children in this study.

A previous study revealed that children (1 to 3 years) who breastfed for four months or longer had better fine motor skills (Oddy et al., 2011). The current study inclines towards this argument as children who optimally breastfed and those who did not had no significant differences in attaining fine motor abilities.

## **5.7 Predictors of developmental milestones**

### **5.7.1 Caregiver's education**

A study in Iraq demonstrated that the mother's education level increased knowledge of child development, like increased alertness and observational skills by the mother (Alkhazrajy & Aldeen, 2017). In Turkey, knowledge of the relationship between motor development and caregiver support is vital in improving a child's motor abilities (Özal et al., 2020). This is observed in the current study as children whose caregivers attended college were more likely to meet the fine motor cut-off value than those whose caregivers had secondary school education. Another study suggested that a lack of exposure from a child specialist may deprive a mother of valuable child development knowledge (Karuppanan et al., 2020). Caregiver education was also associated with parenting behaviour and better stimulation (Jeong et al., 2017). These studies differ from the current study that found children of caregivers with less education more likely to

meet the communication cut-off value. This can be explained simply as less education, more casual work with flexible hours, and more one-on-one parenting.

### **5.7.2 Caregiver's age**

Different studies have shown an association between a caregiver's age and a child's development (Demirci & Kartal, 2016). It has been noted that older caregivers may be found to be less involved than younger parents and may be too busy pursuing their careers rather than making parenting their primary focus (Duncan et al., 2018). Another study found that older motherhood was related to delayed development of personal social skills for children compared to those born to younger mothers (Falster et al., 2018). These findings are similar to the current study, as children whose caregivers were 21-30 years were more likely to meet the cut-off value for personal social skills compared to children whose caregivers were 51-60 years old.

### **5.7.3 Age of child**

The early stages of development in children are vital for lifelong learning. Higher parental involvement in childhood was a significant predictor of a child's cognitive ability (Malhi et al., 2018). The current study demonstrated that children 7-8 months were more likely to meet the problem-solving skill cut-off than those 19- 23 months old. This can be attributed to parental involvement as children 7-8 months have started solid food hence more interaction with the caregivers during feeding time. A significant transformation in motor development occurs at 3-4 months post-term in most typically developing infants (Hadders-Algra, 2018). However, a study done in Ireland noted that children's fine motor skill proficiency was not progressing at the expected rate as

children increased in age (Gaul & Issartel, 2016). This is similar to the current study, as children 2-6 months were more likely to meet the fine motor skill cut-off than children 19-23 months.

#### **5.7.4 Weight for age**

Having a normal weight for age was related to the likelihood of meeting the cut-off for different development domains compared to being severely underweight. This is similar to another study that found a high prevalence of being underweight to be a contributing factor to delayed attainment of milestones (Ibeanu et al., 2018). A study in India also showed a close positive link between nutritional status and development in children (Agarwal et al., 2018). In a different research, underweight children also had executive dysfunction (Selvam et al., 2018). Similarly, a study done in Uganda found development domains were related to nutritional status, with weight for age Z-scores being the main predictor (Muhoozi et al., 2016). All this could be due to chronic energy deficiency from the poor nutritional status leading to inadequate brain nutrition and delay in milestone attainment. Also, being underweight increases irritability and depression and may affect social skills development (Jimoh et al., 2018).

#### **5.7.5 Length for age**

Children with a normal length for age were more likely to meet the cut-off for communication, gross motor, fine motor, and problem-solving skills. This is similar to another study that found associations between stunting and all developmental domains except the social-emotional domain (Miller et al., 2016). A different study in Haiti indicated that increased length- for- age contributed to better motor and communication skills compared to other anthropometric indicators (Iannotti et al., 2016). A study in

India also found that length for age Z-scores were a more important correlate for development than weight for length (Larson et al., 2017). A meta-analysis of data from 29 LMICs confirmed that length for age was significantly associated with motor and cognitive abilities (Sudfeld et al., 2015). Stunted children usually have a poorer immune system, brain function, and organ development which could lead to delayed development.

#### **5.7.6 Minimum dietary diversity score**

Those who met the minimum dietary diversity score (MDD) had a better likelihood of meeting the cut-off for fine motor and problem-solving skills than those who did not meet the MDD score. An initiative in Bangladesh showed that developmental advancement in children 6-23 months was partially explained through improved minimum dietary diversity score (Frongillo et al., 2017). Another study showed motor development as a mediator of the relationship between dietary diversity and mental development (Larson et al., 2017). Dietary diversity score was also linked to the acquisition of motor developmental milestones (Geletu et al., 2019) and is known to improve nutritional outcomes, improving developmental milestones.

## CHAPTER SIX: SUMMARY, CONCLUSION, AND RECOMMENDATIONS

### 6.1 Summary of the study findings

This study was a cross-sectional comparative study aimed at comparing growth and development between breastfed and non-breastfed children (0-23 months) at the Young Child Clinic, Kabale Hospital Uganda.

This study showed that most caregivers were young, married, and had attained primary education. Most of the caregivers were peasant farmers and Christians. The study had slightly more male children than female; most children were between 12-18 months old.

The most consumed food groups were grains, legumes, and breastmilk, while the least consumed were meat, dairy products, and fruits and vegetables. More breastfed children met the MDDS, while more non-breastfed children met the minimum meal frequency. However, most of them were unable to meet the minimum acceptable diet.

More than 50% of the children had not been sick in the last two weeks. The most common sicknesses were acute respiratory infections (ARIs), diarrhoea, and vomiting.

Most children had a normal nutritional status, with breastfed children being more than non-breastfed children. The prevalence of undernutrition based on the three indices was wasting (5.2%), underweight (12%), and stunting (49.6%). More non-breastfed children were undernourished hence a significant correlation between breastfeeding and nutritional status.

Most children met the cut-off values for the different developmental domains; however, slightly more breast children met the cut-off values overall.

The predictors of the different developmental milestones in this study were the caregiver's education level and age, length for age, and minimum dietary diversity score.

## **6.2 Conclusion**

The first two hypotheses stating that there is no significant difference in socio-economic characteristics of caregivers of breastfed and non-breastfed children aged 0- 23 months and there is no significant difference in nutritional status between breastfed and non-breastfed children aged 0- 23 months, were rejected while the third hypothesis that stated there is no significant difference in attainment of development milestones between breastfed and non-breastfed children aged 0- 23 months was accepted.

Findings from this study show that breastfed children had a better minimum dietary diversity score and had a preferable nutritional status compared to non-breastfed children. However, the study groups had no significant difference in morbidity and developmental milestones. This suggests that optimum breastfeeding is not a direct predictor of developmental milestones. Other factors like the caregiver's age and education level, child's age, weight for age, length for age, and minimum dietary diversity score are predictors of developmental milestones.

## **6.3 Recommendations**

### **6.3.1 Recommendations for practice**

Meeting the minimum meal frequency is good; however, caregivers should also strive to meet the minimum dietary diversity to improve nutritional status and development.

Caregivers should receive continuous counselling on breastfeeding during hospital visits to understand its implications on a child's nutritional status.

Family members and primary health care providers should support breastfeeding mothers to breastfeed exclusively for the first six months and to continue breastfeeding for up to two years so the children can have a normal nutritional status.

### **6.3.2 Recommendations for policy**

Currently, Uganda does not have development monitoring standards for children. The Ministry of Health needs to develop these standards to shed light on developmental milestones.

The Ministry of Health should continuously establish and fund nutrition counselling programmes. It is anticipated that if well executed, these will improve dietary diversity, meal frequency, and possibly nutritional status

### **6.3.3 Suggestions for further research**

The high prevalence of stunting (49.6%) in the current study calls for effective interventions by the government of Uganda, like growth monitoring and promotion programmes and effective nutrition counselling and education.

Similar studies should be done with the inclusion of the home environment to observe its effect on developmental milestones.

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## APPENDICES

### **APPENDIX A: INFORMED CONSENT FOR CAREGIVERS OF CHILDREN (0- 23 MONTHS)**

Introduction (To be read out loud to the respondent)

Dear participant,

My name is Komutambo Ivy-Marie, a postgraduate student at Kenyatta University, pursuing a Master of Science in Food, Nutrition and Dietetics. I am carrying out a self-funded research titled “Growth and development of breastfed and non-breastfed children (0 - 23 months) at the young child clinic, Kabale hospital”. This is aimed at investigating factors like marital status, religion, age, sex, birth weight, education level and household income associated with how your child feeds, sickness and how all of these influence growth and development of breastfed and non- breastfed children 0-23 months at the young child clinic, Kabale Hospital. The number of participants involved will be approximately 250.

This research has been accredited by Kenyatta University ethics committee and I would be grateful if you spare time and participate in it. Any information given will be treated with utmost confidentiality and will only be used for the purpose of this study.

Purpose of the study

This study will compare growth and developmental milestones for example smiling, crawling and walking of breastfed and non-breastfed children 0-23 months, attending the young child clinic at Kabale Hospital in Uganda.

Time Frame

The interview will take about 30-40 minutes,

**Voluntary participation**

Participation in this study is completely voluntary, but you may withdraw from participating in any part of the study anytime. However, your sincere participation will be of great benefit for the study. You are free to ask any questions related to this study which is not clear to you after you have had the consent explained to you. I would greatly appreciate your help responding to the questions you will be asked.

**Procedures to be followed**

You will be asked questions on your marital status, religion, age, sex, birth weight, education level and household income as well as how you feed your child and questions on sickness. Your child will also be weighed and length will be determined to assess their growth rate. You will also be asked questions on your child's development for example smiling, holding objects, crawling etc.

**Risks**

There are no risks associated with this study since all procedures performed will be safe.

**Benefits**

There may be no direct benefits for participating in this study. However, if there is any concern after the interview, you will be referred to the health worker. By participating in the study, we assist the Ministry of health both at district and national level to recognise challenges involved in delivering maternal infant and young child feeding services. This will enable them to take necessary steps to improve delivery of services which will benefit all children 0-23 months and their care givers. You will also be able to receive feedback on the progress and findings of the study.

### Compensation

Due to lack of sufficient resources for this self-funded research, compensation for your time will not be possible but your participation is greatly appreciated.

### Confidentiality

Your response will be treated in utmost confidentiality and will only be used for the limited purpose of this study and your name will not appear in this questionnaire. The responses will not be linked to you in any way; neither will they be discussed with your friends and family. The questionnaires will be given codes that will not be accessible to any other person. Utmost confidentiality will be guaranteed. In case you have any questions regarding this study you are free to ask. You will be asked questions in private.

### Withdrawal criteria

A participant can exclude themselves from the research at any time. When withdrawing, the participant should let the interviewer know that he/ she wishes to withdraw, they may provide the reason but they are not required to.

I would greatly appreciate you participating in this study. However, you are free to choose whether to participate in this study. Are you willing to participate?

Yes .....

No.....

### Participant's Statement

The above information regarding my participation in the study is clear to me. I have been assured of confidentiality of all information I will provide. My participation in this study

will be purely voluntary and no reward will be given to me. I will have the opportunity to ask questions all of which will be answered to my satisfaction.

Name of the participant .....

Signature or thumbprint.....Date .../...../.....

For illiterate participants

Name of the witness .....

Signature or thumbprint ..... Date ...../ ...../.....

Investigator’s statement

I, the undersigned, have explained to the participant in a language she understands procedures to be followed and risks and benefits involved.

Name of Interviewer .....

Name of facility .....

Interviewer’s signature ..... Date ..... /...../.....

Contact Person

In case you have any question(s) or want to know your rights, please contact the following people:

Komutambo Ivy-Marie

**Mobile number:** +256 785 970307

**Email:** kivy.marie@gmail.com

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Ethical Review Committee

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**Tel** +254 20 8714388

**Email:** chairman.kuerc@ku.ac.ke

**APPENDIX B: OKUCENGYESA ABARAREBERERA ABAANA ABE  
MWEZI 0- 23**

Okukigura : ( Kukishomera omuzaire)

Omukundwa omuzairwe,

Amazina gangye ni Komutambo Ivy-Marie, ndyomushomi wa degree yakabiri mu Kenyatta University, Nairobi. Ndashoma ebye byokurya nokubirakora namagara gabantu.

Ndikukora okubuririza haryebi, omushwija, amadini, emyaka, abaana, abojo neinga abahara, okubararemera hakuzarwa, orazara obuterwa neinga oratinzaho kukurasa omwana, obwegyese oyine obuhikirihe hamwe ne ntasya yawe birakwatirina bitya nendya yomwana wawe, noku arakwatwa oburwaire, nkoku arikukura entaso yomwana ayonkire notonkire, kuruga ha mwerere kuhika mwaka gumwe ne myezi ikumi na gumwe. Oku kubuririza ndi kukukorera mwi rwariro rya Kabale.

Ndikukushaba ngu oyetabe muryoku kubuririza . Ebirakukwataho ebyorangambire nebyama byogumushomo gonka tibine ahandi ahibiraza. Abarabuzibwe nabantu bishatu nankaga na munana (368)

Ebigenderera byokubuririza

Okubuririza kuraza kucengunza aberere nkoku barikukura kuhika ha mwaka gumwe ne mwenzi ikumi na gumwe okubari kumwenya, kushitama, kwajura, kwemerera, kutambura, kwiruka n’okugamba. Oku kucendenza kuri kukorerwa ha kiri niki yaberere na nabana bato murwariro rya Kabale.

Buri kubuririza kuraza kumara edakika 30-40

Buri muzaire oraikiriza kubuzibwa noyekundire. Orabasa kurugamu obwire bwona. Okwikiriza kubuzibwa kwawe kuraza kuyamba obu bushomi munonga. Orabasa kubuza ekitakushobokera kyona. Nakushoborerera ndaza kushemererwa waikiriza kugarukamu ebi bibuzo.

Okushashurwa

Habwokutagira essence, okushashurwa habobwirwe bwawe tiburaza kubasika, kushe webare munongakwegeitaho muryogu mushomo

Turaza kukora tuti

Ndaza kukubuza nkoku embera zawe ziri, oshemereirwe , ori wa dini ki? Orazara obutwera , entasya yawe eri eta, omwana wawe oramurisa ki? Ararwaragurika? Omwana ndaza kumupima oku araremera nobureingwa akarahuka kushera , ararahuka kukwata ebintu? Ndi kugyezaho kucenga nkoku ari kukura.

Butandu

Tiharimu butandu muryoku kubuririza.

Amagoba

Oku kucondoza kwashanga omwana wawe Atari kukura nkoku ashemereire, turaza kukohereza kureba omushaho otunge obuyambi. Tituraza kukozeza amazina gawe. Turaza kukuha enamba. Nahabwekyo abandi bantu tibaraza kumanya ebiwangabira. Ebibuzo biri mukyama. Ndaza kukubuza hatariho ondiyo muntu.

Ndaza kusima munonga wanyamba okagarukamu ebi ndakubuze

Oreikiriza kubuzibwa?

Yeego \_\_\_\_\_

Ingaha \_\_\_\_\_

Orikugarukamu yagira ati nayetegereza ebi banshobororera ebibuzo ndabigarukamu nyekundire kandi mukyama. Tinyine ekindi kushashurwa , ndaza ku buza ekitarayetegereze, nkikyenge kurungi.

Amazina gomubuzibwa \_\_\_\_\_

Sign yeye/ ekinkumu \_\_\_\_\_

Omubuza yagira ati

Nyowe orikubuririza nashobororera omubuzibwa omu rurimi orwarakyenga ebiturakore muryokukubuririza, amagoba garimu na butandu erimu.

Amazina gomubuza \_\_\_\_\_

Ekitongole \_\_\_\_\_

Sign yomubuza \_\_\_\_\_

Abokwebuzaho

Waba orenda kumanya ebiasingaho, orabasa kwebuza ahari aba bantu:

**Komutambo Ivy-Marie**

Esimu +256 785970307

E-mail kivy.marie@gmail.com

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**APPENDIX D: SOCIO-DEMOGRAPHIC QUESTIONNAIRE**

	<b>DATE OF INTERVIEW (DD/MM/YY)</b>									
	<b>RESPONDENT'S NAME</b>									
	<b>RESPONDENT RELATIONSHIP TOCHILD</b>									
1	What is your marital status	Currently married .....01 Living together .....02 Separated ..... 03 Divorced..... 05 Widowed ..... 06 Never Married .....07								
2	Mothers date of birth (DD/MM/YY).	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> <td style="width: 20px; height: 20px;"></td> </tr> </table>								
3	Have you ever been to school?	Yes.....01 No.....02....								
4	What is the highest level of education you have completed	Less than primary school ..... 01 Primary school..... 02 Secondary/High school..... 03 College/ pre university..... 04 Post graduate degree .....05								
5	What is your religion	Christian .....01 Muslim ..... 02 Traditional .....03								

		Others (specify)... .. 96
6	<p>What would you say is the MAINsource of your livelihood?</p> <p>MAIN SOURCE OF LIVELIHOODCIRCLE ONLY ONE RESPONSE</p>	<p>Income from own business .....01</p> <p>Income from spouse .....02</p> <p>Income from household head (if not spouse).....03</p> <p>Income from farming..... 04</p> <p>Income from formal employment ..... 05</p> <p>Income from casual employment..... 06</p> <p>Remittances ..... 07</p> <p>Begging .....08</p> <p>Aid.....09</p> <p>Others (specify)... .. 96</p>
7	<p>What is the main occupation?</p> <p>MAIN OCCUPATION OF THEMOTHER CIRCLE ONLY ONE RESPONSE</p>	<p>Formal employment .....01</p> <p>Casual employment .....02</p> <p>Commercial farming ..... 03</p> <p>Peasant farming .....04</p> <p>Own business..... 05</p> <p>Unemployed ..... 06</p> <p>Student .....07</p> <p>Housewife .....08</p> <p>Other (specify)..... 96</p>



**APPENDIX F: INFANT AND YOUNG CHILD FEEDING QUESTIONNAIRE**

DATE OF INTERVIEW. \_\_\_\_\_/\_\_\_\_\_/\_\_\_\_\_

Make every effort to speak with the mother. If she is not available, speak with the primary caregiver responsible for feeding of [Name].

1	2	3	4	5	6	7	8
Age of child in months	Sex of child  1= M  2= F	Did you ever breastfeed [Name]?  1= Yes  2= No  3= DNK	If No, why	If yes, how soon after birth did you put [Name] on the breast?	During the first 3 days after delivery, did you give [Name] the fluid/liquid that came from your breasts?  1= Yes,  2= No,  3= DNK	In the first 3 days after delivery, was [Name] given anything to drink other than breast milk?	Are you still breastfeeding [Name]?  1= Yes  2= No

Breast milk	Infant formula	Other milks: animal milk, reconstituted powdered milk,	Sweetened flavored juices	Tea/Coffee	Plain water	Thin porridge
1. Yes	1. Yes			1. Yes	1. Yes	
2. No	2. No	1. Yes	1. Yes	2. No	2. No	1. Yes
3. DNK	3. DNK	2. No	2. No	3. DNK	3. DNK	2. No
		3. DNK	3. DNK			3. DNK



**APPENDIX G: MORBIDITY TOOL**

1. Has the child been sick in the last 2 weeks? 1=Yes 2=No
2. If YES, what was the child suffering from? (More than one responses possible)

---

1= Diarrhea

2=Vomiting

3=Fever with chills like malaria

4=Fever, cough, difficulty in breathing

5=Intestinal Parasite

6= Measles

7= Eye infections

8=Skin infections

9= Accident

10=Malnutrition

11=Stomachache

12=Toothache

13=other (specify)

**APPENDIX H: MODIFIED AGES AND STAGES QUESTIONNAIRES**

**MODIFIED AGES AND STAGES QUESTIONNAIRE (2 MONTHS)**

**Date**

**1. Child's name**

**Child's breastfeeding status**

1. Exclusive breastfeeding

2. Mixed feeding

3. Not breastfeeding

**2. Person answering questionnaire**

Name

Place of residence

Relationship with child

1. Parent

2. Guardian

3. Grandparent

4. Others

**Communication**

**Yes**

**Sometimes**

**Not yet**

1. Does your baby sometimes make gurgling sounds?
2. Does your baby make cooing sounds such as "ooo", "gah"?
3. When you speak to your baby, do they make sounds too?
4. Does your baby smile when you talk to them?
5. Does your baby chuckle softly?
6. Does your baby get excited when they see you after a while?

Communication total=			

**Gross motor**

**Yes   Sometimes   Not yet**

1. While your baby is on their back, do they wave their arms and legs?
2. When your baby is on their tummy, do they turn their head to the side?
3. When your baby is on their tummy, do they hold their head up for more than a few seconds?
4. When your baby is their back, do they kick their legs?
5. While your baby is on their back, do they move their head from side to side?
6. After holding her head up on her tummy, does your baby lay her head or do they fall forward?

Gross motor total=			

**Fine Motor**

**Yes**

**Sometimes**

**Not yet**

1. Is your baby's hand usually tightly closed?
2. Does your baby grasp your figure if you touch their palm?
3. Does your baby hold toys briefly?
4. Does your baby touch their face with their hands?
5. Does your baby hold his hands open when he is awake?
6. Does your baby grab their clothes?

Fine motor total=			

**Problem solving**

**Yes**

**Sometimes**

**Not yet**

1. Does your baby look at objects that are 8-10 inches away?
2. Does your baby follow you with their eyes?
3. Does your baby follow a toy when you move them side to side?
4. Does your baby follow a toy when you move it up and down?
5. Does your baby in a sitting position look at toys placed on the table or floor in front of them?
6. Does your baby try to reach for toys above them while lying on their back?

Problem solving total=			

**Personal-Social**

**Yes Sometimes Not yet**

1. Does your baby try to suck even when they are not feeding?
2. Does your baby cry when hungry, wet, tired or wants to be held?
3. Does your baby smile at you?
4. When you smile at your baby, do they smile back at you?
5. Does your baby watch their hands?
6. Does your baby know they are about to feed when they see the breast or bottle?

Personal-social total=			

**SCORE AND TRANSFER TOTALS TO CHART BELOW** (Yes=10, Sometimes=5, Not yet=0). Add item scores, and record each area total. In the chart below, transfer the total scores, and fill in the circles corresponding with the total scores.

Area	Cutoff	Total Score	0	5	10	15	20	25	30	35	40	45	50	55	60	
Communication	22.77															
Gross motor	41.84															
Fine motor	30.16															
Problem solving	24.65															
Personal-Social	33.71															

**3. ASQ SCORE INTEPRETATION**

If the baby’s total score is in the unshaded area, it is above the cut off, and the baby’s development appears to be on schedule

If the baby’s total score is in the grey area, it is close to the cut off, provide learning activities and monitor



**Gross Motor**

**Yes    Sometimes    Not yet**

1. Does your baby move their head side to side while on their back?
2. After holding their head up while on the tummy, does your baby lay back down rather than fall forward?
3. When your baby is on their tummy, do they hold their head up for at least 15 seconds?
4. When your baby is on their tummy, do they hold their head straight up looking around?
5. Does your baby hold their head steady in a sitting position?
6. While your baby is on their back, do they bring their hands together over their chest, touching their fingers?

	Yes	Sometimes	Not yet
Gross motor total=			

**Fine Motor**

**Yes**

**Sometimes**

**Not Yet**

1. Does your baby hold their hands open or partly open?
2. Does your baby wave toys about briefly?
3. Does your baby grab at their clothes?
4. Does your baby hold onto a toy for a minute, waving it or trying to chew it?
5. Does your baby scratch their fingers on surfaces in front of them?
6. Does your baby stretch out to reach for a toy close by when held in sitting position?

Fine motor total=			

**Problem Solving**

**Yes**

**Sometimes**

**Not yet**

1. Does your baby follow a moving toy side to side?
2. Does your baby follow a moving toy up and down?
3. Does your baby look at a toy placed on the table in front of them?
4. When you put a toy in their hand, does your baby look at it?
5. When you put a toy in their hand does your baby put the toy in their mouth?
6. Does your baby wave their arms towards toy when they are lying on their back?

Problem solving total=			

**Personal Social**

**Yes**

**Sometimes**

**Not yet**

1. Does your baby watch their hands?
2. Does your baby play with their fingers?
3. Does your baby know they are about to be fed when they see the breast or bottle?
4. Does your baby hold the breast or bottle while feeding?
5. Does your baby smile when they see you nearby?
6. When in front of a large mirror, does your baby smile or coo at themselves

Personal-social total=			

**SCORE AND TRANSFER TOTALS TO CHART BELOW** (Yes=10, Sometimes=5, Not yet=0). Add item scores, and record each area total. In the chart below, transfer the total scores, and fill in the circles corresponding with the total scores.

Area	Cutoff	Total Score	0	5	10	15	20	25	30	35	40	45	50	55	60
Communication	34.60														
Gross motor	38.41														
Fine motor	29.62														
Problem solving	34.98														
Personal-Social	33.16														

**7. ASQ SCORE INTERPRETATION**

If the baby's total score is in the unshaded area, it is above the cut off, and the baby's development appears to be on schedule

If the baby's total score is in the grey area, it is close to the cut off, provide learning



**Gross motor**

**Yes**

**Sometimes**

**Not yet**

1. Does your baby lift their legs high enough to see their while they lie on their back
2. Is your baby able to straighten both their arms and push their whole chest off the bed or floor?
3. Does your baby roll from their back to their tummy?
4. When you put your baby on the floor, do they on their hands while sitting?
5. If you hold both hands just to balance your baby, does he support his own weight while standing?
6. Does your baby get into a crawling position by getting up on her hands and knees

Gross motor total=			

**Fine Motor**

**Yes Sometimes Not yet**

1. Does your baby grab a toy you offer and look at it, wave it and chew it?
2. Does your baby reach for a toy using both hands at once?
3. Does your baby reach for small pieces of food and touch them with their fingers?
4. Does your baby hold toys with their fingers around it?
5. Does your baby pick up food with fingers in a raking motion?
6. Does your baby pick up a small toy with only one hand?

Fine motor total=			

**Problem Solving**

**Yes Sometimes Not yet**

1. Does your baby reach for a toy with both hands?
2. When your baby is on their back, does he turn their head to look for a toy when they drop it?
3. When your baby is on their back, do they try to get a toy they have dropped?
4. Does your baby pick up a toy and put it in their mouth?
5. Does your baby pass a toy back and forth using their hands?
6. Does your baby play by banging toys up and down on the floor?

Problem solving total=			

**Personal-Social**

**Yes Sometimes**

**Not yet**

1. Does your baby smile or coo at themselves in front of a large mirror?
2. Does your baby act differently towards strangers than they do with you?
3. Does your baby play by grabbing their foot while lying on their back?
4. Does your baby reach out to pat the mirror when in front of it?
5. Does your baby put their foot in the mouth when lying on their back?
6. Does your baby try to get a toy that is out of reach?

Personal-social total=			

**SCORE AND TRANSFER TOTALS TO CHART BELOW** (Yes=10, Sometimes=5, Not yet=0). Add item scores, and record each area total. In the chart below, transfer the total scores, and fill in the circles corresponding with the total scores.

Area	Cutoff	Total Score	0	5	10	15	20	25	30	35	40	45	50	55	60
Communication	29.65														
Gross motor	22.25														
Fine motor	25.14														
Problem solving	27.72														
Personal-Social	25.34														

**11. ASQ SCORE INTEPRETATION;**

If the baby’s total score is in the unshaded area, it is above the cut off, and the baby’s development appears to be on schedule

If the baby’s total score is in the grey area, it is close to the cut off, provide learning activities and monitor

If the baby’s total score is in the dark area, it is below the cut off, further assessment and follow up may be needed.

**12. MODIFIED AGES AND STAGES QUESTIONNAIRE (8 MONTHS)**

**Date**

**13. Child’s name**

**Child’s breastfeeding status**

- 4. Exclusive breastfeeding feeding
- 2. Complementary
- 3. Notbreastfeeding

**14. Person answering questionnaire**

Name

Place of residence

Relationship with child

- 4. Parent
- 2. Guardian
- 3. Grandparent
- 4. Others

**Communication**

**Yes Sometimes Not yet**

- 1. Does your baby look in the direction of your voice when you call them?
- 2. Does your baby turn around to see where loud noise is coming from?
- 3. If you copy the sounds your baby makes, does your baby repeat the same sounds back to you?
- 4. Does your baby make sounds like “da”, “ga” and “ba”?
- 5. Does your baby respond to you when you say “no-no” to them?
- 6. Does your baby make two similar sounds like “ba-ba” and “da-da”?

	Yes	Sometimes	Not yet
1. Does your baby look in the direction of your voice when you call them?			
2. Does your baby turn around to see where loud noise is coming from?			
3. If you copy the sounds your baby makes, does your baby repeat the same sounds back to you?			
4. Does your baby make sounds like “da”, “ga” and “ba”?			
5. Does your baby respond to you when you say “no-no” to them?			
6. Does your baby make two similar sounds like “ba-ba” and “da-da”?			
Communication total=			

**Gross motor****Yes****Sometimes****Not yet**

1. Does your baby lean on their hands while sitting?
2. Does your baby roll from their back to their tummy?
3. Does your baby get into a crawling position on their feet and knees?
4. Does your baby support their own weight while standing as you hold them?
5. Does your baby sit up straight for several minutes without using hands for support?
6. Does your baby hold on furniture without their chest's support?

Gross motor total=			

**Fine Motor**

**Yes Sometimes Not yet**

1. Does your baby reach for small pieces of food and touch them with their fingers?
2. Does your baby hold toys with their fingers around it?
3. Does your baby pick up food with fingers in a raking motion even if not successful?
4. Does your baby pick up a small toy with only one hand?
5. Does your baby successfully pick up food using their fingers in a raking motion?
6. Does your baby pick toys with the tips of their thumb and fingers?

Fine motor total=			

**Problem Solving**

**Yes Sometimes Not yet**

1. Does your baby pick up a toy and put it in their mouth?
2. When your baby is on their back, do they try to get a toy they have dropped?
3. Does your baby play by banging toys up and down on the floor?
4. Does your baby pass a toy back and forth using their hands?
5. Does your baby pick up two small toys in both hands?
6. Does your baby bang two toys together?

Problem solving total=			

**Personal-Social**

**Yes                      Sometimes                      Not yet**

1. Does your baby play by grabbing their foot while lying on their back?
2. Does your baby reach out to pat the mirror when in front of it?
3. Does your baby try to get a toy that is out of reach?
4. Does your baby put their foot in the mouth when lying on their back?
5. Does your baby drink from a cup while you hold it?
6. Does your baby feed themselves?

Personal-social total=			

**SCORE AND TRANSFER TOTALS TO CHART BELOW** (Yes=10, Sometimes=5, Not yet=0). Add item scores, and record each area total. In the chart below, transfer the total scores, and fill in the circles corresponding with the total scores.

Area	Cutoff	Total Score	0	5	10	15	20	25	30	35	40	45	50	55	60	
Communication	33.06															
Gross motor	30.61															
Fine motor	40.15															
Problem solving	36.17															
Personal-Social	35.84															

**ASQ SCORE INTERPRETATION;** If the baby’s total score is in the unshaded area, it is above the cut off, and the baby’s development appears to be on schedule

If the baby’s total score is in the grey area, it is close to the cut off, provide learning activities and monitor



**Gross Motor**

**Yes Sometimes Not yet**

1. If you hold both hands just to balance your baby, do they support their own weight while standing?
2. Does your baby sit up straight for several minutes without support?
3. Does your baby hold onto furniture without support from the chest?
4. While holding onto furniture, does your baby bend down and pick up a toy from the floor and then return to a standing?
5. While holding onto furniture, does your baby lower themselves with control?
6. Does your baby walk beside furniture while holding on with only one hand?

Gross motor total=			

**Fine Motor**

**Yes Sometimes Not yet**

1. Does your baby pick up a small toy with one hand?
2. Does your baby successfully pick up food with all their fingers in a raking motion?
3. Does your baby pick up a toy with the tips of his fingers?
4. Does your baby pick up a piece of string with her first finger and thumb?
5. Does your baby pick up food with a thumb and a finger?
6. Does your baby put a toy down with dropping it and take her hand off the toy?

Fine Motor total=			

**Problem solving**

**Yes   Sometimes   Not yet**

1. Does your baby pass a toy back and forth in both hands?
2. Does your baby pick up two to toys, one in each hand and hold them for a minute?
3. When holding a toy in his hand, does your baby band it on the table against another toy?
4. While holding a toy in each hand, does your baby clap the toys together?
5. Does your baby try to get a crumb out of a clear bottle?
6. After watching you hide a small toy under a piece of cloth or paper, does your baby find it?

Problem solving total=			

**Personal Social  
yet**

**Yes   Sometimes   Not**

1. Does your baby put their foot in the mouth while laying on their back?
2. Does your baby drink from a cup while you hold it?
3. Does your baby feed themselves?
4. Does your baby offer you a toy when you ask for it from them?
5. Does your baby push their arm through the sleeve when you are dressing them?
6. When you hold out your hand to ask for a toy, does your baby let go of it into your hand?

Personal-social total=			

**18. SCORE AND TRANSFER TOTALS TO CHART BELOW**

(Yes=10, Sometimes=5, Not yet=0). Add item scores, and record each areatotal. In the chart below, transfer the total scores, and fill in the circles corresponding with the total scores.

Area	Cutoff	Total Score	0	5	10	15	20	25	30	35	40	45	50	55	60
Communication	13.97														
Gross motor	17.82														
Fine motor	31.32														
Problem solving	28.72														
Personal-Social	18.91														

**19. ASQ SCORE INTEPRETATION**

If the baby’s total score is in the unshaded area, it is above the cut off, and the baby’s development appears to be on schedule

If the baby’s total score is in the grey area, it is close to the cut off, provide learning activities and monitor

If the baby’s total score is in the dark area, it is below the cut off, further assessment and follow up may be needed.

**20. MODIFIED AGES AND STAGES QUESTIONNAIRE (10 MONTHS)**

**Date**

**21. Child’s name**

**Child’s breastfeeding status**

1.Exclusive breastfeeding

2. Complementary feeding

3. Not breastfeeding

**22. Person answering questionnaire**

Name

Place of residence

Relationship with child

1. Parent 2. Guardian

3. Grandparent

4. Others

**Communication**

**Yes**

**Someone**

**Not yet**

1. Does your baby make noises like “da”, “ka”, and ba”?
2. Does your baby respond to your sounds by making similar sounds?
3. Does your make two similar sounds like “ba-ba”, “da-da”
4. Does your baby say bye-bye when you ask them to?
5. Does your baby follow simple commands like “come here”?
6. Does your baby say three words like “mama” “dada” and ‘baba”?

Communication total=			

**Gross Motor**

**Yes**

**Sometimes**

**Not yet**

1. If you hold both hands just to balance your baby, do they support their own weight while standing?
2. Does your baby sit up straight for several minutes without support?
3. Does your baby hold onto furniture without support from the chest?
4. While holding onto furniture, does your baby bend down and pick up a toy from the floor and then return to a standing?
5. While holding onto furniture, does your baby lower themselves with control?
6. Does your baby walk beside furniture while holding on with only one hand?

Gross motor total=			

**Fine Motor****Yes      Sometimes      Not yet**

1. Does your baby pick up a small toy with one hand?
2. Does your baby successfully pick up food with all their fingers in a raking motion?
3. Does your baby pick up a toy with the tips of his fingers?
4. Does your baby pick up a piece of string with her first finger and thumb?
5. Does your baby pick up food with a thumb and a finger?
6. Does your baby put a toy down with dropping it and take her hand off the toy?

Fine Motor total=			

**Problem solving****Yes      Sometimes      Not yet**

1. Does your baby pass a toy back and forth in both hands?
2. Does your baby pick up two to toys, one in each hand and hold them for a minute?
3. When holding a toy in his hand, does your baby band it on the table against another toy?
4. While holding a toy in each hand, does your baby clap the toys together?
5. Does your baby try to get a crumb out of a clear bottle?
6. After watching you hide a small toy under a piece of cloth or paper, does your baby find it?

Problem solving total=			

**Personal Social**

**Yes      Sometimes      Not yet**

1. Does your baby put their foot in the mouth while laying on their back?
2. Does your baby drink from a cup while you hold it?
3. Does your baby feed themselves?
4. Does your baby offer you a toy when you ask for it from them?
5. Does your baby push their arm through the sleeve when you are dressing them?
6. When you hold out your hand to ask for a toy, does your baby let go of it into your hand?

Personal-social total=			

**SCORE AND TRANSFER TOTALS TO CHART BELOW**

(Yes=10, Sometimes=5, Not yet=0). Add item scores, and record each area total. In the chart below, transfer the total scores, and fill in the circles corresponding with the total scores.

Area	Cutoff	Total Score	0	5	10	15	20	25	30	35	40	45	50	55	60	
Communication	22.87															
Gross motor	30.07															
Fine motor	37.97															
Problem solving	32.51															
Personal-Social	27.25															

**7. ASQ SCORE INTERPRETATION**

If the baby's total score is in the unshaded area, it is above the cut off, and the baby's development appears to be on schedule

If the baby's total score is in the grey area, it is close to the cut off, provide learning activities and monitor

If the baby's total score is in the dark area, it is below the cut off, further assessment and follow up may be needed.

**MODIFIED AGES AND STAGES QUESTIONNAIRE (12 MONTHS)**

**Date**

**8. Child's name**

**Child's breastfeeding status**

1. Exclusive breastfeeding                      2. Complementary feeding                      3. Not breastfeeding

**9. Person answering questionnaire**

Name

Place of residence

Relationship with child

1. Parent   2. Guardian                      3. Grandparent                      4. Others

**Communication**

**Yes**

**Somethi Not yet**

1. Does your make two similar sounds like "ba-ba", "da-da"
2. Does your baby say bye-bye when you ask them to?
3. Does your baby follow simple commands like "come here"?
4. Does your baby say three words like "mama" "dada" and 'baba"?
5. When you ask "where is the ball?" does your baby look at it?
6. When your baby wants something, do they tell you by pointing to it?

Communication total=			

**Gross motor****Yes    Sometimes    Not yet**

1. While holding onto furniture, does your baby bend down and pick up a toy from the floor and then return to standing?
2. While holding onto furniture, does your baby lower themselves with control?
3. Does your baby walk beside furniture while holding on with only one hand?
4. If you hold both hands just to balance your baby, do they support their own weight while standing?
5. When you hold one hand just to balance your baby, do they take several steps forward?
6. Does your baby stand up by themselves and take several steps forward?

Gross motor total=			

**FINE MOTOR**

**Yes            Sometimes            Not yet**

1. Does your baby pick up a piece of string with her first finger and thumb?
2. Does your baby pick up food with a thumb and a finger?
3. Does your baby put a toy down with dropping it and take her hand off the toy?
4. Without resting their arm or hand on the table, does your baby pick up food?
5. Does your baby throw a ball with a forward arm motion?
6. Does your baby help turn pages of a book?

Fine motor total=			

**Problem solving**

**Yes            Sometimes            Not yet**

1. Does your baby clap the toys together?
2. Does your baby try to get a crumb out of a clear bottle?
3. Does your baby find a hidden toy under a cloth or paper?
4. If you put a toy in a box, does your baby copy you even if they don't let go of the toy?
5. Does your baby drop two small toys, one after another into a container?
6. After you scribble back and forth on a crayon, does your baby copy you by scribbling?

Problem solving total=			

**Personal Social**

**Yes                      Sometimes      Not yet**

1. Does your baby offer you a toy when you ask for it from them?
2. Does your baby push their arm through the sleeve when you are dressing them?
3. When you hold out your hand to ask for a toy, does your baby let go of it into your hand?
4. When you dress your baby, do they lift their foot for the shoe or sock?
5. Does your baby roll a ball to you so you return it to them?
6. Does your baby play with a doll or stuffed animal by hugging it?

Personal-social total=			

**SCORE AND TRANSFER TOTALS TO CHART BELOW** (Yes=10, Sometimes=5, Not yet=0). Add item scores, and record each area total. In the chart below, transfer the total scores, and fill in the circles corresponding with the total scores.

Area	Cutoff	Total Score	0	5	10	15	20	25	30	35	40	45	50	55	60
Communication	22.87														
Gross motor	30.07														
Fine motor	37.97														
Problem solving	32.51														
Personal-Social	27.25														

**10. ASQ SCORE INTERPRETATION**

If the baby’s total score is in the unshaded area, it is above the cut off, and the baby’s development appears to be on schedule

If the baby’s total score is in the grey area, it is close to the cut off, provide learning activities and monitor



**Gross motor**

**Yes      Sometimes      Not yet**

1. If you hold both hands just to balance your baby, do they support their own weight while standing?
2. When you hold one hand just to balance your baby, do they take several steps forward?
3. Does your baby stand up by themselves and take several steps forward?
4. Does your baby climb onto furniture or other large objects?
5. Does your baby bend down and pick up a toy from the floor and then return to standing?
6. Does your baby move around by walking?

Gross motor total=			

**Fine Motor**

**Yes      Sometimes      Not yet**

1. Does your baby pick up food with a thumb and a finger?
2. Does your baby throw a ball with a forward arm motion?
3. Does your baby help turn pages of a book?
4. Does your baby stack a small toy on top of another one?
5. Does your baby make a mark on the paper with the tip of a pencil when trying to draw?
6. Does your baby stack three small blocks or toys on top of each other?

Fine motor total=			

**Problem Solving**

**Yes      Sometimes      Not yet**

1. If you put a toy in a box, does your baby copy you even if they don't let go of the toy?
2. Does your baby drop two small toys, one after another into a container?
3. After you scribble back and forth on a crayon, does your baby copy you by scribbling?
4. Can your baby drop a biscuit into a clear bottle?
5. Does your baby drop several small toys, one after another, into a container?
6. After you have shown your baby how, do they try to get a small toy that is slightly out of reach by using a stick?

Problem solving total=			

**Personal-Social**

**Yes      Sometimes      Not yet**

1. When you dress your baby, do they lift their foot for the shoe or sock?
2. Does your baby roll a ball to you so you return it to them?
3. Does your baby play with a doll or stuffed animal by hugging it?
4. Does your baby feed themselves with a spoon, even though they may spill some food?
5. Does your baby undress themselves by taking off clothes like socks?
6. Does your baby get your attention by pulling on your hand?

Personal-social total=			

**SCORE AND TRANSFER TOTALS TO CHART BELOW** (Yes=10, Sometimes=5, Not yet=0). Add item scores, and record each area total. In the chart below, transfer the total scores, and fill in the circles corresponding with the total scores.

Area	Cutoff	Total Score	0	5	10	15	20	25	30	35	40	45	50	55	60		
Communication	17.40																
Gross motor	25.80																
Fine motor	23.06																
Problem solving	22.56																
Personal-Social	23.18																

**14. ASQ SCORE INTEPRETATION**

If the baby’s total score is in the unshaded area, it is above the cut off, and the baby’s development appears to be on schedule

If the baby’s total score is in the grey area, it is close to the cut off, provide learning activities and monitor

If the baby’s total score is in the dark area, it is below the cut off, further assessment and follow up may be needed.

**15. MODIFIED AGES AND STAGES QUESTIONNAIRE (16 MONTHS)**

**Date**

**16. Child’s name**

**Child’s breastfeeding status**

- 6. Exclusive breastfeeding
- 2. Complementary feeding
- 3. Not breastfeeding

**17. Person answering questionnaire**

Name

Place of residence

Relationship with child

1. Parent

2. Guardian

3. Grandparent

4. Others

**Communication**

**Yes Something Not yet**

1. Does your child point to pictures in a book?
2. Does your child say four or more words in addition to “mama” and “Dada”?
3. When your child wants something, do they tell you by pointing to it?
4. Does your child go to another room to pick a familiar toy?
5. Does your child imitate a two word sentence for example “mama eat”?
6. Does your child say eight or more words in addition to “mama” and “dada”?

Communication total=			

**Gross motor**

**Yes Sometimes Not yet**

1. Does your child stand up by themselves and take several steps forward?
2. Does your child climb onto furniture or other large objects?
3. Does your child bend down and pick up a toy from the floor and then return to standing?
4. Does your child move around by walking?
5. Does your child walk well and seldom fall?
6. Does your child climb onto a chair to reach something they want?

Gross motor total=			

**Fine Motor**

**Yes Sometimes Not yet**

1. Does your child help turn pages of a book?
2. Does your child throw a ball with a forward arm motion?
3. Does your child stack a small toy on top of another one?
4. Does your child stack three small toys on top of each other by themselves?
5. Does your child make a mark on the paper with a tip of the pencil when trying to draw?
6. Does your child turn the pages of a book by himself?

Fine motor total=			

**Problem Solving**

**Yes Sometimes Not yet**

1. After you scribble back and forth on a crayon, does your child copy you by scribbling?
2. Can your child drop food into a clear plastic bottle?
3. Does your child drop several small toys, one after the other, into a container?
4. After you have shown your child how, do they try to get a small toy that is slightly out of reach using a stick?
5. Does your child scribble back and forth with a pencil?
6. After a biscuit is dropped into a clear bottle does your child turn the bottle upside down to dump it out?

Problem solving total=			

**Personal-social**

**Yes    Sometimes    Not yet**

1. Does your child feed themselves with a spoon, even though they may spill some food?
2. Does your child undress themselves by taking off clothes like socks?
3. Does your child play with a doll or stuffed animal by hugging it?
4. While looking at themselves in the mirror, does your child offer a toy to their own image?
5. Does your child get your attention by pulling on your hand?
6. Does your child come to you for help when they need help, for example opening a tin?

Personal-social total=			

**SCORE AND TRANSFER TOTALS TO CHART BELOW** (Yes=10, Sometimes=5, Not yet=0). Add item scores, and record each area total. In the chart below, transfer the total scores, and fill in the circles corresponding with the total scores.

Area	Cutoff	Total Score	0	5	10	15	20	25	30	35	40	45	50	55	60
Communication	16.81														
Gross motor	37.91														
Fine motor	31.98														
Problem solving	30.51														
Personal-Social	26.43														

**18. ASQ SCORE INTEPRETATION**

If the baby’s total score is in the unshaded area, it is above the cut off, and the baby’s development appears to be on schedule

If the baby’s total score is in the grey area, it is close to the cut off, provide learning activities and monitor

If the baby’s total score is in the dark area, it is below the cut off, further assessment and follow up may be needed

**19. MODIFIED AGES AND STAGES QUESTIONNAIRE (18 MONTHS)**

**Date**

**20. Child’s name**

**Child’s breastfeeding status**

- 1. Exclusive breastfeeding
- 2. Complementary feeding
- 3. Not breastfeeding

**21. Person answering questionnaire**

Name

Place of residence

Relationship with child

- 1. Parent
- 2. Guardian
- 3. Grandparent
- 4. Others

**Communication** **Yes** **Sometimes** **Not yet**

- 1. When your child wants something, do they tell you by pointing to it?
- 2. Does your child go to another room to pick a familiar toy?
- 3. Does your child say eight or more words in addition to “mama” and “dada”?
- 4. Does your child imitate a two-word sentence for example “mama eat”?
- 5. Does your child point to the correct picture when you ask them to show you something?
- 6. Does your child say two or three words that represent different id?

Communication total=			

**Gross motor**

**Yes    Sometimes    Not yet**

1. Does your child bend down and pick up a toy from the floor and then return to standing?
2. Does your child move around by walking?
3. Does your child walk well and seldom fall?
4. Does your child climb onto a chair to reach something they want?
5. Does your child walk down stairs if you hold onto one of their hands?
6. Does your child try to kick a ball by moving his leg forward or by walking into it?

Gross motor total=			

**Fine Motor**

**Yes    Sometimes    Not yet**

1. Does your child throw a ball with a forward arm motion?
2. Does your child stack a small toy on top of another one?
3. Does your child make a mark on the paper with a tip of the pencil when trying to draw?
4. Does your child stack three small toys on top of each other by themselves?
5. Does your child turn pages of the book by themselves?
6. Does your child get a spoon into her mouth right side up so that food usually doesn't spill?

Fine motor total=			

**Problem solving**

**Yes Sometimes Not yet**

1. Does your child drop several small toys, one after the other, into a box?
2. After you have shown your child how, do they try to get a small toy that is slightly out of reach using a stick?
3. After a biscuit is dropped into a clear bottle does your child turn the bottle upside down to dump it out?
4. Does your child scribble back and forth with a pencil?
5. Does your child copy you by drawing a single line on a paper?
6. After a biscuit is dropped into a clear bottle does your child turn the bottle upside down to dump it out?(don't show them how)

Problem Solving total=			

**Personal-social**

**Yes Sometimes Not yet**

1. While looking at themselves in the mirror, does your child offer a toy to their own image?
2. Does your child play with a doll or stuffed animal by hugging it?
3. Does your child get your attention by pulling on your hand?
4. Does your child come to you for help when they need help, for example opening a tin?
5. Does your child drink from a cup putting it down again with little spilling?
6. Does your child copy the activities you do like sweeping?

Personal-social total=			

**SCORE AND TRANSFER TOTALS TO CHART BELOW** (Yes=10, Sometimes=5, Not yet=0). Add item scores, and record each area total. In the chart below, transfer the total scores, and fill in the circles corresponding with the total scores.

Area	Cutoff	Total Score	0	5	10	15	20	25	30	35	40	45	50	55	60
Communication	13.06														
Gross motor	37.38														
Fine motor	34.32														
Problem solving	25.74														
Personal-Social	27.19														

**22. ASQ SCORE INTEPRETATION**

If the baby’s total score is in the unshaded area, it is above the cut off, and the baby’s development appears to be on schedule

If the baby’s total score is in the grey area, it is close to the cut off, provide learning activities and monitor

If the baby’s total score is in the dark area, it is below the cut off, further assessment and follow up may be needed.

**23. MODIFIED AGES AND STAGES QUESTIONNAIRE (20 MONTHS)**

**Date**

**24. Child’s name**

**Child’s breastfeeding status**

- 1. Exclusive breastfeeding
- 2. Complementary feeding
- 3. Not breastfeeding

**25. Person answering questionnaire**

Name

Place of residence

Relationship with child

- 1. Parent
- 2. Guardian
- 3. Grandparent
- 4. Others

**Communication**

**Yes      Sometimes      Not yet**

1. Does your child imitate a two-word sentence for example “mama eat”?
2. Does your child say eight or more words in addition to “mama” and “dada”?
3. Does your child point to the correct picture when you ask them to show you something?
4. If you point to a picture of a ball and ask your child your child what it is, can they correctly name it?
5. Without clues, can your child carry out at least three directions? eg “take my hand”
6. Does your child say two or three words that represent different ideas?

Communication total=			

**Gross motor**

**Yes      Sometimes      Not yet**

1. Does your child climb onto a chair to reach something they want?
2. Does your child walk well and seldom fall?
3. Does your child walk down stairs if you hold onto one of their hands?
4. Does your child try to kick a ball by moving his leg forward or by walking into it?
5. Does your child run fairly well, stopping themselves without bumping into things or falling?
6. Does your child walk either up or down at least two steps by themselves?

Gross motor total=			

**Fine motor****Yes   Sometimes   Not yet**

1. Does your child make a mark on the paper with a tip of the pencil when trying to draw?
2. Does your child stack three small toys on top of each other by themselves?
3. Does your child turn pages of the book by themselves?
4. Does your child get a spoon into her mouth right side up so that food usually doesn't spill?
5. Does your child stack six small blocks or toys on top of each other by themselves?
6. Does your child use a turning motion with their hand to screw lids on and off jars?

Fine motor total=			

**Problem Solving****Yes   Something   Not yet**

1. Does your child scribble back and forth with a pencil?
2. Does your child copy you by drawing a single line on a paper?
3. Does your child copy you when you pull on your earlobe?
4. Does your child turn a spoon to the right side so they can use it properly?
5. When you line up blocks, does your child imitate your line up?
6. If your child wants something he cannot reach, does he find a chair to stand on to reach it?

Problem solving total=			

**Personal-social**

**Yes Sometimes Not yet**

1. Does your child feed themselves with a spoon, even though they might spill some food?
2. Does your child get your attention by pulling on your hand?
3. Does your child drink from a cup putting it down again with little spilling?
4. Does your child copy the activities you do like sweeping?
5. When playing with a stuffed animal, does your child pretend to feed it, rock it put it to bed etc?
6. Does your child eat with a fork?

Personal social total=			

**SCORE AND TRANSFER TOTALS TO CHART BELOW** (Yes=10, Sometimes=5, Not yet=0). Add item scores, and record each area total. In the chart below, transfer the total scores, and fill in the circles corresponding with the total scores.

Area	Cutoff	Total Score	0	5	10	15	20	25	30	35	40	45	50	55	60
Communication	13.06														
Gross motor	37.38														
Fine motor	34.32														
Problem solving	25.74														
Personal-Social	27.19														

**26. ASQ SCORE INTEPRETATION**

If the baby’s total score is in the unshaded area, it is above the cut off, and the baby’s development appears to be on schedule

If the baby’s total score is in the grey area, it is close to the cut off, provide learning activities and monitor

If the baby’s total score is in the dark area, it is below the cut off, further assessment and follow up may be needed.



**Gross motor**

**Yes    Sometimes    Not yet**

1. Does your child try to kick a ball by moving his leg forward or by walking into it?
2. Does your child run fairly well, stopping themselves without bumping into things or falling?
3. Does your child walk down stairs if you hold onto one of their hands?
4. Does your child walk either up or down at least two steps by themselves?
5. Does your child jump with both feet leaving the floor at the same time?
6. Without support, does your child kick a ball by swinging his leg forward?

Gross motor total=			

**Fine motor**

**Yes    Sometimes    Not yet**

1. Does your child get a spoon into her mouth right side up so that food usually doesn't spill?
2. Does your child stack six small blocks or toys on top of each other by themselves?
3. Does your child use a turning motion with their hand to screw lids on and off jars?
4. Does your child turn pages of the book by themselves?
5. Does your child flip switches on and off?
6. Can your child string beads onto a shoe lace?

Fine motor total=			

**Problem Solving**

**Yes Sometimes Not yet**

1. Does your child scribble back and forth with a pencil?
2. When you line up blocks, does your child imitate your line up?
3. Does your child pretend that objects are something else for example holding a cup to the ear pretending it's a telephone?
4. Does your child copy you by drawing a single line on a paper?
5. Does your child turn a clear bottle upside down to remove a biscuit?
6. Does your child turn a spoon to the right side so they can use it properly?

Problem Solving total=			

**Personal-social**

**Yes Sometimes Not yet**

1. Does your child copy the activities you do like sweeping?
2. Does your child copy you pulling your earlobe?
3. Does your child eat with a fork?
4. Does your child drink from a cup putting it down again with little spilling?
5. When playing with a stuffed animal, does your child pretend to feed it, rock it put it to bed etc?
6. Does your child push a little car steering it around objects and backing it out of corners?

Personal-social total=			

**SCORE AND TRANSFER TOTALS TO CHART BELOW** (Yes=10, Sometimes=5, Not yet=0). Add item scores, and record each area total. In the chart below, transfer the total scores, and fill in the circles corresponding with the total scores.

Area	Cutoff	Total Score	0	5	10	15	20	25	30	35	40	45	50	55	60
Communication	13.04														
Gross motor	27.75														
Fine motor	29.61														
Problem solving	29.30														
Personal-Social	30.07														

**30. ASQ SCORE INTEPRETATION**

If the baby’s total score is in the unshaded area, it is above the cut off, and the baby’s development appears to be on schedule

If the baby’s total score is in the grey area, it is close to the cut off, provide learning activities and monitor

If the baby’s total score is in the dark area, it is below the cut off, further assessment and follow up may be needed

**APPENDIX I: MAP OF UGANDA SHOWING KABALE DISTRICT**



## APPENDIX J: RESEARCH PERMITS AND AUTHORIZATION



### KENYATTA UNIVERSITY GRADUATE SCHOOL

E-mail: [dean-graduate@ku.ac.ke](mailto:dean-graduate@ku.ac.ke)

P.O. Box 43844, 00100

Website: [www.ku.ac.ke](http://www.ku.ac.ke)

NAIROBI, KENYA

Tel. 020-8704150

#### Internal Memo

**FROM:** Dean, Graduate School **DATE:** 16<sup>th</sup> August, 2019  
**TO:** Ms. Komutambo Ivy-Marie **REF:** H60EA/37443/2017  
 C/o Department of Food, Nutrition & Dietetics

**SUBJECT: APPROVAL OF RESEARCH PROPOSAL**

=====

This is to inform you that Graduate School Board, at its meeting on 7<sup>th</sup> August, 2019 approved your Research Proposal for the M.Sc. Degree entitled, "Growth and Development of Breastfed and Non Breastfed Children (0-23 Months) at the Young Child Clinic, Kabale Hospital, Uganda."

You may now proceed with your Data collection, subject to clearance with the Director General, Uganda National Council for Science and Technology.

As you embark on your data collection, please note that you will be required to submit to Graduate School completed Supervision Tracking Forms per semester. The form has been developed to replace the Progress Report Forms. The Supervision Tracking Forms are available at the University's Website under Graduate School webpage downloads.

Thank you,

**JULIA GITU**

**FOR: DEAN, GRADUATE SCHOOL**



CC. Chairman, Food, Nutrition & Dietetics Department

**Supervisors:**

1. Prof. Judith Kimiywe  
C/o Department of Food, Nutrition & Dietetics  
Kenyatta University
2. Dr. Judith Munga  
C/o Department of Food, Nutrition & Dietetics  
Kenyatta University

JG/2019



Kenyatta University  
P.O Box 43844-00100  
Nairobi-Kenya

REF: KU/ERC/APPROVAL/VOL1/1

Date: 2<sup>nd</sup> March, 2020

Ivy Marie Komutambo  
P.O Box 43844-00100  
NAIROBI

Dear Ms. Komutambo,

**RE: APPLICATION NUMBER: PKU/2072/I1219 DEVELOPMENT OF BREASTING AND NON BREASTFED CHILDREN(0-23MONTH) AT THE YOUNG CHILD CLINIC.KABALE HOSPITAL,UGANDA**

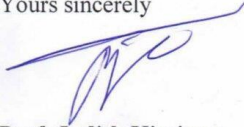
This is to inform you that **KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE** has reviewed and approved your above research proposal. Your application approval number is **PKU/2072/I1219**. The approval period is **2<sup>nd</sup> March, 2020 – 2<sup>nd</sup> March, 2021**.

This approval is subject to compliance with the following requirements;

- i. Only approved documents including (informed consents, study instruments, MTA) will be used
- ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by **KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE**.
- iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to **KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE** within 72 hours of notification
- iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to **KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE** within 72 hours
- v. Clearance for export of biological specimens must be obtained from relevant institutions.
- vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
- vii. Submission of an executive summary report within 90 days upon completion of the study to **KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE**.

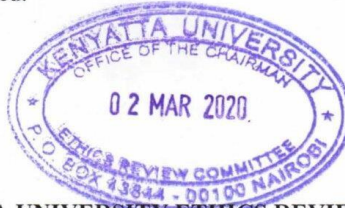
Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) <https://oris.nacosti.go.ke> and also obtain other clearances needed.

Yours sincerely



**Prof. Judith Kimiywe**

**CHAIRPERSON- KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE.**





**Uganda National Council for Science and Technology**  
*(Established by Act of Parliament of the Republic of Uganda)*

Our Ref: HS 2687

11<sup>th</sup> November 2019

Ms. Ivy – Marie Komutambo  
 Principal Investigator  
 C/o Kenyatta University  
 Nairobi

Dear Ms. Komutambo,

**Re: Research Approval: Growth and Development of Breastfed and Non Breastfed children (0 – 23) Months at the Young Child Clinic, Kabale Hospital, Uganda**

I am pleased to inform you that on **31/10/2019**, the Uganda National Council for Science and Technology (UNCST) approved the above referenced research project. The Approval of the research project is for the period of **31/10/2019** to **31/10/2020**.

Your research registration number with the UNCST is **HS 2687**. Please, cite this number in all your future correspondences with UNCST in respect of the above research project.

As Principal Investigator of the research project, you are responsible for fulfilling the following requirements of approval:

1. All co-investigators must be kept informed of the status of the research.
2. Changes, amendments, and addenda to the research protocol or the consent form (where applicable) must be submitted to the designated Research Ethics Committee (REC) or Lead Agency for re-review and approval **prior** to the activation of the changes. UNCST must be notified of the approved changes within five working days.
3. For clinical trials, all serious adverse events must be reported promptly to the designated local IRC for review with copies to the National Drug Authority.
4. Unanticipated problems involving risks to research subjects/participants or other must be reported promptly to the UNCST. New information that becomes available which could change the risk/benefit ratio must be submitted promptly for UNCST notification after review by the REC.
5. Only approved study procedures are to be implemented. The UNCST may conduct impromptu audits of all study records.

**LOCATION/CORRESPONDENCE**

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 KAMPALA, UGANDA*

**COMMUNICATION**

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 FAX: (256) 414-234579  
 EMAIL: [info@uncst.go.ug](mailto:info@uncst.go.ug)  
 WEBSITE: <http://www.uncst.go.ug>



## Uganda National Council for Science and Technology

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6. An annual progress report and approval letter of continuation from the REC must be submitted electronically to UNCST. Failure to do so may result in termination of the research project.

Below is a list of documents approved with this application:

	Document Title	Language	Version	Version Date
1.	Research proposal	English	N/A	September 2019
2.	Informed consent for primary caretakers of children (0 – 23 months)	English and Runyankole	N/A	September 2019
3.	Questionnaires	English	N/A	September 2019
4.	Screening instrument	English	N/A	September 2019

Yours sincerely,

Isaac Makhuwa

For: Executive Secretary

**UGANDA NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY**

Copied to: Chair, Mildmay Uganda, Research Ethic Committee

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