

Is Nutritional Knowledge in Mothers Associated with Recommended Infant Feeding Practices in Children 0-24 Months in the Lubombo Region of Eswatini?

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by

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DEDICATION

This is dedicated to the people of Eswatini for giving me another place I can call home.

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LIST OF ABBREVIATIONS

World Health Organization.....	WHO
Orphaned and Vulnerable Children	OVC
Neighborhood Care Points	NCP
Antenatal Care Services	ANC
Eswatini National Nutrition Council	ENNC
Rural Health Motivators	RHM
Infant and Young Child Feeding Practices	IYCEP
Severe Acute Malnutrition	SAM
Height -for-age Z-Scores	HAZ
U.S Agency for International Development	USAID
Household Food Insecurity Access Score.....	HFIAS
Food and Agriculture Organization	FAO
Knowledge, Attitudes and Practices	KAP
Diet Diversity Score.....	DDS

ABSTRACT

IS NUTRITIONAL KNOWLEDGE IN MOTHERS ASSOCIATED WITH RECOMMENDED INFANT FEEDING PRACTICES IN CHILDREN 0-24 MONTHS IN THE LUBOMBO REGION OF ESWATINI?

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Objectives: A cross-sectional study design was used to assess knowledge and practices among mothers (18-49 years) with at least one young child (0-24 months old) in the Siphofaneni Tinkhundla (Administrative subdivision) of the Lubombo region of eSwatini. The purpose of this study was to determine whether nutritional knowledge is associated with recommended infant and young child feeding practices among mothers in the Lubombo region of eSwatini. Methods: Quantitative data was collected through one-on-one interviews, over the course of a two-week period. The questionnaire was split up into four sections 1.) Sociodemographic 2.) Household Food Security Assessment 3.) Nutrition Practices 4.) Nutrition Knowledge. A total of 164 mothers were interviewed from Siphofaneni chiefdom of the Lubombo region of Eswatini. Mothers who fit the inclusion criteria were recruited by community health workers in each chiefdom of Siphofaneni. The mothers who were included in the dataset were 18 to 48 years old with a mean of 26.95 (SD 6.5). Their children's age ranged from 0-24 months with a mean of

10.4 months (SD 6.3). Results: The total knowledge score ranged from 8 to 44 with a mean of 21.8 (SD 6.14). Approximately 92% have heard of exclusive breastfeeding, of those mothers, 87% were able to properly explain what it was. Ninety three percent of infants 0-5 months received breastmilk, but less than half of the 0-5 months were exclusively breastfed. The range of scores mothers received on breastfeeding knowledge was 1-17 with a mean of 8.9 (SD 2.5). The mothers answered 12 questions about micronutrients, with a total possible score of 25. The range of scores was 0-15 with a mean of 4.7 (SD 3.6). The mean for the Minimum Diet Diversity score was 3.7 (SD 1.38). A logistic regression was performed to determine a statistical significance association between breastfeeding practices and nutrition knowledge, and association between diet diversity and nutrition knowledge. Breastfeeding practices was not significantly associated with nutrition knowledge. Diet Diversity scores and nutrition knowledge were significantly associated $p = .009$.

CHAPTER ONE: BACKGROUND

Poverty, food insecurity and malnutrition are major public health problems in Eswatini. Eswatini is a small landlocked country in Southern Africa, surrounded by South Africa and Mozambique. Eswatini is one of the last remaining complete monarchies in Africa, ruled by King Mswati III who has been in power since 1986.¹ In April 2018, King Mswati III renamed the Kingdom of Swaziland to the Kingdom of Eswatini meaning “land of the Swazis” in SiSwati, the local dialect.² Eswatini is heavily dependent on South Africa for both imports and exports. It is considered a lower middle income country with a 28% unemployment rate.¹

According to the World Food Program, 63% of the population lives below the national poverty line.³ The country also has one of the highest rates of HIV worldwide, with a prevalence of 27% among adults aged 15-49. The HIV pandemic has contributed to a curtailed average adult life expectancy, leaving 45% of children orphaned and almost half of the population younger than 20 years of age.³ The high population of orphaned and vulnerable children (OVC) has led to a large number of child-headed households.⁴ This has created a large age gap between the young and the old, leaving many young people in the care of their grandparents or having to care for themselves. Eswatini is split up into four regions: Manzini, Shiselweni, Hhohho and Lubombo. The Lubombo region

is located in the east and is bordered by Mozambique; it is the most rural with the highest prevalence of poverty (76%). Lubombo also has the highest proportion of OVCs (35.9%), followed by Shiselweni (35.5%), Manzini (33.2%), and Hhohho (21.6%)⁵. OVCs are at even greater risk of food insecurity and a higher percentage of OVCs means a higher number of children in each household, as it is common for relatives to take in orphaned children.⁶

Nutritional knowledge and farming practices are traditionally passed along to future generations in rural households. Due to the HIV pandemic, family members often do not survive long enough to pass this information to their children; this loss of knowledge combined with the environmental impacts of drought and land use practices and poverty has created a decline in yield in food production and an increase in food insecurity, creating the cycle of crisis of child malnutrition and development in Eswatini.⁷

The Swazi government has reported a 54% drop in agriculture production in HIV/AIDS-affected households. Most of the population relies on subsistence farming for their livelihood, making them vulnerable to the damaging effects of droughts and disease.³ The 2015/16 El Niño occurrence caused Southern Africa to experience one of the driest agricultural seasons in the past 35 years, and Eswatini was one of the countries hit hardest.⁸ Drought conditions have worsened already critical farming conditions, with food insecurity affecting over 30% of the population. The deficiency of micronutrients is associated with low intake of fresh fruits and vegetables, and of protein-rich food from animal products.⁹

Chronic malnutrition is prevalent, with ‘stunting’ affecting 26% of children under the age of five. Approximately 40% of adults are stunted as well, contributing to deteriorating health conditions, a high mortality rate, and a perpetual cycle of poverty. According to the Cost of Hunger study in 2009, Eswatini lost an equivalent of \$92 million due to child malnutrition.¹⁰ Deficiencies of micronutrients such as iron, iodine, folate and protein early in life lead to growth retardation and reduced cognitive functions in young children.¹¹ The percentage of pre-school children with vitamin A deficiency is 44.6%, the rate of anemia is 46.7%, 21% of the Eswatini population is at risk of zinc deficiency and the proportion of school-age children with iodine deficiency is 34.5%.⁵

The World Health Organization (WHO) and UNICEF recommend that breastfeeding begins within one hour of birth. It is also recommended that a baby is breastfed exclusively for the first 6 months of life, after which an infant should be fed complementary food that is nutritionally adequate. Breastfeeding should continue for up to 2 years along with complementary feeding. Breastfeeding should provide a child with half of its calories between 6 and 12 months, and one third of its calories between 12 and 24 months.¹² The WHO also recommends that HIV positive mothers who are receiving antiretroviral therapy should exclusively breastfeed their infants for the first six months of life, and introduce complementary foods at six months while continuing to breastfeed.¹³ The Eswatini National Nutrition Council (ENNC) follows these guidelines.

In Eswatini, 70.3% of children are exclusively breastfed for 5 months and malnutrition commonly emerges between 3 and 6 months, when mothers start to introduce complementary foods that are insufficient to meet the dietary needs of the

infant.¹⁴ In the Lubombo region, 18.7% of children are not consuming the minimum level of calories needed.⁵ The percentage of infants 0-23 months receiving a minimum acceptable diet in Lubombo is only 9.7%.¹⁵ The lack of access to food could be a contributor to malnutrition in Eswatini. The World Food Programme (WFP) has provided food over the years to Neighborhood Care Points (NCPs), but this has led to a dependency on food aid and takes money away from the local markets when food is available, discouraging people from growing their own food. NCPs are community centers where children can receive a free hot meal and take part in day care or preschool. The NCPs are run by volunteer caregivers from the community, so the reliability of these centers can vary from community to community. They were created in response to the HIV epidemic that left many orphaned children.¹⁵ Food aid delivery is also unreliable, does not always reach the target population, and can be cut off with little warning, leaving people worse off than before. The index of hunger vulnerability is 4.6% in the Lubombo region, the highest in Eswatini.⁵

Inadequate education and nutrition knowledge in mothers are considered key determinants of childhood malnutrition in Eswatini, according to an analysis done in 2012.⁵ In Eswatini, there is inadequate formal education in the subjects of nutrition. The under-five mortality rate in children with mothers who have no education is about three times higher than in children with mothers with at least a secondary education.⁵

In Eswatini, education is not mandatory, even though it is funded by the government. Most Swazi children have completed primary school (90%), but only 20% of these children go on to secondary school. Instead, many children stay home and work

to help support their families.¹⁶ While the number of girls who start school is very high, many drop out after becoming pregnant. Thirty-three percent of women have had a child by the age of 18 and are not able to complete their education.¹² Another free service that is not taken full advantage of is antenatal care (ANC) services. Most Swazi women attend ANC services at some point during their pregnancy, but only 26% visit the ANC during the first trimester, the most important time in the development of the fetus and when prenatal supplements are most needed.⁵ The “first 1,000 days” of a child’s life, the period from conception to 24 months, is a critical stage of child development. It is when nutritional status is at its highest importance and when children are most susceptible to the negative consequences of malnutrition.¹⁷

The Eswatini National Nutrition Council (ENNC) under the Ministry of Health has been training Rural Health Motivators (RHM) all across Eswatini. RHM are volunteers from the community who agree to participate in a five-day training on counseling skills and infant and young child-feeding practices (IYCFP). After training, they take part in home visits, as well as health talks at the community health facility and NCPs. The RHMs make home visits a priority for vulnerable mothers who may have ill or malnourished children. HIV-positive mothers who are pregnant or breastfeeding are also considered a priority population for home visits. Other mothers are visited monthly for growth monitoring. In the Lubombo region, RHMs were trained sometime between 2016 and 2017. The Nutrition Council trains RHM trainers in a week long course. The RHM trainers then go out and train the RHMs in a three-day training. It is not known

how many RHMs have been trained, or how many women they have been able to reach with the information.

In Eswatini, about 50% of the health information people receive comes from health care workers, 25.3% originates from the media, and 20.5% comes from RHMs; only 2.5% of health information comes from friends or family. In this regard, there is little difference between the rural and urban areas of Eswatini. In the urban areas they receive slightly more information from the media and in the rural areas they receive slightly more from the RHMs.¹⁴

Research Question and Study Purpose

The purpose of this study was to identify the following:

- 1.) What are the current gaps in nutrition knowledge among mothers on recommended infant feeding?
- 2.) Whom do mothers of infants and young children go to when they have questions about infant and young child-feeding practices?
- 3.) What is the association between nutritional knowledge and recommended infant feeding practices among mothers with young children (0-24 months) in the Lubombo region of Eswatini?

Study Implications

This study could help determine if the nutritional information from the RHMs is reaching the mothers, and what potential nutrition knowledge gaps might still exist. This study will inform the ENNC on the current infant feeding practices of this particular underserved region of Eswatini and will help identify appropriate/targeted interventions to address malnutrition in this target population.

CHAPTER TWO: LITERATURE REVIEW

Poverty, the main determinant of malnutrition, is influenced by multiple socioeconomic factors including education level, access to improved sanitation, disease, and food production. Malnutrition is also influenced by cultural food customs, breastfeeding habits, and access to health care services.^{18 19} Reducing malnutrition is a multifaceted challenge that is caused by this series of complex issues that an approach focusing solely on food security, increased food production or food aid may not resolve.^{18 20} It may increase access to food and reduce overall hunger, while failing to improve the quality of diets.²¹ Any intervention that increases access to food must be combined with nutrition education.

A study in rural Uganda with a high rate of infant malnutrition looked into the barriers of infant and child-feeding practices in primary caregivers. The lack of knowledge on breastfeeding and complementary feeding was the most common barrier that emerged that prevented the mother from following recommended feeding practices.²² Nutrition education has the potential to be a long term, sustainable, cost-effective solution that has can lead to positive behavior change. The literature suggests that nutrition education can be effective in changing dietary choices, leading to improved health in

low-income women, positively impacting weight and length gain in infants, and reducing the prevalence of stunted growth in infants.^{23 24 25 26} It has also been shown to be an important element in the prevention of non-communicable diseases.²⁷

A study in Romania found that above average nutritional knowledge in women was strongly associated with recommended dietary supplement use during pregnancy and a greater likelihood of seeking out prenatal care earlier in a pregnancy.²⁸ A study in the Manzini region of Eswatini that specifically focused on mothers with HIV found that nutritional knowledge and education level were significantly associated with nutritional practices; similar results were found in a study among mothers in rural Ethiopia and Iran.^{29 30 31} In Iran, researchers concluded that higher nutrition knowledge was associated with improved nutrition practices and a higher quality diet in both rural and urban households.³¹

In Western Uganda, a post-program comparison group study compared caregivers with children 6-59 months who took part in a 10-week nutrition education program to another group who did not receive the same education program. The children in the education group had higher dietary diversity scores and were fed more frequently than the children from the comparison group. They concluded that nutrition education can be an effective way to improve feeding practices for two months after the completion of the program.³²

A study in Mozambique showed that mothers with higher levels of nutrition knowledge fed their child a more diverse diet, and education level had a significant effect on height vs. weight of children 0-24 months.³³ In multiple studies, after controlling for

the mother's height and wealth, there was still a positive association between a mother's education and her children's nutrition,^{34 35 33} and higher nutrition knowledge scores were significantly associated with higher Food Variety Scores in adolescents in rural south Africa.³⁶

The degree to which nutrition-related knowledge influences dietary practices has been contradicted in other studies where knowledge or education did not lead to better practices.³⁷ In Uganda, 89.5% of mothers who were interviewed had reported that they had been trained in the importance of nutrition. However, less than 25% of this group consumed at least three meals a day and less than 40% consumed at least six different food groups. Consumption of a diversified diet was more significantly associated with food aid instead of nutritional knowledge.³⁸ In Nepal, a mother's educational level was not significantly associated with severe acute malnutrition (SAM) in children under five, and not considered a main determinant of SAM. Instead, the study found that the main determinants were the mother's age and socioeconomic status, father's educational level, and lack of complementary feeding at 6 months of age.³⁹ In a cluster-randomized trial of an educational intervention in a poor area in Peru, nutrition education decreased the prevalence of stunted growth, but only where there was enough access to food.²⁶

The literature shows that nutrition knowledge is associated with improved dietary practices only in some cases; one possible reason for these differences between studies is that the type of nutrition knowledge and the way it is taught is also important. In urban Kenya, results showed that maternal nutrition knowledge was positively associated with child height-for-age Z-scores (HAZ), even after controlling for demographic factors.

However, breaking down the types of knowledge revealed that maternal nutrition knowledge, specifically the health consequences of not following recommended dietary practices, was strongly associated with nutritional outcomes of children and adolescents measured in HAZ. Knowledge on specific dietary recommendations had no significant association with HAZ.⁴⁰

Another study found that knowledge on infant and young child nutrition was shared among neighbors in rural Bangladesh and influenced their infant feeding practices. Mothers who lived next to participants of a nutrition behavior change communication intervention in rural Bangladesh were more likely to have higher nutritional knowledge themselves. They were also more likely to feed their children aged 6-24 months legumes and nuts, vitamin A-rich food and eggs. They were also more likely to meet the WHO guidelines for a minimum diet diversity, acceptable diet, and minimum meal frequency for children under 24 months who were still being breastfed.⁴¹

CHAPTER THREE: METHODOLOGY

Design and Research Site

A cross-sectional study design was used to assess knowledge and nutrition practices among mothers (18-49 years) with at least one young child (0-24 months old) in the Siphofaneni Tinkhundla (Administrative subdivision) of the Lubombo region of Eswatini. The population of this region is estimated to be about 14,441 people. The purpose of this study was to determine 1.) What are the current gaps in nutrition knowledge among mothers on recommended infant feeding? 2.) From whom do mothers of infants and young children go to when they have questions about infant and young child-feeding practices? 3.) What is the association between nutritional knowledge and recommended infant feeding practices among mothers with young children (0-24 months) in the Lubombo region of Eswatini? All of the methodology was approved by both the George Mason University Institutional Review Board (IRB) and the Ministry of Health in Eswatini. Ethical approval from local authorities and government was received before the study recruitment began. The author received permission to recruit for the study from the Lubombo regional health center and Siphofaneni Tinkhundla's health council. The data

was collected over two weeks in April of 2019 through the use of quantitative data collection tools.

Sample Recruitment and Eligibility

The participants for this study were recruited from the Siphofaneni subdivision of the Lubombo region. The study's inclusion criteria were for mothers between the ages of 18-49, with at least one child 0-24 months old. The RHM that work in each neighborhood spread word to the mothers in their communities who fit the selection criteria. They explained the purpose of the project and asked them to meet at a central location within walking distance of the homesteads. All mothers who made it to the central location and met the study criteria were approached and requested to participate in the study. Everyone that was approached and who met the study criteria took part in the study. This was a convenience sample because time and resources did not permit a random sample, due to the rural and spread out nature of the homesteads. The five different neighborhoods of Siphofaneni were visited over a two-week period. If the target number of 25 surveys were not met for that day, the interviewers would go from household to household until that number was reached. After the study was explained to the individual participants, the consent process began, if the participant met the criteria and agreed to take part, the interview began immediately. Only a total of 164 mothers were able to be interviewed due to resource constraints. A total of 127 mothers were interviewed in the community center, and 37 mothers were interviewed at their household or in the market. The participants were compensated for their time with a small snack of fruit.

Consent and Confidentiality

Every participant signed a consent form before the data collection began. The consent form was read aloud in SiSwati by the interviewer from the ENNC. The participant also received a hard copy that they could keep and read. Once it was determined that the participant understood, they signed the form. Ink was available for thumbprints for those who could not write. The participants' names were not recorded on any of the other data collection forms. Each participant was assigned a number to ensure that their responses remain anonymous. All data is kept in a lock box in a safe location and will be shredded five years after the study is published. A copy of the English consent form and the SiSwati consent form are included in Appendices B-C.

Data Collection Methods

Quantitative data was collected through one-on-one interviews, over the course of a two-week period. The interviews were conducted in SiSwati by five employees of the ENNC. A questionnaire was compiled in English and translated into SiSwati by the Nutrition Council. The questionnaire was reviewed by Dr. Sibiyi, a Professor of Nutrition from the University of Eswatini and the Nutrition Council to determine cultural acceptability and validity. The nutrition council verified that all of the questions covered topics that were in any training sessions for RHM trainers and that they believed was information that should be known by the mothers. The questionnaire was split up into four sections 1.) Sociodemographic 2.) Household Food Security Assessment 3.) Nutrition Practices 4.) Nutrition Knowledge. The questionnaire is included in Appendix

A. The interviewer asked the questions in SiSwati then recorded their answer in English directly on the form.

Sociodemographic Questions

The first part of the questionnaire contained a demographic form that included questions such as the mother's age, number of children, marital status, work status and information about her children.

Household Food Security Questions

Food Security Status is a variable that may influence infant feeding practices irrelevant of the level of nutritional knowledge in the mother. Since food insecurity is prevalent in Eswatini, it is an important control variable that should be included in the study. The Household Food Insecurity Access Scale (HFIAS) was adopted from the U.S Agency for International Development's (USAID) Food and Nutrition Technical Assistance (FANTA) project. It has been adapted from the version used by the United States to determine food insecurity, which has been validated for use in households in low-income countries around the world.⁴² The participant was asked to answer the questions about the past four weeks. They were first asked an occurrence question, that if answered "yes", a follow up question about how often it had occurred in the past four weeks was asked, if they answered "no", the second part of the question was skipped. For example: "In the past four weeks, did you worry that your household would not have enough food? 0 = No (skip to Q2) 1 = Yes 1.a. How often did this happen? 1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks)." USAID divided the

questions into three different groups of food insecurity. These included: anxiety and uncertainty about the household food supply, insufficient quality (includes variety and preferences of types of food), and insufficient food intake and its physical consequences. The questions were meant to be asked at a household level, and the interviewer addressed these questions to the mother. A HFIAS score was created by adding up all of the scores for each question to get a score between 0-27. A score of 0 means that the household is highly food secure and a score of 27 the household is highly food insecure.⁴² The scores were also converted into four food security categories access scores created by USAID which include food secure, mildly food insecure, moderately food insecure, and severely food insecure. These groupings did not necessarily depend on the score, but if the mothers answered ‘yes’ to the more severe questions.

Knowledge, Attitudes and Practices Questionnaire

The nutrition practice and nutrition knowledge questions that were used, were created by Food and Agriculture Organization (FAO) and USAID. These questions were taken from *Guidelines for assessing nutrition-related Knowledge, Attitudes and Practices (KAP)* that was created by the FAO to be easily adaptable to different regions of the world. It was prepared by analyzing studies by the FAO, and reviewing KAP survey methodologies by the WHO, and UNICEF. It was field tested in Mexico, El Salvador, Malawi, and Cambodia. The manual was created for people in charge of planning, implementing and evaluating food security and nutrition projects, but can be used for many different objectives. The KAP model was created to be adapted for multiple objectives and uses, including only using parts of the tool. The modules comprise

predefined questions that capture information on critical knowledge, attitudes and practices related to the 13 most common nutrition topics including nutrition through the lifespan, common micronutrient deficiencies, food safety, personal hygiene, water and sanitation, food based dietary guidelines and obesity. For the purpose of this study, only the modules covering infant and feeding young children were used. The KAP model also contained questions on perceived benefits, severity, susceptibility and barriers, but these were excluded. This portion of the questionnaire was broken up into two sections: 1.) Nutritional Practices and 2.) Nutritional Knowledge.

Nutritional Knowledge

Nutritional Knowledge measured the mother's level of knowledge on concepts and processes related to the recommended infant feeding practices. All of the subjects covered in the questionnaire have been covered in the ENNC educational material that the RHMs are trained in, and the practices are part of the recommended feeding recommendations by the nutrition council. It also measured the mother's knowledge on health benefits on recommended feeding practices and consequences of nutritional deficiencies. This section consisted of 29 questions that were split up into three subjects: breastfeeding with a total possible score of 22, complementary feeding with a total possible score of 20, and micronutrients with a total possible score of 25. A point was given for every correct answer a participant gave. Most of the questions had more than one potential answer making the total possible score 67. Each mother was given 3 individual subject scores and a combined total knowledge score.

Nutrition Knowledge Sources

Mothers were first asked whom they went to when they had questions about nutrition or infant feeding practices. This was asked in an open-ended format. The mothers were then additionally asked if they had ever spoken to a Rural Health Motivator about nutrition or infant feeding practices. The mothers may have gotten information from more than one source.

Nutritional Practices

Nutritional Practices in this tool were used to determine if the infant was exclusively breastfed from 0-5 months. It was also used to determine the types of food the infant was eating. The first section asks the mother if she had fed her infant under 6 months of age any water, infant formula, milk, juice, broth, yogurt, porridge, and other liquid to determine if the infant was exclusively breastfed. If the infant was currently between 0-5 months, the mother responded with her current practices. If her infant was currently older than 6 months the mother was asked to retrospectively respond about her practices. The mother was then asked if she had breastfed in the past 24 hours to determine if the infant is still breastfeeding at his current age. These mothers were then grouped into two categories: Exclusive vs Non-exclusive breastfeeding. Exclusive breastfeeding is when the infant only receives breastmilk and no other food or water for the first six months of life. The infant is able to receive ORS, vitamins, minerals and medicines. Non-exclusive is when the infant receives other food or drinks before the age of six months and may or may not consume breast milk.⁴³

This section also contained a Diet Diversity questionnaire that used a 24-hour recall to determine the number of food groups each child consumed over a 24 hour period. The WHO recommends the use of a seven-food group validated Diet Diversity Score (DDS) for children 6-23 months.⁴⁴ These groups were: 1.) Grains, roots and tubers, 2.) Legumes and nuts, 3.) Dairy products, 4.) Flesh foods, 5.) Eggs, 6.) Vitamin A fruits and vegetables, 7.) Other fruits and vegetables and 8.) Other. The one used for this study included 8 groups, but only 7 were included in the Diet Diversity score. The “Other” category included sugary foods, fats, and oils; food groups that are not considered to improve diet diversity if consumed. For each food item from each Group 1-7 that the infant has consumed in the past 24 hours, they receive one point for a total score of 7 to determine their Diet Diversity Score. To reach what is considered a minimum Diet Diversity, the infant must consume at least four or more of the 7 food groups. Other studies have associated children consuming a minimum of 4 food groups with “better quality diets.”⁴⁴ The cut off of “4” was used to create a dichotomous variable out of Diet Diversity. The two categories of the Diet Diversity that will be used in the data analysis score are low diet diversity, a score of 0-3 and acceptable diet diversity, a score of 4-7.

Data Analysis

Descriptive statistics were computed for demographic variables and the knowledge, practice and HFIAS scores. Continuous variables including age, number of children and knowledge, practice and HFIAS scores were summarized using means, median and standard deviation. Categorical variables such as education level, marital

status, and HIV status were summarized by the percentage of mothers that fall into each category.

To determine gaps in nutrition knowledge, the percentage of how many people choose each answer was calculated to determine the most incorrect questions, or what information was not as commonly known. Nutrition knowledge levels was determined by calculating how many mothers answered each question correctly and how many did not know the answer. To determine whom mothers went to for advice on nutrition or infant feeding practices, responses were consolidated into five categories: health care professionals, female family members, male family members such as uncle, father or husband, and RHMs. These were similar groupings that the ENNC used.

The mean, SD, mean difference and 95% CI of knowledge scores were compared against exclusive breastfeeding versus non-exclusive breastfeeding. Mean, SD, mean difference and 95% CI of the knowledge scores were also compared to low diet diversity scores versus adequate diet diversity scores. The mean, SD, mean difference and 95% CI of the knowledge scores of mothers who spoke to an RHM were also compared to mothers who did not speak to an RHM.

The association between nutritional knowledge and recommended infant feeding practices is assessed by a bivariate and multivariate logistic regression models. The knowledge scores used in the model were continuous. Both breastfeeding and diet diversity were treated as dichotomous outcomes in separate models. First a bivariate regression was used to determine if there was an association between total nutrition knowledge and the two practices: exclusive breastfeeding and diet diversity. Then the

knowledge scores were broken up into three knowledge subject groups including breastfeeding, complementary feeding and micronutrients to determine if there were any associations between the individual knowledge subject and the two practices. Each demographic variable was entered one-by-one into a bivariate logistic model to assess associations with knowledge. If the associations were statistically significant at $p \leq 0.05$ level, they were included in the final multivariate model. Regardless of significance, infant sex, maternal education measured by years, and household size were included in the multivariate model. These were included because they were the most commonly controlled for variables in similar studies. The odds ratio and 95% confidence interval (CI) of the bivariate and multivariate regressions were displayed for knowledge vs breastfeeding and knowledge vs. diet diversity. All analyses were performed using SPSS Statistics software. The cutoff for type one error is set at $p \leq 0.05$.

CHAPTER FOUR: STUDY RESULTS

A total of 164 mothers were interviewed from Siphofaneni chiefdom of the Lubombo region of Eswatini. Of the mothers that were interviewed, 77% were interviewed at the community meeting point, and 22% were approached at their households or in the market. The data from two surveys were not used due to the mother or child's age not fitting the inclusion criteria. One survey was not included because the entire demographic section of the child was skipped by the interviewer. The mothers who were included in the dataset were 18 to 48 years old with a mean of 27 years, standard deviation (SD) 6.5. Their children's age ranged from 0-24 months with a mean of 10.4 months (SD 6.3). Mother's years of education ranged from 0 to 13 years with the mean of 8.8 years (SD 2.4), about 60% of the mothers completed at least some part of secondary school. Approximately 80% of the mothers were unemployed and 50% of the mothers were not married. About 36% were positive for HIV as shown in Table 1. Approximately 44% of the mothers came from severely food insecure households, 36% came from mildly to moderately food insecure households and 20% of the mothers came from food secure households. The complete breakdown of food insecurity can be found in figure 1.

Table 1: Demographics of the Sample

	N	Percent	Mean	Median	SD
Mother's age	162	...	27.0	25.0	6.5
# of children	161	...	2.6	2.0	1.4
Female children	160	54.3%	...	...	...
Married	162	50.6%	...	...	...
HIV +	151	36.4%	...	...	...
HFIAS	162	...	8.7	7.0	7.6
Unemployed	162	80.7%	...	...	...
Years of Ed.	161	...	8.8	9.0	2.4
<i>No school</i>	161	1.2%	...	...	...
<i>Primary school</i>	161	31.7%	...	...	...
<i>Secondary school</i>	161	62.1%	...	...	...
<i>Higher education</i>	161	5.0%	...	...	...
Household size total	161	...	7.7	7.0	3.7
<i>Children <18</i>	161	...	4.1	4.0	2.4
<i>Adults ≥ 18</i>	161	...	3.6	3.0	2.0
Child's age	162	...	10.4	9.9	6.3
<i>0-5 months</i>	162	27.8%	...	...	...
<i>6- 11 months</i>	162	32.7%	...	...	...
<i>12-17 months</i>	162	24.7%	...	...	...
<i>18-24 months</i>	162	14.8%	...	...	...

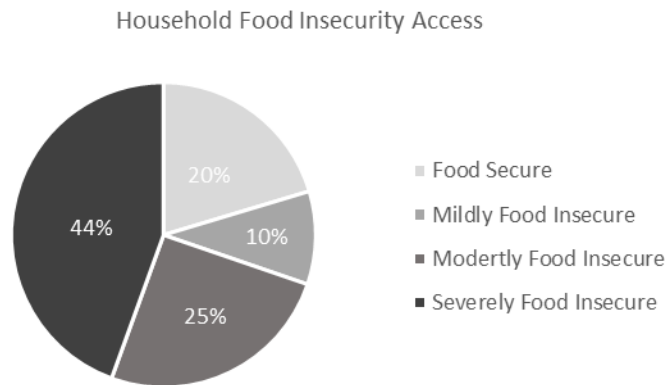


Figure 1: Percentage of Participants Household Food Insecurity Access (N=162)

Nutrition Knowledge

The first research question was to identify the level of nutrition knowledge in the mothers, and to identify any major gaps in knowledge. The total knowledge scores were out of 67 and the mothers scores ranged from 8 to 44 with a mean of 21.8 (SD 6.14). The total knowledge score was broken down into three individual subject scores. An overview of the scores can be found in Table 2.

Table 2: Nutrition Knowledge Scores of Mothers*

	<u>N</u>	<u>Possible**</u> <u>Max Score</u>	<u>Mean</u>	<u>Median</u>	<u>SD</u>
Total	162	67	21.9	21	6.2
Breastfeeding	162	22	8.9	9	2.5
Complementary feeding	162	20	8.2	8	2.2
Micronutrients	162	25	4.8	4	3.6

*Participants received one point for each correct answer to the knowledge questionnaire. The mean, median and SD is shown for the participants scores.

**The total possible max score is shown for each knowledge category, and is the total points a participant could have received from the knowledge questionnaire.

Breastfeeding Knowledge

The mothers answered 9 questions about breastfeeding, with a total possible score of 22. The range of scores was 1-17 with a mean of 8.9 (SD 3.6). About 96% of mothers knew that the first food a child should receive was only breastmilk. Approximately 92% had heard of exclusive breastfeeding, of those mothers, 87% were able to properly explain what it was. Approximately 73% knew that it helped keep their child healthy, only 30% knew that babies cannot digest other food, and 22% knew that it provides

protection against diarrhea. A low percentage of the mother's knew the specific benefits of exclusive breastfeeding for the child and of the physical health benefits for a mother to breastfeed such as delaying fertility, and losing weight. Less than half of the mothers knew that they should continue breastfeeding up to 24 months. A comprehensive breakdown of what questions were asked and how they were answered can be found in table 3.

Table 3: Breastfeeding Knowledge

Questions	N	Answers	
K.1 What is the first food a new-born baby should receive?	162	Only breastmilk	96%
		Does not know	4%
K.2 Have you heard about exclusive breastfeeding?	162	Yes	92%
		Infant is only fed breastmilk	87%
		Does not know	13%
K.3 How long should a baby receive nothing more than breastmilk?	162	From birth to six months	96%
		Does not know	4%
K.4: Why do you think breastmilk is the only food recommended for infants up to six months old?	162	Provides all nutrients	70%
		Babies cannot digest other food	26%
		Does not know	12%
K.5: How often should a baby younger than six months be breastfed or fed with breastmilk?	161	On demand	89%
		Does not know	11%
K.6: What are the benefits for a baby if he or she receives only breastmilk during the first six months of life?	161	Grows healthy	73%
		Protection from diarrhoea	22%
		Protection from obesity	6%
		Protection from other diseases	25%
		Does not know	13%
K.7: What are the physical or health benefits for a mother if she exclusively breastfeeds her baby?	161	Delays fertility	17%
		Lose weight	4%
		Lowers risk of cancer	6%
		Lowers risk of losing blood	2%
		Improves relationship	23%
		Cheap	7%
		Does not know	52%
K.8: Many times, mothers complain		On demand	10%

about not having enough breastmilk to feed their babies. Please tell me different ways a mother can keep up her milk supply	162	Manually expressing breastmilk	1%
		Good nutrition/ eating well	30%
		Drink enough liquids	56%
		Does not know	24%
K.9: How long is it recommended that a woman breastfeeds her child?	162	24 months	39%
		12-23 months (incorrect)	35%
		6-11 months (incorrect)	17%
		< 6 months (incorrect)	3%
		Does not know	5%

*Bolded answers are correct

Complementary Feeding Knowledge

The mothers answered 8 questions about complementary feeding, with a total possible score of 20. The range of scores was 2-15 with a mean of 8.2 (SD 2.2).

Approximately 90% knew that babies should start eating additional food at six months, 40% added some kind of oil or butter to porridge to make it more calorie dense, approximately 30% knew that adding animal source foods and/ or pulses and nuts could make it more nutritious. Most mothers knew that an infant that was not growing well was either sick or not eating enough. A comprehensive breakdown of what questions were asked and how they were answered can be found in table 4.

Table 4: Complementary Feeding Knowledge

Questions	N	Answers	%
K.10: At what age should babies start eating foods in addition to breastmilk?	162	At six months	91%
		Does not know	9%
K.11: Why is it important to give foods in addition to breastmilk to babies from the age of six months?	162	Breastmilk alone is not sufficient for growth	85%
		Does not know	15%
K.12: Please look at these two pictures of porridges. Which one do you think should be given to a young child?	162	Thick porridge	68%
		Does not know	32%
K.13: Why did you pick that picture?	162	Thicker is more nutritious	44%
		Does not know	56%
K.14: To feed their children, many mothers give them (Indengane) porridge made out of maize maizemeal or Incwaincwa sour porridge? Please tell me some ways to make porridge more nutritious or better for your baby's health.	162	Animal-source foods	29%
		Pulses and nuts	31%
		Vitamin-A-rich fruits and vegetables	9%
		Green leafy vegetables	10%
		Energy-rich foods (oil, butter)	40%
		Dairy products	12%
K.15: What are the reasons why people are undernourished?	162	Not getting enough food	80%
		Food is watery, not enough nutrients	8%
		Disease	6%
		Other	3%
		Does not know	9%
K.16: If the baby is not gaining weight, what does that mean?	162	The baby is not eating well	75%
		The baby might be sick	31%
		Does not know	3%
K.17: What should we do to prevent undernutrition among infants 0-24 months of age?	162	Breastfeed exclusively	64%
		Go to the health center	35%
		Give more food/ feed frequently	82%
		Give attention during meals	14%
		Does not know	2%

*Bolded answers are correct

Micronutrients Knowledge

The mothers answered 12 questions about micronutrients, with a total possible score of 25. The range of scores was 0-15 with a mean of 4.7 (SD 3.6).

Approximately 44% of the mothers had heard about iron-deficiency anemia, and 40% could point out a symptom of it. Approximately 40% have heard about vitamin A deficiency, and 31% could list an example of a symptom. About half of the mothers could list at least one example of iron rich and vitamin A rich foods, the most common examples being spinach, beetroot and carrots. Approximately 40% had heard about iodine deficiency, 24% knew that it caused goiters and 33% knew that iodine deficiency can be prevented by eating food prepared with iodized salt. The overall knowledge on micronutrients was low. A comprehensive breakdown of what questions were asked and how they were answered can be found in table 5.

Table 5: Micronutrients Knowledge

Questions	N	Answers	
K.18: Have you heard about iron-deficiency anemia?	162	Yes	45%
		No	55%
If Yes: Can you tell me how you can recognize someone who has anaemia?	162	Less energy/weakness	13%
		Paleness/pallor	27%
		Spoon nails/bent nails	0%
		More likely to become sick	3%
		Does not know	63%
K.19: What are the health risks for infants and young children of a lack of iron in the diet?	162	Delays of mental and physical development	19%
		Does not know	79%
K.20: How can anemia be prevented?	162	Can provide at least one example	41%
		Does not know	59%
K.21: Can you list examples of foods rich in iron?	162	Can you list one example of foods rich in iron?	51%
		Does not know	49%
K.22: When taken during meals, certain foods help the body absorb and use iron. What are those foods?	162	Vitamin-C-rich foods	14%
		Does not know	86%
K.23: Some beverages decrease iron absorption when taken with meals. Which ones?	162	Coffee/ Tea	13%
		Does not know	87%
K.24: Have you heard about vitamin A deficiency or lack of vitamin A?	162	Yes	35%
		No	65%
If Yes: Can you tell me how you can recognize someone who lacks vitamin A in his or her body?	162	Weakness/ less energetic	6%
		More likely to become sick	4%
		Eye problems: night blindness	15%
		Does not know	77%
K.25: How can one prevent a lack of vitamin A in the body?	162	Eat Vit. A rich foods	20%
		Give Vit. A supplement	3%
		Does not know	78%
K.26: Can you list examples of foods rich in vitamin A?	162	Yes	43%
		Does not know	57%
K.27: Have you heard about iodine deficiency?	162	Yes	42%
		No	58%
If Yes: Can you tell me what it is? Can you describe the signs of lack of iodine in the body?	162	Having difficulty working or studying	5%
		Apathy	2%
		Goitre	24%
		Don't Know	70%
K.28: What could be the	162	Mentally impaired	7%

consequences or health risks for the unborn baby of a lack of iodine in the diet of a pregnant woman?	162	Physically damaged	12%
		Does not know	83%
K.29: How can iodine deficiency be prevented?	162	Eat/prepare foods with iodized salt	33%
		Does not know	67%

*Bolded answers are correct

Knowledge Sources

The second question was to determine from whom do mothers go to when they have questions about nutrition or proper infant feeding practices. Responses included their mothers, grandmothers, clinic staff, nurses, uncles, fathers, husbands and RHMs. Less than 50% received information from RHMs, the next most common source was from Health Care Professionals. Almost a quarter of the mothers responded that they did not go to anyone for advice on nutrition related topics. This can be seen in Figure 2.

Mothers who had spoken to an RHM were more likely to have a higher breastfeeding knowledge score, then mothers who did not speak to an RHM. There was no significant association between mothers who had spoken with an RHM and recommended infant feeding practices.

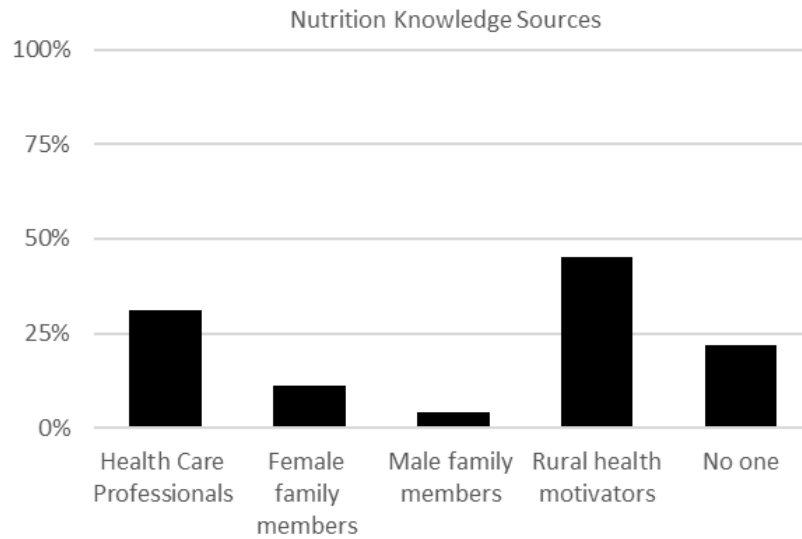


Figure 2: Whom Mothers ask for Advice on Nutrition or Infant Feeding Practices

Infant Feeding Practices

Infants 0-5 Months Feeding Practices

Ninety three percent of infants 0-5 months received breastmilk, but less than half of the 0-5 months were exclusively breastfed. Approximately 18% were breastfed and only given additional water, about 40% gave their infant complementary foods. Seventy-one percent of the mothers who did not exclusively breastfeed still breastfed their child. Figure 3 shows what non-exclusive infants 0-5 months were commonly fed along with breastmilk. “Other liquids” category in Figure 3 included examples such as sugar water, salt water, and traditional and herbal medicines.

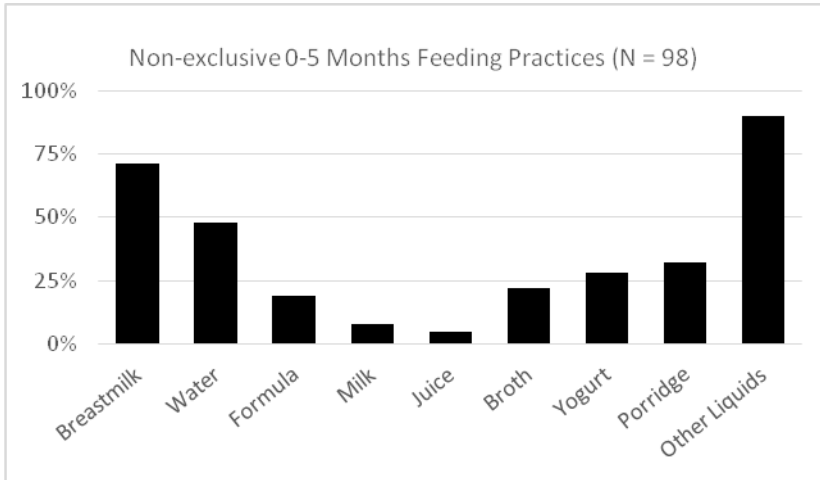


Figure 3: Feeding Practices Among Non-exclusively Breastfed Infants 0-5 Months Old

Infants 6-24 Months Feeding Practices

All of the infants aged 6-24 months consumed grains. Over half of 6-24 months received dairy products and between 42-50% consumed flesh meats and approximately 55% consumed Vitamin A rich foods. The mean for the Minimum Diet Diversity score was 3.7 (SD 1.38), out of a total of 7 groups. To reach a minimum Diet Diversity is the consumption of at least four or more of the 7 food groups. Fifty-six percent had a score of at least 4 or above. The percentage of infants who still received breastmilk in addition to other foods was 85% in infants aged 6-11 months, 69% in infants aged 12-17 months, and 38% in infants aged 18-24 months.

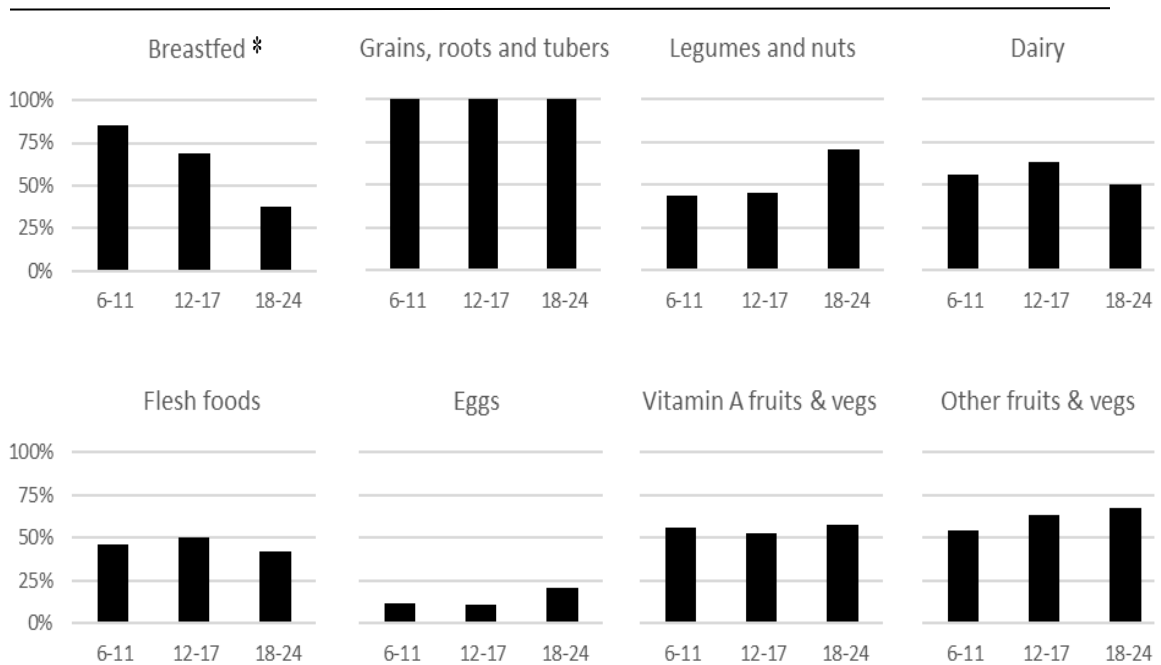


Figure 4: Diet Diversity Among Infants 6-24 Months Old

*If the infant is still consuming breast milk at their current age regardless if they were exclusively or non-exclusively breastfed under 6 months of age.

Association between knowledge scores and infant feeding practices

In a bivariate regression model of nutrition knowledge and breastfeeding practices, there was no statistically significant association between the total knowledge score and breastfeeding practices. The scores were broken down into three subject scores breastfeeding knowledge, complementary feeding and micronutrient knowledge to see if there was any association between the individual scores. After breaking the scores down there was still no statistically significant associations. Mothers with higher knowledge scores did not have higher odds of exclusively breastfeeding than mothers with lower

knowledge scores. As shown in Table 7, mothers who exclusively breastfeed did have an average higher breastfeeding knowledge score, but the difference was not significant.

There was a statistically significant positive association between the total knowledge score and the dichotomized diet diversity scores (OR 1.09, 95% CI 1.02,1.15). As shown in Table 8, mothers who had higher diet diversity score (> 3) had an average total knowledge scores of 3 points higher.

After controlling for child sex, maternal education and household size, breastfeeding knowledge had a significant positive association with the dichotomized diet diversity scores (OR 1.19, 95% CI 1.01,1.4). A one unit increase in the mothers' breastfeeding knowledge score is associated with a 19% higher odds that their child will consume a more diverse diet.

After controlling for the same variables, micronutrient knowledge also had a significant positive association with the dichotomized diet diversity scores (OR 1.1, 95% CI 1.0,1.22). A one unit increase in mothers' micronutrients knowledge is associated with a 10% higher odds that their child will consume a more diverse diet.

Table 6: Knowledge Scores of Non-exclusive vs. Exclusive Breastfeeding
Breastfeeding 0-5 months

Knowledge Scores	Non-exclusive (N = 98)		Exclusive (N = 64)		Mean Difference	95% CI
	Mean	SD	Mean	SD		
Total	21.7	6.5	21.8	5.5	-0.03	-1.98, 1.92
Breastfeeding	8.5	2.8	9.2	2.8	-0.66	-1.44, 0.11
Complementary Feeding	8.1	2.1	8.3	2.2	-0.27	-0.95, 0.41
Micronutrients	5.1	3.9	4.2	3.2	0.90	-0.26, 2.06

Table 7: Knowledge Scores of Low Diet Diversity vs. Adequate Diet Diversity
Diet Diversity Score (DDS)

Knowledge Scores	Low (DDS ≤ 3) N 54		Adequate (DDS > 3) N 70		Mean Difference	95% CI
	Mean	SD	Mean	SD		
Total	20.2	5.5	23.3	6.9	-3.16*	-5.36, -0.96
Breastfeeding	8.2	2.2	9.1	2.8	-0.99*	-1.90, -0.09
Complementary Feeding	8.0	2.3	8.6	2.1	-0.59	-1.37, 0.18
Micronutrients	4.1	3.7	5.6	4.0	-1.57*	-2.94, -0.20

*Mean difference estimates that were statistically significant ($p < 0.05$)

Table 8: Bivariate and Multivariate Logistic Regression of Nutrition Knowledge vs. Practices

Practices	Knowledge Scores	Bivariate		Multivariate	
		<u>OR</u>	<u>95% CI</u>	<u>OR</u>	<u>95% CI</u>
Exclusive Breastfeeding	Total	1.0	0.95-1.05	1.0	0.95-1.06
	Breastfeeding	1.12	0.98-1.29	1.14	0.99-1.31
	Complementary Feeding	1.06	0.92-1.23	1.05	0.90-1.23
	Micronutrients	0.93	0.85-1.02	0.94	0.86-1.03
Diet Diversity	Total	1.09*	1.02-1.15	1.09*	1.02-1.16
	Breastfeeding	1.17*	1.01-1.36	1.19*	1.01-1.40
	Complementary Feeding	1.14	0.96-1.35	1.18	0.99-1.42
	Micronutrients	1.12*	1.01-1.23	1.10*	1.0-1.22

Multivariate regression controlled for sex of the child, maternal education and household size.

**OR estimates that were statistically significant ($p < 0.05$)*

CHAPTER FIVE: DISCUSSION

The study population had a higher percentage of mothers that were HIV positive at 36.4%, while the national average was only 27%. This region is the most rural in eSwatini with the highest incidence of poverty (76%), and also has the highest rate of orphaned and vulnerable children.⁶ The high rate of HIV may be because this study focused only on rural mothers living around the poverty line and did not include urban mothers. Other studies have shown that HIV is higher in areas with higher levels of poverty. A study from the National Nutrition Council reported that 70% of mothers exclusively breastfed, while in this study population, only 40% exclusively breastfed. It is unknown how the Nutrition Council collected this data. The discrepancy could be due to the rural and low economic status of these mothers.

Approximately 44% of the mothers came from severely food insecure households, which is also higher than the national estimate (16%).³ The difference in food security between the study population and the country as a whole may be because eSwatini is in the top 20 countries with the highest level of wealth disparity.⁴⁵ The study population may be an accurate representation of the Lubombo region, but not the population as a

whole. Education level of the study population was very similar to the general population.⁴⁶

Nutrition Knowledge and Sources

Overall nutrition knowledge was low compared to what is covered in the RHM training manuals and compared to the total maximum score. Breastfeeding and complementary feeding scores were higher than the micronutrient scores; this could be due to the fact that mothers usually do not ask for advice until they have a baby and RHMs focused mainly on breastfeeding information. Health care workers commonly prescribe Vitamin A supplements for babies, and the mothers are aware that their babies need it, but may not know that it is found in specific foods.

The National Nutrition Council reported that country wide, only 20% of mothers received nutrition information from RHMs and 50% received it from health care workers compared to this study population where 48% of mothers received information from RHMs and approximately 30% from health care workers. This discrepancy could be due to this study having taken place in a rural area, as RHMs work only in the rural areas, and the participants having been recruited by RHMs. Mothers in urban areas might be more likely to get their information from a health care worker.

There was no significant difference between total knowledge scores between mothers who had spoken with an RHM compared to those who had not. Mothers who spoke with an RHM were more likely to have had higher breastfeeding knowledge scores. The RHMs' content focused primarily on breastfeeding education and RHMs mainly spoke with pregnant and new mothers. It is common for mothers not to speak with

an RHM until they become pregnant or until after they have given birth. Speaking with an RHM was not associated with recommended practices.

Exclusive Breastfeeding

Despite 87% of mothers being able to correctly define exclusive breastfeeding, only 40% of the mothers exclusively breastfed. A high percentage of mothers knew that breastfeeding is generally healthy for their child, but they seemed more uncertain on some of the specific health benefits and on the physical benefits provided for the mother's health. Past studies have shown that nutrition education on infant feeding practices focuses more on the benefits for the child and less on the benefits of the mother. Emphasizing the maternal health benefits of breastfeeding significantly increased the mother's intention to breastfeed after counselling, and could improve adherence to exclusive breastfeeding.^{47 48} The idea that types of nutrition knowledge might be important is also supported by a study in Bangladesh where maternal knowledge of health consequences was associated with better child nutrition, yet maternal knowledge of specific dietary recommendations was not.⁴¹ Behavior change education might be a necessary part of a nutrition education program; some studies show that it might be as important as content.⁴⁹

Another potential barrier of exclusive breastfeeding is supply of breastmilk. It is unknown if this is a barrier present in this group of mothers, but there was a low percentage of mothers who knew how to provide an adequate supply of breastmilk; the most common answer was drinking enough liquid (56% of mothers). Only 30% knew that they must also consume a nutritious diet with enough food. Less than 10% knew

breastfeeding on demand or manually expressing breastmilk also helped maintain their breastmilk supply.

Improving a mother's self-efficacy when it comes to breastfeeding might also be an important consideration, as a mother's confidence was shown to "positively correlate with the length of breastfeeding" and mothers in Kenya with a higher breastfeeding self-efficacy had a higher rate of exclusive breastfeeding.⁵⁰

Other barriers are cultural beliefs and customs that contradict knowledge. One prevalent belief is that breastmilk is not a complete food source and the possible encouragement from grandmothers and family members in the community to mix feed may contribute to the high rate of mixed feeding that was found in this study. Despite over 85% of mothers correctly defining exclusive breastfeeding, almost 20% of mothers gave their baby only water in addition to breastmilk. These seem to be common practices in other African countries, as seen in a study in rural Cameroon, where almost all the infants in the study had received water supplementation at some point before 6 months of age, and where 85% of the women had received education on the benefits of exclusive breastfeeding.⁵¹ In a rural community in South Africa, mothers strongly believed in giving their breastfed infants water frequently.⁴⁷ There may be more cultural barriers and customs that influence exclusive breastfeeding than diet diversity.

Diet Diversity

Higher diet diversity scores were associated with overall higher nutrition knowledge scores. In this study, about 40% of mothers could list an example of a Vitamin A-rich food, yet 50% of mothers fed their infants Vitamin A-rich foods. In one study, households with higher nutrition knowledge and attitude scores had higher diversity in their diets than those with lower scores.⁵³ This study also found that mothers were more likely to use the nutrition knowledge if it was detailed to their specific situation.⁵³ Another study concluded that understanding the importance of Vitamin A-rich foods did not necessarily mean that this knowledge translated to their dietary practices.⁵⁴ A study in India supported the idea that the type of education is important. They used a “social-marketing strategy” to communicate the importance of Vitamin A-rich foods in diets of young children in one village and a “conventional nutrition” intervention in another village over the period of one year. While both interventions improved Vitamin A knowledge, attitudes and practices, the social-marketing strategy resulted in double the improvement. This supports the idea that the type of nutrition education might be more important than the information itself.

It is possible that mothers were feeding their infants Vitamin A-rich food without realizing the nutritional importance of it. Nutrition knowledge might have only been associated with diet diversity and not breastfeeding practices because there might be more barriers influencing breastfeeding practices than diet diversity, at least in this study population. The association between nutrition knowledge and DDS does not necessarily mean that an educational intervention will improve practices. Knowledge may be a

barrier of recommended practices, but there might be multiple barriers that need to be addressed for an effective intervention.

Strengths and Limitations

Strengths of this study were that it used a previously validated questionnaire, and data was able to be collected on a previously understudied population. The interviews were implemented by members of the ENNC who were familiar with the culture and local dialect. The findings may be generalizable to other rural mothers with infants under 2 years old in this region.

The recruitment process was a limitation since a random sample was not possible with the time constraints and the spread-out nature of the communities. This could have caused bias in the selection as the women were told to meet at a central location by RHMs. It is uncertain if the RHMs reached out to family, friends or with people they are normally in contact with. The selection approach may have had a higher chance of women who communicate with RHMs or receiving nutrition knowledge in general and not be accurate representation of the population. This group may have been more likely to visit the clinic as they were all within walking distance to a localized meeting center and might have more access to food sources such as markets and stores. Despite almost all of the mothers being identified by RHMs, only 50% of them had spoken to them about nutrition related topics.

Another limitation is that the convenience sample size may not have been large enough resulting in low statistical power when detecting associations in a logistic regression model. This could potentially make statistical associations found in the study

less likely to show true effect. Even though there was association between knowledge and diet diversity scores and no association between knowledge and exclusive breastfeeding it is unknown if increasing knowledge scores will actually lead to higher diet diversity scores.

Anthropometric measurements were not taken of the child so it is uncertain if the children were malnourished. Another limitation was having five people interview the mothers. Despite all of them receiving the same training, there might have been bias with the way they asked questions. Due to time limitations and length of the interview we could not ask questions on beliefs and attitudes toward different practices, so it is unclear if there were other barriers preventing nutrition practices.

Another limitation was only using one 24-hour recall to determine diet diversity. It is possible that one 24-hour recall may not be generalizable to the participants typical every day diet.

Implications for Future Research

Cultural beliefs, attitudes and barriers that are preventing mothers from exclusively breastfeeding and feeding their children diverse diets need to be determined. Further research needs to be done to determine what prevents knowledge from translating into actions or behavior change, and what kind of intervention would create the most change. The Nutrition council should further investigate the barriers that are preventing mothers from implementing recommended infant feeding practices.

Recommendations and Main Takeaway

The main findings from this study are that 1.) The study population has a gap in nutrition knowledge, specifically in regards to breastfeeding health benefits for the mother and child, health benefits of a diverse diet, and overall low knowledge on micronutrient benefits and functions. The second finding is that 2.) Nutrition knowledge may be associated with practices, but there are likely other barriers that need to be determined to improve adherence to recommended nutrition practices. 3.) While outside the main scope of this study, there is preliminary concern that the information from the RHMs is not reaching the mothers. It is recommended that monitoring and evaluation of the RHM training program should be implemented to determine if it is working as expected and if nutrition information is reaching the target audience.

APPENDIX

APPENDIX A: QUESTIONNAIRE

Translator _____ Date _____

Sociodemographic questionnaire for mothers

Mother		
1. Assign code		
	<i>Insert respondent code</i>	_ _ _ _
2. Age	How old are you?	Age in completed years _ _
3. Parity (only for women)	How many children do you have? <i>For pregnant women: ask if this is her first pregnancy</i>	Number of children _ _ First pregnancy <input type="checkbox"/>
4. Marriage status	Are you Married?	Yes <input type="checkbox"/> No <input type="checkbox"/>
	Does your husband live with you?	Yes <input type="checkbox"/> No <input type="checkbox"/>
	How many wives does he have?	_ _ _
5. Geographical characteristics	Where do you live?	<input type="checkbox"/> District _____
	<i>Adapt to the local geographical characteristics: district, city, village, section, tribe, etc.</i>	<input type="checkbox"/> City _____ <input type="checkbox"/> Village _____

		<input type="checkbox"/> Section <hr/>
6. Educational level	<p>Have you ever attended school?</p> <p><i>If yes, continue asking:</i></p> <p>What is the highest level of school you attended?</p>	<input type="checkbox"/> None <input type="checkbox"/> Primary school <input type="checkbox"/> Secondary school <input type="checkbox"/> Higher Grade _____
7. Work Status	<i>Have you held a job in the past month?</i>	
8. Can we see your health card?	<i>HIV Status</i>	Yes, inside the home <input type="checkbox"/> Yes, outside home <input type="checkbox"/> No <input type="checkbox"/>
9. Household Size	<i>Number of children under 18</i> _____ <i>Number of adults</i> _____	Positive Negative

Infant/young children		
1. Child's name	What is the name of your child or children under 24 months?	
2. Child's sex	Is (<i>the name of the child</i>) male or female?	Male <input type="checkbox"/> Female <input type="checkbox"/>
3. Child's age	When is your child's birthday?	_____/____/____ year month day

4. Clinic visits	<p>Have you or your child ever been to the clinic?</p> <p>Where is the closest clinic?</p> <p>How do you get there?</p> <p>How much does it cost?</p>	<p>Yes <input type="checkbox"/></p> <p>No <input type="checkbox"/></p> <p>While Pregnant <input type="checkbox"/></p> <p><i>In the Past:</i></p> <p>3 months <input type="checkbox"/></p> <p>6 months <input type="checkbox"/></p> <p>_____</p> <p>_____</p> <p>_____</p>
	<p>5. When you have questions about breastfeeding or what you or your child should eat who do you ask?</p> <p>Have you ever spoken to a Rural Health Motivator about Nutrition?</p>	<p>_____</p>

Household Food Security Assessment-English

Household ID: _____ Date of Interview: _____ Enumerator's name: _____

1. In the past four weeks, did you worry that your household would not have enough food?

- 1 Yes
- 0 No (skip to Q2)

1a. How often did this happen?

- 1 Rarely (once or twice in the past four weeks)
- 2 Sometimes (three to ten times in the past four weeks)
- 3 Often (more than ten times in the past four weeks)

2. In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?

- 1 Yes
- 0 No (skip to Q3)

2a. How often did this happen?

- 1 Rarely (once or twice in the past four weeks)
- 2 Sometimes (three to ten times in the past four weeks)

3 Often (more than ten times in the past four weeks)

3. In the past four weeks, did you or any household member have to eat a limited variety of foods

due to a lack of resources?

1 Yes

0 No (skip to Q4)

3a. How often did this happen?

1 Rarely (once or twice in the past four weeks)

2 Sometimes (three to ten times in the past four weeks)

3 Often (more than ten times in the past four weeks)

4. In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?

1 Yes

0 No (skip to Q5)

4a. How often did this happen?

1 Rarely (once or twice in the past four weeks)

2 Sometimes (three to ten times in the past four weeks)

3 Often (more than ten times in the past four weeks)

5. In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?

1 Yes

0 No (skip to Q6)

5a. How often did this happen?

1 Rarely (once or twice in the past four weeks)

2 Sometimes (three to ten times in the past four weeks)

3 Often (more than ten times in the past four weeks)

6. In the past four weeks, did you or any other household member have to eat fewer meals in a day because there was not enough food?

1 Yes

0 No (skip to Q7)

6a. How often did this happen?

1 Rarely (once or twice in the past four weeks)

2 Sometimes (three to ten times in the past four weeks)

3 Often (more than ten times in the past four weeks)

7. In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?

- 1 Yes
- 0 No (skip to Q8)

7a. How often did this happen?

- 1 Rarely (once or twice in the past four weeks)
- 2 Sometimes (three to ten times in the past four weeks)
- 3 Often (more than ten times in the past four weeks)

8. In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?

- 1 Yes
- 0 No (skip to Q9)

8a. How often did this happen?

- 1 Rarely (once or twice in the past four weeks)
- 2 Sometimes (three to ten times in the past four weeks)
- 3 Often (more than ten times in the past four weeks)

9. In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?

- 1 Yes
- 0 No

9a. How often did this happen?

- 1 Rarely (once or twice in the past four weeks)
- 2 Sometimes (three to ten times in the past four weeks)
- 3 Often (more than ten times in the past four weeks)

Explain to the participant:

I am going to ask you some questions about nutrition **of infants from birth to six months old.** Please let me know if you need me to clarify any of my questions. Feel free to ask any question you may have.

P.1: Was (*name of the baby*) breastfed yesterday during the day or at night?

- Yes
- No
- Don't know/no answer

What are some reasons why you do not breastfeed? _____

P.2: Sometimes babies are fed breastmilk in different ways, for example by spoon, cup or bottle, or are breastfed by another woman.

Did (*name of the baby*) consume breastmilk in any of these ways yesterday during the day or night?

- Yes
- No
- Don't know/no answer

P.3: When you are not home or cannot feed the baby yourself, who does it?

- Father
- Grandmother
- Other children
- Other _____
- Don't know/no answer

If you are not there to feed the baby, what type of food is the baby fed?

- Breastmilk by spoon, cup or bottle
- Infant formula by spoon, cup or bottle
- Other liquids

P.4: UNDER SIX MONTHS: Next I would like to ask you about some liquids that (*name of the baby*) may have had yesterday during the day or at night.

OVER SIX MONTHS: (*If the child is over 6 months ask if the baby consumed any of the list below while he/she was under 6 months*)

A. Plain water

- Yes
- No
- Don't know

B. Infant formula such as (*insert local examples*)

- Yes
- No
- Don't know

C. Milk, such as tinned, powdered or fresh animal milk

- Yes
- No
- Don't know

D. Juice or juice drinks

- Yes
- No
- Don't know

E. Clear broth

- Yes
- No
- Don't know

F. Yogurt

- Yes
- No
- Don't know

G. Thin porridge

- Yes
- No
- Don't know

H. Any other liquids such as (*list other water-based liquids available in the local setting*)

- Yes
- No
- Don't know

I. Any other liquids

- Yes
- No
- Don't know

Explain to the participant:

I am going to ask you some questions about nutrition of infants aged from 6 to 23 months. Please let me know if you need me to clarify any of my questions. Feel free to ask any question you may have.

Season: <input type="checkbox"/> Low food season <input type="checkbox"/> High food season

P.5: Was (*name of the baby*) breastfed or did he or she consume breastmilk yesterday during the day or at night?

- Yes
- No
- Don't know/no answer

P:6: Now I would like to ask you about (other) liquids or foods that (*name of the baby*) ate yesterday during the day or at night. I am interested in whether your child had the item even if it was combined with other foods.

For example, if (*name of the baby*) ate a millet porridge made with a mixed vegetable sauce, you should reply yes to any food I ask about that was an ingredient in the porridge or sauce.

Please do not include any food used in a small amount for seasoning or condiments (like chillies, spices, herbs or fish powder); I will ask you about those foods separately.

Yesterday during the day or at night, (PAST 24 HOURS) did (*name of the baby*) eat:

(Read the food lists. Underline the corresponding foods consumed and tick the column Yes or No depending on whether any food item of the list was consumed. Record the number of times when relevant (Group 3)).

<i>Group</i>	Food lists	No	Yes
Group 1: <i>Grains, roots and tubers</i>	Porridge, bread, rice, noodles or other foods made from grains		
	White potatoes, white yams, manioc, cassava or any other foods made from roots		
Group 2: <i>Legumes and nuts</i>	Any foods made from beans, peas, lentils, nuts or seeds		
Group 3: <i>Dairy products</i>	Infant formula		How many times? |_|||_|
	Milk, such as tinned, powdered or fresh animal milk		How many times? |_|||_|
	Yogurt or drinking yogurt		How many times? |_|||_|
	Cheese or other dairy products		
Group 4: <i>Flesh foods</i>	Liver, kidney, heart or other organ meats		
	Any meat, such as beef, pork, lamb, goat, chicken or duck		
	Fresh or dried fish, shellfish or seafood		
	Grubs, snails or insects		

Group 5: <i>Eggs</i>	Eggs		
Group 6: <i>Vitamin A fruits and vegetables</i>	Pumpkin, carrots, squash or sweet potatoes that are yellow or orange inside		
	Any dark green vegetables [insert local examples]		
	Ripe mangoes (fresh or dried [not green]), ripe papayas (fresh or dried), musk melon [insert other local Vitamin-A-rich fruits]		
	Foods made with red palm oil, red palm nut or red palm nut pulp sauce		
Group 7: <i>Other fruits and vegetables</i>	Any other fruits or vegetables		
Others <i>(not counted in the dietary diversity score)</i>	Any oil, fats, or butter or foods made with any of these		
	Any sugary foods, such as chocolates, sweets, candies, pastries, cakes or biscuits		
	Condiments for flavour, such as chillies, spices, herbs or fish powder		

..... The baby does not consume any food other than breastmilk

P.7: How many times did (*name of the baby*) eat foods, that is meals and snacks other than liquids yesterday during the day or at night?

Number of times |__||__|

Don't know/no answer

Knowledge

K.1 What is the first food a newborn baby should receive?

- *Only breastmilk*
- *Other*
- *Don't know*

K.2 Have you heard about exclusive breastfeeding?

- *Yes*
- *No → continue to question K.3*

What does exclusive breastfeeding mean?

- *Exclusive breastfeeding means that the infant gets only breastmilk and no other liquids or foods*
- *Other*
- *Don't know*

K.3 How long should a baby receive nothing more than breastmilk?

Probe if necessary:

Until what age is it recommended that a mother feeds nothing more than breastmilk?

- *From birth to six months*
- *Other*
- *Don't know*

K.4: Why do you think breastmilk is the only food recommended for infants up to six months old?

Probe if necessary:

Why is breastmilk alone sufficient to feed babies during the first six months?

-*Because breastmilk provides all the nutrients and liquids a baby needs in its first six months*
-*Because babies cannot digest other foods before they are six months old*
-*Other*
-*Don't know*

K.5: How often should a baby younger than six months be breastfed or fed with breastmilk?

-*On demand, whenever the baby wants*
-*Other*
-*Don't know*

K.6: What are the benefits for a baby if he or she receives only breastmilk during the first six months of life?

-*He/she grows healthily*
-*Protection from diarrhoea and other infections*
-*Protection against obesity and chronic diseases in adulthood*
-*Protection against other diseases. Specify*

-*Other*
-*Don't know*

K.7: What are the physical or health benefits for a mother if she exclusively breastfeeds her baby?

Probe if necessary:

-*Delays fertility*
-*Helps her lose the weight she gained during pregnancy*
-*Lowers risk of cancer (breast and ovarian)*

-Lowers risk of losing blood after giving birth
(less risk of post-partum haemorrhage)
-Improves the relationship between the mother
and baby
-Other
-Don't know

K.8: Many times, mothers complain about not having enough breastmilk to feed their babies. Please tell me different ways a mother can keep up her milk supply

-Breastfeeding exclusively on demand
-Manually expressing breastmilk
-Having a good nutrition/eating well/having a
healthy or diversified diet
-Drink enough liquids during the day
-Other
-Don't know

K.9: How long is it recommended that a woman breastfeeds her child?

Probe if necessary:

Until what age is it recommended that a mother continues breastfeeding?

-Six months or less
-6–11 months
-12–23 months
-24 months and more (correct response)
-Other
-Don't know

K.10: At what age should babies start eating foods in addition to breastmilk?

-*At six months*
-*Other*
-*Don't know*

K.11: Why is it important to give foods in addition to breastmilk to babies from the age of six months?

-*Breastmilk alone is not sufficient (enough)/cannot supply all the nutrients needed for growth/from six months, baby needs more food in addition to breastmilk*
-*Other*
-*Don't know*

K.12: Please look at these two pictures of porridges. Which one do you think should be given to a young child?

(Show the images/pictures of thick and watery/thin porridges and tick one of the options here below depending on the respondent answer.)

-*Shows the thick porridge*
-*Shows the watery*
-*Does not know*

K.13: Why did you pick that picture?

-*Because the first porridge is thicker than the other*
-*Because the thick porridge is more nutritious/because it is prepared with different types of foods or ingredients (food diversity)*
-*Other*
-*Don't know*

K.14: To feed their children, many mothers give them (Indengane) porridge made out of maize meal or Incwaincwa sour porridge? Please tell me some ways to make porridge more nutritious or better for your baby's health.

Probe if necessary:

Which foods or types of food can be added to the porridge make it more nutritious?

By adding:

-*Animal-source foods (meat, poultry, fish, liver/organ meat, eggs, etc.)*
-*Pulses and nuts: flours of groundnut and other legumes (peas, beans, lentils, etc.), sunflower seed, peanuts, soybeans*
-*Vitamin-A-rich fruits and vegetables (carrot, orange-fleshed sweet potato, yellow pumpkin, mango, papaya, etc.)*
-*Green leafy vegetables (e.g. spinach)*
-*Energy-rich foods (e.g. oil, butter/ghee)*
-*Other*
-*Don't know*

K.15: What are the reasons why people are undernourished?

-*Not getting enough food*
-*Food is watery, does not contain enough nutrients*
-*Disease/ill and not eating food*
-*Other*
-*Don't know*

What are the reasons why people do not get enough food?

-*Not having enough money to buy food*
-*Food is not available*
-*Other*

Don't know

K.16: If the baby is not gaining weight, what does that mean?

(Families and health workers can find out if children are well nourished or malnourished by weighing them regularly and plotting their weights on growth charts.)

If no answer, probe:

What could be the causes?

- *The baby is not eating well/the baby does not want to eat*
- *The baby may be sick often*
- *Other*
- *Don't know*

K.17: What should we do to prevent undernutrition among infants 0-24 months of age?

Infants (0–6 months)

- *Breastfeed exclusively/give only breastmilk*
- *Go to the health centre/hospital and check that the child is growing (growth monitoring services)*

Young children (6–23 months)

- *Give more food*
- *Feed frequently*
- *Give attention during meals*
- *Go to the health centre/hospital and check that the child is growing (growth monitoring services)*
- *Other*
- *Don't know*

K.18: Have you heard about iron-deficiency anaemia?

- *Yes*
- *No*

..... Don't know/no answer

If Yes:

Can you tell me how you can recognize someone who has anaemia?

-
-
- *Less energy/weakness*
 - *Paleness/pallor*
 - *Spoon nails/bent nails (koilonychia)*
 - *More likely to become sick (less immunity to infections)*
 - *Other*
 - *Don't know*

K.19: What are the health risks for infants and young children of a lack of iron in the diet?

-
-
- *Delay of mental and physical development*
 - *Other*
 - *Don't know*

K.20: How can anaemia be prevented?

-
-
- *Eat/feed iron-rich foods/having a diet rich in iron*
 - *Eat/give vitamin-C-rich foods during or right after meals*
 - *Take/give iron supplements if prescribed*
 - *Treat other causes of anaemia (diseases and infections) – seek health-care assistance*
 - *Continue breastfeeding (for infants 6–23 months old)*
 - *Other*
 - *Don't know*

K.21: Can you list examples of foods rich in iron?

K.22: When taken during meals, certain foods help the body absorb and use iron. What are those foods?

-
-
- *Vitamin-C-rich foods, such as fresh citrus fruits (orange, lemons, etc.)*
 - *Other*
 - *Don't know*

K.23: Some beverages decrease iron absorption when taken with meals. Which ones?

-
-
- *Coffee*
 - *Tea*
 - *Other*
 - *Don't know*

K.24: Have you heard about vitamin A deficiency or lack of vitamin A?

- *Yes*
- *No*
- *Don't know/no answer*

If Yes:

Can you tell me how you can recognize someone who lacks vitamin A in his or her body?

-
-
- *Weakness/feels less energetic*
 - *Be more likely to become sick (less immunity to infections)*

-*Eye problems: night blindness (inability to see at dusk and in dim light), dry eyes, corneal damage, blindness*
-*Other*
-*Don't know*

K.25: How can one prevent a lack of vitamin A in the body?

-*Eat/feed vitamin-A-rich foods – having/giving a diet rich in vitamin A*
-*Eat/feed foods fortified with vitamin A*
-*Give vitamin A supplements/sprinkles*
-*Other*
-*Don't know*

K.26: Can you list examples of foods rich in vitamin A?

Probe if necessary:

Do you know of any animal-source foods, vegetables or fruits that are rich in vitamin A?

Animal-source foods

-*Liver*
-*Kidney*
-*Heart*
-*Egg yolks/egg from chicken, duck, guinea fowl or other bird*
-*Milk, cheese, yogurt or other dairy product*

Orange-coloured vegetables

-*Orange sweet potato*
-*Carrot*
-*Pumpkin*
-*Squash*

Green vegetables

-^[A]_[AFS] *Amaranths, spinach, cassava leaves, kale and other green leafy vegetables*

Fruits (orange- or yellow-coloured non-citrus fruits)

- *Ripe mango*
 *Ripe papaya*

Foods fortified with vitamin A

Other foods

- *Breastmilk (for infants 0–6 months)*
 *Other*
 *Don't know*

K.27: Do you know what iodine deficiency is?

Have you heard about iodine deficiency?

- *Yes*
 *No*
 *Don't know/no answer*

If Yes:

Can you tell me what it is? Probe if necessary:

Can you describe the signs of a lack of iodine in the body?

- *Having difficulty working or studying*
 *Apathy (lack of motivation and excitement)*
 *Goitre*
 *Other*
 *Don't know*

K.28: What could be the consequences or health risks for the unborn baby of a lack of iodine in the diet of a pregnant woman?

- *Risk of being mentally impaired*
 *Risk of being physically damaged*

- *Other*
- *Don't know*

K.29: How can iodine deficiency be prevented?

- *Eat/prepare foods with iodized salt*
- *Other*
- *Don't know*

APPENDIX B: INFORMED CONSENT ENGLISH

Is nutritional knowledge associated with recommended infant and young child feeding practices among mothers in the Lubombo Region of Eswatini.

INFORMED CONSENT FORM

RESEARCH PROCEDURES

Good morning/afternoon, Mr/Mrs _____. I am a student from George Mason University in the United States currently working on my degree in Nutrition and I will be conducting research on infant feeding practices and knowledge and nutrition during pregnancy and lactation. If you agree to participate, you will be asked you how much you know about recommended infant feeding practices from 0-24 months. We will also ask you about your own eating practices while you were pregnant or lactating. We will also ask you some background information such as how many children you have, your job, and your age. These questions will take about 1 hour of your time. This purpose of this research project is to determine the nutritional knowledge and practices of mothers in this region of Swaziland.

RISKS

Some of the questions may make you feel uncomfortable or embarrassed. You are not required to answer any question you do not want to, and you may stop the interview at any time if any of the questions make you feel uncomfortable.

BENEFITS

There are no benefits to you as a participant; however, your participation will help provide a better understanding of the nutritional status among mothers and their infants in this region.

CONFIDENTIALITY

All the information we obtain will remain strictly confidential and your answers and name will never be revealed. You will be assigned a number that will be used to identify your data instead of your name, and you name will not be recorded on any of the data collection sheets except for the consent form.

PARTICIPATION

Your participation is voluntary, and you may withdraw from the study at any time and for any reason. If you decide not to participate or if you withdraw from the study, there is no penalty. There are no costs to you or any other party. The objective of this study is to **assess the nutrition situation of this region**. This is not to evaluate or criticize you, so please do not feel pressured to give a specific response and do not feel shy if you do not know the answer to a question. We are not expecting you to give a specific answer; I would like you to answer the questions honestly, telling me about what you know, how

you feel, the way you live and how you prepare food. Feel free to answer questions at your own pace.

CONTACT

This research is being conducted by Alina Dallmeier in the Department of Nutrition and Food Studies at George Mason University. She may be reached at 268 7822 9180 or you may contact Dr. Constance Gewa at 703-993-2173 for questions or to report a research-related problem. You may contact the George Mason University Institutional Review Board office at 703-993-4121 if you have questions or comments regarding your rights as a participant in the research.

This research has been reviewed according to George Mason University procedures governing your participation in this research.

CONSENT

I have read this form, all of my questions have been answered by the research staff, and I agree to participate in this study.

Signature

Date of Signature

APPENDIX C: INFORMED CONSENT SISWATI

Lwati ngekudla kahle luyahambisana netindlela tekondliwa kwebantfwana kubomake base Lubombo Region of Eswatini.

IMVUME YEKUTIMBANDZAKANYA NELUCWANINGO

Sicela ufundze lolokulandzelako, imvumo yekutimbandzakanya nalolucwaningo:

LUHLELO LWELUCWANINGO

“Libito lami ngingu [.....] Sisuka e-George Mason University lese United States ikanye ne University of Swaziland. Sikoleka imininingwane ngelwati lwekondliwa kwetinswane nebantfwana labasebancane. Injongo lenkhulu kuhlola lwati, imivo Kanye netindlela tekondla letisebentiswa banakekeli bebantfwana. Ngicela kutimbandzakanya kwakho kulolucwaningo lwetempilo netekudla kahle. Imibuto yalolucwaningo utotsatsa imizuzu lelishumi nesihlanu. Ngicela uphendvule ngekwetsembeka. Ngeke wehlulelwe ngetimphendvulo takho ngako ke sicela ube nekutimisela lokukhulu.

INZUZO

Kute ke inzuzo lesingatsi icondzene nawe lengaba yimali noma kuncephetelwa ngekutimbandzakanya kulolucwaningo. Kutimbandzakanya kwakho kukukhetsa kwakho.

BUNGOTI

Ungala kuphendvula imibuto nekutsi ungakhetsa kuyekela kuchubeka nalolucwaningo noma nini. Kungavumi kutimbandzakanya ngeke kukulimate wena Kanye nemndzeni wakho. Ngale kwaloko siyetsemba kutsi lolucwaningo litosita sive semaSwati kutsi sicondze kahle kutsi ayabasita yini bomake labatetfwele nalabamunyasako. Timphendvulo talolucwaningo titawusentjetiswa kulomunye umfundzate nakudzingekile.

TIMPHENDVULO TITAWUGCINWA TIFIHLAKELE

Bacwaningi batawukwenta siciniseko sekutsi timphendvulo takho tifihlakele kutsi betingacondziswa kuwe. Kuze uchubeke nekuphendvula kumele ube neminyaka lengu 19-49 uphindze ube nemuntfwana longaba na 0-24 wetinyanga. Yonkhe imininingwane lesiyikhulumile ngeke yatiwe kutsi usuka kuwe futsi ngeke isentjentiswe nangoba ngubani kuze atfole kutsi isuka kuwe noma umndeni wakho, ngetizatfu letitsite.

INOMBOLO YELUCINGO

Lolucwaningo lwentiwa ngu by Alina Dallmeier lochamuka ku- Department yaka Nutrition and Food Studies yase George Mason University. Ungamtsintsa kulenombolo +268 7822 9180 noma Dr. Constance Gewa at +1703-993-2173 uma unemibuto ngalolucwaningo. Ungaphindze utsintse baka George Mason University Institutional Review Board office kunayi inombolo 703-993-4121.

Lolucwaningo seluvunyelwe luhlaka lwetelucwaningo loluhambisana nemigomo yeGeorge Mason University.

IMVUMO

Sengiyifundzile imininingwane yalolucwaningo, ngiyavuma kuba incenye yalolucwaningo.

Signature

Date

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