

2018

# Quality of Nutrition Services for Children and Pregnant Women in Ntungamo District, Uganda

Church Tophill  
*Walden University*

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# Walden University

College of Health Sciences

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Church Tophill

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Dr. Patrick Tschida, Committee Chairperson, Public Health Faculty

Dr. Eric Anderson, Committee Member, Public Health Faculty

Dr. Ronald Hudak, University Reviewer, Public Health Faculty

Chief Academic Officer

Eric Riedel, Ph.D.

Walden University

2018

Abstract

Quality of Nutrition Services for Children and Pregnant Women in Ntungamo

District, Uganda

by

Church Tophill

MPH, Walden University, 2014

BED, Uganda Christian University Mukono, 2002

Doctoral Study Submitted in Partial Fulfillment of  
the Requirements for the Degree of  
Doctor of Public Health

Walden University

May 2018

## Abstract

Inadequate nutrition during infancy and early childhood seriously interferes with brain development, leading to neurological and behavioral disorders. Such effects are detrimental to children under 2 years of age. The purpose of this cross-sectional study was to better understand the quality of nutrition services offered to children and pregnant women in Ntungamo District in southwestern Uganda. The cross-sectional design facilitated comparison of different variables, using a research-question-driven approach, assessing existing secondary data from SPRING Uganda database. Stepwise, backward multiple logistic regression was used to identify the independent variables that influenced the provision of quality nutrition assessment, counseling, and support (NACS) services to clients. Only the independent variables with  $p < 0.05$  were retained in the final model. Odds ratios with 95% confidence intervals were used to estimate the strength of association between the independent variables which are: 1) training of health workers with different nutrition packages, 2) availability of nutrition assessment equipment at varied service delivery points, 3) availability of nutrition supplies for preventing and treating acute malnutrition, 4) availability of nutrition treatment protocols and IEC materials functionality of quality improvement teams, and 5) supervision and motivation of health workers. The dependent variables were indicated by percentage of children and pregnant women who were provided with appropriate NACS in outpatient departments, young child clinics, antenatal clinics, postnatal clinics and antiretroviral therapy (ART) departments in the past 3 months. Statistical analysis was performed with IBM SPSS 25.0. All associations with  $p < 0.05$  were considered statistically significant. All surveyed facilities offer maternal health services, a positive indication that a greater percentage of the facilities in western Uganda realize the importance of nutrition assessment of pregnant mothers and children. Of the sampled health facilities supported by SPRING Uganda, 56.3% had functional nutrition assessment equipment like mid-upper arm circumferences (MUAC) tapes and weighing scales. This study showed that different nutritional services offered to pregnant and lactating mothers and children could either positively or negatively affect the quality of nutrition in Ntungamo District.

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## Dedication

I dedicate this work to God Almighty, my creator, and my source of wisdom, knowledge, and inspiration. I also dedicate this work to my wife Mrs. Margaret Kugonza Tophill and children Tophill, Kijumba Immaculate Bacwa, Tophill, Karungi Naomi Bacwa, Tophill, Nowa Nkurunungi Bacwa, Tophill, Noelle Kenyange Bacwa and Tophill, Samuel Bacwa who encouraged me throughout this study and gave me the inspiration to continue.

This work is also dedicated to all pregnant women in Uganda, and throughout the world who bear the burden of carrying unborn children, enduring childbirth, and caring for the children. This work is finally dedicated to all public health practitioners who strive to make a difference in improving the lives of women and children.

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## Section 1: Foundation of the Study and Literature Review

In this study, I focused on the quality of nutrition services for children and pregnant women in the Ntungamo District in southwestern Uganda. The quality of nutrition services offered to children and pregnant women is extremely critical, and without the provision of the right kind of nutrition-care to children and pregnant women, they are at increased risk of high malnutrition hence, the need for children and pregnant mothers to understand how existing nutrition programs are addressing the quality of services offered to children and pregnant women.

Prado and Dewey (2012) reported that adequate nutrition during pregnancy and the first 2 years of life is necessary for normal brain development, laying the foundation for future cognitive and social ability, school success, and productivity. When a Child is adequately nourished during gestation and infancy, it has access to the essential energy, protein, fatty acids, and micronutrients necessary for brain development. This lays a foundation for lifetime brain function (Prado and Dewey, 2012). As Mealtimes Memo (2001) has noted, the effect of nutrition on the brain begins before birth with the nutrition of the mother. Under-nutrition and the resulting negative effects on brain development during pregnancy and the first 2 years of life may be permanent and irreversible.

In the guidance note for Integrated Early Childhood Development (ECD) activities into nutrition programs in emergencies, UNICEF/WHO (2011) summarized some of the key points as follows:

- Child growth and brain development depend on good nutrition and stimulation and caretaker emotional responsiveness.
- ECD activities improve maternal mood if conducted using groups and home visits.

Obtaining ideal health for every human being is paramount, but when it comes to pregnant women and children's health, the quality of what they access and eat is critical. Avoiding dietary deficiencies and focusing on food quality becomes important to both the state, the practitioners in the nutrition field, the community, and the family.

A study by researchers in the Department of Nutrition at Harvard School of Public Health (2016) showed that the nutritional quality of food is central to achieving and maintaining a healthy life. I designed this study to look deeply into the quality of nutritional services accessed by pregnant women and children in the Ntungamo District of Southwestern Uganda. Specifically, I explored all possible factors and avenues that influence quality nutrition and its accessibility by children and pregnant women in Ntungamo. Consequently, I offer practicable recommendations that would advance not only knowledge on the value of quality nutrition, but also possibilities of sustainable access and use.

The findings of this study will inform nutrition practitioners in the district and policy makers at the national level on the growing need for and essential qualities of nutrition service delivery for pregnant women and children in building a healthy nation.

In this chapter, I discuss the background, problem statement, purpose, research questions and hypotheses, theoretical foundations, nature, assumptions, scope, delimitations, and limitations of the study. I then offer an extensive review of the scholarly literature..

### **Background**

The study of nutrition likely began during the 6th Century B.C. (Gratzer, 2005). The first dietary advice, carved into a Babylonian stone tablet around the year 2500, cautioned those with pain inside to avoid eating onions for three days (Palacio, Canter and Deborah, 2014). Scurvy, found to be a vitamin C deficiency, was first described in 1500 B.C. in the Ebers Papyrus. In China, Ho, the physician, is said to have concluded that diseases were caused by deficiencies of elements, and he classified diseases as well as prescribed diets (Glatzer, 2005). In 400 B.C., Hippocrates, who recognized and was concerned with obesity, which may have been common in Southern Europe at the time, said “Let food be your medicine and medicine be your food” (Richard, 2004, p. 328). Gratzer (2005) quotes the works of Cato the Elder and Aulus Celsus, where salt, pepper, and other spices were prescribed for various ailments in various preparations.

In 2nd Century B.C., Cato the Elder contended that cabbage or the urine of cabbage eaters could cure digestive diseases, ulcers, warts, and intoxication, and Aulus Celsus, an ancient Roman doctor, believed in “strong” and “weak” foods. Subsequently, in 1747 James Lind discovered that lime juice saved sailors who had been at sea for years from scurvy, a deadly and painful bleeding disorder. In the early 1880s, Kanehiro Takaki discovered that Japanese sailors (whose diets consisted almost entirely of white rice)

developed beriberi (endemic neuritis, a disease causing heart problems and paralysis) and that adding various types of vegetables and meats to the diets of Japanese sailors prevented the disease (Carpenter 1994). These historical findings have influenced research in the field of nutrition and have significantly contributed to individuals' quality of life, influencing policy and government programs, and actions world over.

According to the Joint Collection Development Policy (2014), nutrition is the science that interprets the interaction of nutrients and other substances in food in relation to maintenance, growth, reproduction, health, and disease of an organism. It includes food intake, absorption, assimilation, biosynthesis, catabolism, and excretion. A poor diet may cause health problems, causing deficiency diseases such as blindness, anemia, scurvy, pre-term birth, still-birth, cretinism, severe acute malnutrition, and stunting in chronic cases of malnutrition (Rolfes and Rady, 2013).

While there is no doubt regarding the importance of adequate nutrition to the wellbeing of children and pregnant women, and while there are ongoing efforts to improve the quality of nutrition for this group of people, there is a knowledge gap on the quality of nutrition services provided to children and pregnant women in Ntungamo District, Southwestern Uganda. The government and partners have been implementing different nutrition and health programs in an effort to increase the uptake of the high impact nutrition interventions. These are known to reduce under nutrition among pregnant women and children less than 2 years old. Therefore, this study is necessary in order to address this knowledge gap and inform future programs aimed at improving the



nutrition, health, and wellbeing of children and pregnant women in the district and in the country at large.

### **Problem Statement**

The World Bank/Consultative Group of Early Childhood Care and Development (ECCD, 2001) has emphasized that inadequate nutrition before birth and in the 5 years of life can seriously interfere with brain development. The group also stated that poor nutrition may lead to neurological and behavioral disorders as well as learning disabilities and mental retardation. The effects of undernourishment are most detrimental to children under 2 years of age because the effects are irreversible in children very young children. This makes it especially important to properly nourish children within the first 1000 days (IFPRI, 2010). Concerns regarding inadequate diet have been voiced by myriad nutritional scholars the world over. The National Institute for Health and Clinical Excellence (2008) contended that there is a range of adverse health effects associated with maternal undernourishment; it can affect both the pregnant woman and the developing baby in the short and long- term.

Pregnant women who receive inadequate nutrition experience greater maternal morbidity during gestation and have a higher risk of poor pregnancy outcomes (such as premature birth, miscarriage, and low birth weight babies). They also have an increased risk of developing anemia, infection, lethargy, weakness, and lower productivity rates (Academy for Educational Development, 2004). In developing countries, as economic

crises remain or are worsened, communities' and households' abilities to secure to quality nutrition remains hampered.

Nutrition is not only a matter of immediate survival; it is also an investment in future generations. Reducing malnutrition is therefore a humanitarian and developmental issue (Nutrition in Developing Countries, 2011). Approximately 180 million children under the age of 5 are affected by growth stunting, and 55 million suffer from wasting (of which 20 million cases are severe). The regions most affected by maternal and child under nutrition are South Asia and Sub-Saharan Africa (Nutrition in Developing Countries, 2011). Disadvantaged children in developing countries who do not reach their developmental potential are less likely to be productive adults (Lancet, 2007). This is catastrophic, and research of this nature must be carried out to continually seek answers and feasible recommendations to the nutritional challenges in this part of the world. Despite investments by development partners and the government of Uganda in timely treatment of acute malnutrition in children and pregnant women at community and health facility levels, there has been limited evidence-based information on the quality of nutrition services offered to children and pregnant women at community and health facilities in southwestern Uganda. Therefore, malnutrition of pregnant women and children remains a problem in southwestern Uganda.

### **Purpose of the Study**

To better understand the quality of nutrition services offered to children and pregnant women in the Ntungamo District, I used quantitative data from the health

facilities in which the relevant nutrition programs have been implemented. Based on secondary data collected in the targeted health facilities, findings from this study will inform the Ministry of Health, the government of Uganda, and development partners about the quality of nutrition care services provided to children and pregnant women in Uganda.

In this study, I show the relationship between the quality of nutrition services being offered to children and pregnant women and those who are not being offered nutrition services in the Ntungamo District, indicated by percentage of children and pregnant women who were provided with appropriate nutrition assessment, counseling, and support (NACS) services. The dependent variables I used to identify the quality of nutrition services include (a) training of health workers; (b) availability of nutrition equipment, supplies, monitoring and IEC materials; and (c) presence of quality improvement teams and community health workers. I selected these variables because they directly impact the independent variables, which included the number and type of NACS services provided to children and pregnant women, documentation, and reporting of NACS. I used the level of health facilities (Health Center II, III, IV, and Hospital) as covariates to test for differences in the quality of nutrition services provided.

This study is timely given that both the government and development partners are in the process of scaling-up NACS services across all regions of Uganda. Assessing the quality of nutrition care services provided at the various contact points in health facilities could help inform the scaling-up process of the NACS framework across the country.

This study can provide policy and programmatic evidence as to whether the investment by USAID and the Ugandan government, in integrating NACS into routine health service delivery, has contributed to the quality of nutrition care and influenced uptake of the services by children and pregnant women. Hence, programmatically, my research could help identify the means that health officials used to improve the quality of nutrition care for children and pregnant women. Program planners could use the findings to ensure that they refine their approach to integrating nutrition services into routine health delivery for children and pregnant women.

This study was thus be used for other researchers investigating the integration of high impact nutrition services into routine health service delivery for children, pregnant, and lactating women with the NACS framework. Specifically, my findings could be used to address quality improvement gaps in nutrition programming, thus improving the health service delivery process and ensuring quality care given to pregnant women, lactating women, and children. As a potential social implication of the project, the study findings can be used to raise awareness among health care service providers across the country on the role of quality NACS service delivery in prevention and management of maternal and child under-nutrition. This can best be done by use of a positive deviance approach, a model that can promote uptake of quality nutrition services, hence promoting social behavioral change. The purpose of this study, therefore, was to better understand the quality of nutrition services offered to children and pregnant women in the Ntungamo District.

## Research Questions and Hypotheses

Research Question 1: What is the relationship between the percentage of children who receive appropriate nutrition assessment using MUAC tapes and weighing scales and those who do not?

$H_01$ : There is no relationship between the percentage of children who receive appropriate nutrition assessment using MUAC tapes and weighing scales and those who do not.

$H_{a1}$ : There is a relationship between the percentage of children who receive appropriate nutrition assessment using MUAC tapes and weighing scales and those who do not.

Research Question 2: What is the relationship between the percentage of pregnant and lactating mothers who receive nutrition assessment using MUAC tapes and weighing scales and those who do not?

$H_02$ : There is no relationship between the percentage of pregnant and lactating mothers who receive nutrition assessment using MUAC tapes and weighing scales and those who do not.

$H_{a2}$ : There is a relationship between the percentage of pregnant and lactating mothers who receive nutrition assessment using MUAC tapes and weighing scales and those who do not.

Research Question 3: What is the relationship between the percentage of children who are reported with physical signs of malnutrition and deficiency of vitamins and micronutrients and those who have good nutrition signs?

$H_03$ : There is no relationship between the percentage of children who are reported with physical signs of malnutrition and deficiency of vitamins and micronutrients and those who have good nutrition signs.

$H_a3$ : There is a relationship between the percentage of children who are reported with physical signs of malnutrition and deficiency of vitamins and micronutrients and those who have good nutrition signs.

Research Question 4: What is the relationship between the percentage of pregnant and lactating mothers who are reported with physical signs of malnutrition and deficiency of vitamins and micronutrients and those who are not?

$H_04$ : There is no relationship between the percentage of pregnant and lactating mothers who are reported with physical signs of malnutrition and deficiency of vitamins and micronutrients and those who are not.

$H_a4$ : There is a relationship between the percentage of pregnant and lactating mothers who are reported with physical signs of malnutrition and deficiency of vitamins and micronutrients and those who are not.

### **Variables**

The research had two types of variables to measure and test: dependent and independent variables. The dependent variables, which I used to establish the quality of

nutrition services offered, these variables directly impact the independent variables, which included the number and type of NACS services provided to children and pregnant women, documentation, and reporting of NACS. I used the levels of health facilities (Health Center II, III, IV and Hospital) as covariates to test for differences in quality of nutrition services provided. In the study, I tested for significance association between the independent and dependent variables using linear regression and correlation, significance tests like chi square, and multiple regression methods.

### **Nature of the Study**

I used a retrospective cross sectional study design to analyze the quality of nutrition-specific services provided to children and pregnant women in the Ntungamo District. According Mann (2003), cross sectional studies are relatively quick and easy to use when determining prevalence, but do not permit distinction between cause and effect of a particular issue. Hence, I used a retrospective cross sectional study design with specific attention to secondary data because pre-existing databases provide an excellent and convenient source of data (Mann, 2003). Specifically, I used NACS data from hospitals, health center IVs, health center IIIs, and health center IIs is where the SPRING/Uganda project was implemented between 2012 and 2015. This data was used to analyze the quality of nutrition services provided by clients attending the outpatient department, young child clinic, antenatal care, postnatal care, and ART/TB health service delivery points in the different health facilities in the Ntungamo District.

## Operational Definitions

*Quality of nutrition service:* The satisfaction derived from the use of a service in comparison to the established standards by the Ministry of Health. American Institute of Medicine (IOM, 2004) defines quality in health care as a direct correlation between the level of improved health services and the desired health outcomes of individuals and populations. I measured the quality of nutrition by percentage of children and pregnant women who were provided with appropriate nutrition assessment, counseling, and support (NACS) services, which gave me the proportion of children and pregnant women who are documented to have received appropriate nutrition assessment.

*Nutrition assessment, counseling, and support (NACS):* An organizing framework that is client-centered and emphasizes nutrition assessment, counseling, and support. NACS brings together existing nutrition services, protocols, and actors along the continuum of care, with referrals and effective coordination critical for quality and impact (CORE Group, 2012).

*Nutrition assessment:* An indicator of good nutrition care; Good nutrition care starts with good assessment (measurement and classification) of nutritional status. Nutrition assessment is a critical first step in improving and maintaining nutritional status. NACS aims to establish routine nutrition assessment as an integral component of facility- and community-based screening, care, and support (Nekatebeb et al., 2013). This variable was measured using standard measurement tools like MUAC tapes and weighing



scales. I used these measures to identify complications that affect nutrition status as well as track growth and weight trends.

*Nutrition counseling:* An interactive process between a client and a trained counselor that uses information from nutrition assessments to prioritize actions to improve nutritional status. Counseling helps identify client preferences, barriers to behavior change, and possible solutions to overcome those barriers. With this information, the client and care provider jointly plan a feasible course of action to support healthy practices. The care provider may use job aids to select appropriate messages and guide counseling sessions. Group education on key nutrition topics can be provided in health facility waiting rooms or for community groups using various print and audiovisual media (FANTA, 2012).

*Nutrition support:* The provision of enteral or parenteral nutrients to treat or prevent malnutrition. This includes: (a) therapeutic and supplementary foods to treat clinical malnutrition, (b) complementary food supplements for children 6–23 months old to prevent malnutrition, (c) micronutrient supplements to prevent vitamin and mineral deficiencies, and (d) point-of-use water purification products to prevent water-borne disease. Some aspects of nutrition support, such as prescription of therapeutic and supplementary foods, can be provided only by trained facility-based health care providers, but all aspects can be promoted and supported at the community level (FANTA, 2012).

*Training:* Initiatives for health workers that come from local and regional efforts. Such initiatives target state and local health agencies, service provider professionals and organizations, community-based organizations, other voluntary associations and health advocacy groups, academic and education centers, and other categories of interested parties. Trainings facilitate broader and more strategically controlled access to health services and a better quality of care assurance (Nekatebeb et al., 2013).

*Quality improvement (QI):* The systematic and continuous actions that lead to measurable improvement in health care services and the health status of targeted patient groups (U. S. Department of Health and Human Services, 2011).

### **Assumptions**

I assumed that the secondary data is accurate and consistent with the situation of children and pregnant women in the Ntungamo District. This was necessary because the study could easily misinform the public if the secondary data is inaccurate and inconsistent with the nutrition situation of children and pregnant women in the district. The agencies, which are implementing nutrition projects in Ntungamo District from which the secondary data was obtained, do not alter the data to suit their own programmatic needs. There could be data manipulation by agencies implementing nutrition programs in order to enhance their own performance and attract more donor funding. This could affect the quality of the secondary data, leading to biases.

I assumed that the responses from health workers and clients in the health facilities from which I collected the NACS data are a true representation of their honest and true

opinions as asked by the interviewers. Further, I assumed that there were no biases in the opinions of the health workers and clients in the selected facilities because of their anticipation of the benefits from the nutrition projects. Many respondents tend to lie about their responses in order to create an impression of the high need for services. These biases reduce the accuracy of the data collected.

### **Delimitations**

In this study, I set out to understand the quality of nutrition services offered to pregnant women and children under 2 in the Ntungamo District. The best way to get the necessary information was through existent secondary data collected by nutrition implementing partners in the district in the past 5 years. Use of previously collected data can result in sampling bias, since the secondary data being analyzed was collected for other purposes. Thus, the data may not ideally be suited to the testing of the current research hypothesis in addition to being incomplete. However, the retrospective study is advantageous because observer bias during data collection is greatly diminished. It is also less time consuming, comparatively inexpensive to the researcher, and efficient to use. In addition to obtaining authorization from different organizations to use the available data for study purposes, I am currently based far away from the study area, which has led to considerable expense in coordinating all the research preparations required.

### **Limitations**

The study may have been limited by recall error because survey respondents sometimes answer what they think is the desired answer. Further, I used secondary data from a

survey, which cannot explain the causes of under nutrition among the children and pregnant women studied. Finally, the study was reliant only on quantitative data without any qualitative data to triangulate the finding obtained from the quantitative data.

### **Significance**

This study can provide policy and programmatic evidence as to whether the investment by USAID and the government of Uganda, in integrating NACS into routine health service delivery, has contributed to the quality of nutrition care and influenced uptake of the services by children and pregnant women. Findings obtained from my assessment of the quality of nutrition services offered using the NACS framework in different contact points where children and pregnant women received health services, will act as a reality check to assess whether it was indeed useful in improving the quality of nutrition services offered to children and pregnant women. Hence, programmatically, the research could help identify the tools and techniques that were used to improve the quality of nutrition care for children and pregnant women.

Program planners could use the findings to ensure that they refine the approach used to integrate nutrition services into routine health delivery for children and pregnant women. The proposed research could thus be of significant importance to other researchers investigating the integration of high impact nutrition services into routine health service delivery for children, pregnant women, and lactating women with the NACS framework. This can be used to address quality improvement gaps in nutrition programming, thus improving the health service delivery process and ensuring quality

care given to pregnant and lactating women and children. As a potential implications of within the project, the study findings can be used to create and raise awareness among health care service providers across the country on the role of quality NACS service delivery in prevention and management of maternal and child under-nutrition. This can best be done by use of the positive deviance approach, a model that can promote uptake of quality nutrition services, hence promoting social behavioral change.

### **Summary**

I designed this study to look deeply into the quality of nutritional services accessed by and provided to pregnant women and children in the Ntungamo District of southwestern Uganda. I explored various factors and avenues that influence the quality and accessibility of nutritional services for pregnant women and children in Ntungamo District. Study findings may be used to inform nutritional practitioners' in the district and policy makers at a national level on the quality of nutritional service delivery for both pregnant women and children in the Ntungamo District, and in Uganda at large.

### **Literature Review**

In this study, I focused on the quality of nutrition services for children and pregnant women in the Ntungamo District of southwestern Uganda. The quality of nutrition services offered to children and pregnant women is critical, especially in the contemporary world, where lack of appropriate nutrition care affects health and quality of life. Without provision of the right kind of nutrition care to children and pregnant women, benefits are less likely to be realized. The study established a relationship between the

quality of nutrition services being offered to children and pregnant women and those who are not being offered nutritional services in the Ntungamo District as indicated by percentage of children and pregnant women who were provided with appropriate nutrition assessment, counseling, and support (NACS) services.

This section includes a review of studies, models, case studies, and other scholarly works that guided my research on quality nutrition, especially among children and pregnant women. This literature review, therefore, relates the research question and hypothesis, and I have used findings from this review to help validate the methods I used to answer and test the research questions and hypothesis respectively.

### **Literature Search Strategy**

The literature search strategy involved breaking down the research question into specific subject areas in order to identify keywords or phrases associated with the research subject. I gathered journal articles and other scholarly publications on nutrition services among children and pregnant mothers using Google Scholar, the Cochrane Online Library, and other scholarly databases. Key search terms included: *nutrition services offered to children and pregnant women in the Ntungamo District, NACS, children, pregnant and lactating mothers, malnutrition and deficiency of vitamins and micronutrients, nutrition assessment, and health facilities.*

### **Theoretical Foundation for the Study**

I used cognitive behavioral theory as the theoretical foundation for this study. Although it is not possible to give a comprehensive review of the evidence base

underpinning CBT, I have provided a brief overview highlighting some important studies.

It is nearly impossible to mention CBT without automatically invoking names of Albert Skinner, Aaron Beck, and Albert Ellis, among others. It should be noted that while Skinner and Beck are generally framed as the grandfathers of CBT, Thorndike is actually viewed as the originator of this theory because it was his classical works on learning theory that led to the development of operant conditioning within behaviorism (Thorndike, 1898; McCleod, 2007). Operant conditioning involves learning from the consequences of our behavior. Thorndike devised a classic experiment (using animals, usually cats) in which he used a puzzle box to empirically test the laws of learning.

According to McLeod (2007), Skinner's theory is built on the ideas of Edward Thorndike. In the experiment, Thorndike placed a cat in the puzzle box and encouraged the cat to escape and to reach a scrap of fish placed outside. This experiment was timed and repeated several times. In successive trials, the cat would learn that pressing the lever would have favorable consequences and the cat would adopt this behavior, becoming increasingly quick at pressing the lever. Thorndike consequently put forward a *law of effect*, which stated that any behavior that is followed by pleasant consequences is likely to be repeated and any behavior followed by unpleasant consequences is likely to be stopped (McLeod, 2007).

It is also noteworthy that thought plays the largest role in discussions of behavior mechanisms. Pavlovian conditioning, also called respondent conditioning, plays a role in

the behavioral analytical process. According to Foa, Rothbaum, and Furr (2003), Pavlov's experiments with dogs provide the most familiar example of the classical conditioning procedure. In these experiments, a dog was presented with a stimulus such as light or a sound, and then the food was placed in the dog's mouth. After a few repetitions of these sequences, the light or sound itself caused the dog to salivate. Behavior change theories and models, validated within the field of dietetics, offer systematic explanations for nutrition related behavior change. They are integral to the nutrition care process, guiding nutrition assessment, intervention and outcome evaluation (American Dietetic Association, 2010).

In his work in the 1930s, Skinner suggested that private events, including thoughts and feelings, should be subjected to the same controlling variables as observable behavior (Karola & Mickey, 2009; Mecca, 1994). This became the basis for his philosophy called radical behavior. Skinner later proposed radical behaviorism as the conceptual underpinning of the experimental analysis of behavior. Skinner carried out substantial experimental work on the effects of different schedules and rates of reinforcement on the rates of operant responses made by rats and pigeons. He achieved remarkable success in training animals to perform unexpected responses in order to emit a large numbers of responses and to demonstrate many empirical regularities at a purely behavioral level (MacCoquodale, 1970; Stemmer, 1990).

On the other hand, Beck (1970) proposed that humans all have deep cognitive structures called *schemas* that enable them to process incoming information and interpret



experiences in meaningful ways. Symptoms of psychopathology such as aberrant emotions, cognitions, and behaviors result when pathological schemas are activated by stressful events. It is from these deductions that Beck (1970) developed a therapy that treats psychopathology by intervening in and changing the relationships between automatic thoughts, behaviors, and schemas that cause unpleasant emotions.

The cognitive behavioral model is based on a combination of basic principles from behavioral and cognitive psychology (Beck, 2011). According to Schactor (2010), it is different from historical approaches to psychotherapy, such as the psychoanalytical approach, where the therapist looks for unconscious meaning behind behaviors and then formulates a diagnosis. In this study, I used CBT in seeking action-oriented methodology that coaches an individual to identify, discover dysfunctional patterns of thinking, and act. How we act (behavior), how we think (cognition), and how we feel (emotion) all interact. Both cognitive and behavior change strategies are used to effect change (American Dietetic Association, 2010).

Skinner (1938) and Ellis (2001; as quoted by the American Dietetic Association, 2010), observed that behavioral theory and cognitive behavioral therapy are based on the assumption that behavior is learned and that environmental and internal factors are related to one's behavior. These theories endorse strategies such as self-motivation and problem solving, which make people more aware of internal and external cues in relation to their response. Clients (mothers or pregnant women in this case) may be taught a variety of strategies to promote behavior change, including self-monitoring, problem

solving, goal setting, contingency management, cognitive restructuring, social support, stimulus control, stress management, and relapse prevention.

According to the National Heart, Lung, and Blood Institute (2007) and the American Diabetes Association (2008), behavioral theory and CBT are the oldest and most tested behavioral change theories used in nutrition counseling. These two theories provide the theoretical basis of the most structured diet, exercise, and behavioral therapy programs, commonly referred to as CBT, behavioral therapy, behavioral modification, or lifestyle modification.

Skinner (1938) and Ellis (2001) contend that CBT assumes that behavior is learned and can be unlearned by using a variety of cognitive and behavioral strategies that are taught to clients for use throughout their life. CBT focuses on both the external factors (environmental stimulus and reinforcement) and the internal factors (thoughts and thinking) (American Dietetic Association, 2010). CBT in context can be utilized in promoting the reduction of intake of certain foods, drinks among pregnant women and children, and encouragement of eating certain foods and drinks that are beneficial to them.

### **Conceptual Framework**

This research is grounded on the fact that when there are the right combinations of programmatic inputs, such as policies, guidelines, resources (human, economic, infrastructural, and technical), and commodities (such as ready to use therapeutic food-RUTF, iron/folic acid supplements, vitamin A supplements). This is a social change

implication, Clearly defined and controlled nutrition programmatic activities such as nutrition support to eligible clients, nutrition assessment and counseling, capacity building and quality improvement support, monitoring and surveillance, and development of program guidelines, are needed by development partners and the Ugandan government. The capacity of service providers and facilities will be enhanced, leading to increased number of clients assessed, counseled, provided with timely and quality nutrition support, or referred to appropriate nutrition and other complementary services (GoU, 2011).

Eventually the study will result in increased nutrition knowledge and improved dietary practices. The study will positively reduce the number of malnourished children and pregnant women. When a health facility has service providers whose capacity has been built on NACS, and when those providers understand the principles of quality improvement for nutrition service delivery across different contact points of the health facility, children and pregnant women will receive quality nutrition care as stipulated in Uganda's Ministry of Health guidelines.

### **Literature Review Related to Key Variables and/or Concepts**

According to Schaefer (2001), nutrition is the process of taking in food and using it for growth, metabolism, and repair. Nutritional stages are ingestion, digestion, absorption, transport, assimilation, and excretion. According to Barasi (2003), nutrition is the science of food in relation to health. It has evolved from interest in clinical diseases caused by single nutrient deficiencies such as scurvy, which is a lack of vitamin C, to an

emphasis on more complex conditions such as heart disease, diabetes, and osteoporosis. The current focus on nutrition is based on a new definition of health as "prevention of disease," in which nutrition plays a key role.

For WHO/UNICEF/USAID (2008), nutrition is how food affects the health of the body. Food is essential—it provides vital nutrients for survival. It helps the body function and stay healthy. Food is comprised of macronutrients including protein, carbohydrates, and fat that not only offers calories to fuel the body and give it energy but play specific roles in maintaining health. Food also supplies micronutrients such as vitamins and minerals and phytochemicals that does not provide calories but serve a variety of critical functions to ensure the body operates optimally.

Historical viewpoints on the concept of nutrition. According to Carpenter (2006), the development of nutrition started way back before 1700, where several scholars are said to have been involved in publishing thoughts about foods and its benefits in the body. It is, however, believed that the real nutrition business started with the Chemical Revolution in France at the end of the 18th century (University of California, 2006). WHO/UNICEF/USAID (2008) defines nutrition as the process in which food affects the health of the body. It notes that food is essential because it provides vital nutrients for survival and helps in normal body function. Food is comprised of macronutrients including protein, carbohydrates, and fat that not only offers calories to fuel the body and give it energy but play specific roles in maintaining health. Food also supplies

micronutrients (vitamins and minerals) and photochemical that do not provide calories but serve a variety of critical functions to ensure the body operates optimally.

While early developers and contributors like Claude Berthollet (1785), Antoine Lavoisier, Francois Magandie, Jean Baptiste Boussingault, and others are fronted by a myriad of scholars in context with this study, it is the works of Kazimierz Funk of Poland who coined the term vitamin. The works of Dr. Stephen Babcock, Hart, Humphrey, McCollun, and Steenbock's is selected because of its direct relevancy to this study. Dr. Stephen Babcock is also known for the single-grain experiment that eventually led to the development of nutrition science. In his test, he had an idea of feeding dairy cattle with one food source, either all corn plant or all wheat plant. Consequently Hart, Humphrey, McCollum, and Steenbock conducted similar experiments where four, five-month old heifers were each fed either exclusively feed on the corn plant, wheat plant, oat plant, or all three mixed together. The test shows that they all put on weight at approximately the same rate during the first 12 months. However, the corn fed cows went on to have normal calves, while the wheat fed cows gave birth to either dead calves or those that died shortly after birth. It was also observed that the corn fed cows produced three times as much as wheat ones.

Needham (1931) peered through this and concluded that Hart, Humphrey, McCollum, and Steenbock found disturbances leading to weak or dead fetuses when the ratio was deficient in the antirachitic vitamin. They concluded that either wheat contained something that was bad for cows or the corn had an essential nutrient that wheat did not

have. Subsequent discoveries eventually found that something in the fat soluble portion of the corn affected reproduction, which they called factor A- what we now know as Vitamin A.

Kazimierz Funk from Poland, a biochemist working with Lister Institute in London, wrote land mark discoveries where he announced four types of Vitamins: Anti beriberi Vitamin, Anti Scurvy Vitamin, Anti pellagra vitamin, and anti-Rickets Vitamin. According to Aminoff and Daroff (2014), Funk chose the term “vitamin” because his investigations indicated that the anti-beriberi factor was an amine. Building on his discoveries, further research has identified various types of vitamins and properties- B, B1, B2, B3, B12, and others. The discovery of Vitamin B12 and others have enhanced disease preventing, disease treatment by understanding what animals, humans, and birds require in their foods.

**Access to nutrition services.** Access to healthy and affordable food is central to the success of the Supplemental Nutrition Assistance Program (SNAP) program. There has been much recent attention paid to describing the nature and extent of “food deserts” and disparities in access to healthy food. The concept of a “food dessert” describes an environment that provides insufficient access to healthy and affordable food. Little is known about whether improved access to healthy, affordable food results in increased consumption of these foods and improved health outcomes. To narrow this information gap, IMPAQ conducted a literature review focused on studies addressing the relationship between access to nutritious food and improved nutritional intake or improved dietary

and health outcomes. An overwhelming majority of the studies reviewed provided evidence of associations between access to food and purchasing habits, dietary intake and quality, and diet-related health outcomes.

According to WHO/UNICEF (2003), nutrition is the food you eat and how the body uses it. We eat food to live, to grow, to keep healthy and well, and to get energy for work and play. Food is made up of different nutrients needed for growth and health, all nutrients needed by the body are available through food, many kinds and combinations of food can lead to a well-balanced diet, no food, by itself, has all the nutrients needed for full growth and health and each nutrient has specific uses in the body. Most nutrients do their best work in the body when teamed with other nutrients.

According to Shils et al. (2006), all persons throughout life have a need for the same nutrients but in varying amounts. The amount of nutrients needed is influenced by age, sex, size, activity, and state of health. Trained scientists make suggestions for the kinds and amounts of food needed. For Schaefer (2001), the way food is handled influences a number of nutrients in food, its safety, appearance, and taste. Handling means everything that happens to food while it is being grown, processed, stored, and prepared for eating. For women of childbearing age, good nutrition is important for preparing the body for the demands of pregnancy.

During pregnancy, a woman's macronutrient (energy) and micronutrient (e.g. vitamins, mineral) requirements increase, and it is even more important that she consumes food in which will give her both energy and specific micronutrients in

which are essential for maintaining her and her growing baby's health (WHO/UNICEF 2003). For example, women require an additional 240 calories of energy per day in the second trimester and 452 calories per day in the third trimester of pregnancy to account for fetal growth. An additional 975 milligrams of iron is required in the course of the pregnancy to form fetal and additional maternal blood. He further indicated that while nutritional supplements can provide large quantities of particular micronutrients, a healthy balanced diet should form the basis of a woman's nutritional intake. For WHO/UNICEF/USAID (2008) revealed that good nutrition is most important immediately prior to conception and during the first 12 weeks of pregnancy (including the very early stages, when the woman is unaware she is pregnant). It is therefore important for women to maintain a healthy diet throughout their childbearing years and particularly if they are planning to become pregnant.

Nutrition service delivery to children and mothers. Nutrition for children is based on the same principles as nutrition for adults. Everyone needs the same types of nutrients such as vitamins, minerals, carbohydrates, protein, and fat. Children, however, need different amounts of specific nutrients at different ages. Nutrition for kids is based on the same principles as nutrition for adults. Everyone needs the same types of nutrients such as vitamins, minerals, carbohydrates, protein, and fat. Children, however, need different amounts of specific nutrients at different ages.

Kramer and Kakuma (2001) considered these nutrient-dense foods, such as protein—seafood, lean meat and poultry, eggs, beans, peas, soy products, and unsalted nuts and



seeds. Fruits -a variety of fresh, canned, frozen or dried fruits rather than fruit juice.

When consumed in excess, dried fruits can contribute extra calories.

Cravings and food aversions. Revealed during pregnancy, many women experience aversions to particular foods or cravings for at least one type of food. It is unclear why women develop food cravings or aversions during pregnancy. However, researchers believe hormones play a role. According to Wang et al. (2013), common cravings during pregnancy include chocolate, spicy foods, fruits, and comfort foods, such as mashed potatoes and pizza. It is ok to give in to these cravings sometimes, especially if you crave foods that are a part of a healthy diet. However, if one finds herself wanting more junk food and processed foods during pregnancy, it is best to limit intake of these foods. Pica is a disorder that causes cravings for items that contain no nutritional value. Pregnant women with Pica may have a desire to eat clay, cigarette ashes, or starch, among other strange substances.

When a woman has pica during pregnancy, it may indicate a lack of a specific vitamin or mineral. According to Barasi (2003), it is indicated that eating such items can be dangerous for both a woman and baby. While some pregnant women may crave certain foods, others may have an aversion to particular foods. This may only be problematic if women have an aversion to foods that are not important for the baby's growth and development. According to WHO Report (2009), the following foods should be included in a pregnant woman's daily consumption:

- 2-3 servings of meat, fish, nuts or legumes, and tofu

- 2-3 servings of dairy (milk, eggs, yogurt, cheese)
- 2 servings of green vegetables; 1 serving of a yellow vegetable
- 3 servings of fruit
- 3 servings of whole-grain bread, cereals, or other high-complex carbohydrates
- Salt to taste
- 6-8 glasses of clean, filtered water

The diet above should provide all of the nutrients necessary to assist in the growth of a healthy baby in the womb and maintenance of a healthy mother-to-be. Zinc, calcium, iron, magnesium; and vitamins A, B, and C must be woven into the fabric of a pregnant woman's daily diet. The list above covers all of these requirements.

Exercise during pregnancy. Eating right is of utmost importance to a pregnant woman or a woman planning to get pregnant, but exercising regularly also aids in the development of a healthy fetus throughout each trimester (WHO, 2008). It will also be that much easier to raise a healthy child and ingrain nutritious habits and regular exercise into the child's life.

Importance of nutrition to pregnant mothers. According to Jahanfar (2015), a woman's body has increased nutritional needs during pregnancy. Although the old adage of "eating for two" is not entirely correct, a woman requires more micronutrients and macronutrients to support them and their baby. Micronutrients are dietary components such as vitamins and minerals, which are only required by the body in small amounts.

According to Briggs (2011), macronutrients on the other hand, are nutrients that provide calories or energy. Examples of macronutrients include carbohydrates, proteins, and fats. One needs to consume more of each type of nutrient during pregnancy. Most pregnant women can meet these increased nutritional needs by choosing a diet that includes a variety of healthy foods (Weiss, 2007). A simple way to ensure one is getting all the necessary nutrients is to eat different foods from each of the food groups every day. In fact, all meals should include at least three different food groups. Briggs (2011) asserts that each food group has something to offer your body. Grains are a good source of energy. Fruits and vegetables are packed with antioxidants, fiber, water-soluble, and fat-soluble vitamins.

According to WHO (2015), the food groups that include meats, nuts, and legumes provide the body with protein, folate, and iron. Dairy products are the best source of calcium and vitamin D. The body is unable to function properly if it is missing the nutrients from any of these food groups. Remember that your goal is to eat a wide variety of foods during pregnancy. Whenever possible, it is important to choose natural, low-fat foods over processed junk foods (Jahanfar, 2015). He further indicated that chips and soda, for example, contain no nutritional value. For indicated that for a person can benefit more from fresh fruits, vegetables, and lean proteins such as chicken, fish, beans, or lentils. This does not necessarily mean that one needs to avoid all of his or her favorite foods during pregnancy. However, one must balance them with nutritious foods so that they do not miss any important vitamins or minerals. Including the following nutrients in

the daily diet will help ensure that a woman satisfies her body nutritional needs during pregnancy: for listed the following foods and drinks as essential for pregnant mothers.

Protein is critical for ensuring the proper growth of fetal tissue, including the brain. It also helps with breast and uterine tissue growth during pregnancy. It even plays a role in your increasing blood supply, allowing more blood to be sent to your baby.

Calcium: Calcium helps build a baby's bones and regulates a woman's use of fluids. Iron: Iron works with sodium, potassium, and water to increase blood flow. This helps ensure that enough oxygen is supplied to both you and your baby. Folate: Folate, commonly known as folic acid, plays an important part in reducing the risk of neural tube defects. These major birth defects affect the baby's brain and spinal cord. Examples of neural tube defects include spina bifida and anencephaly

Kramer and Kakuma (2001), in their study, defined nutrition and pregnancy to refer to the nutrient intake and dietary planning that is undertaken before, during, and after pregnancy. Nutrition of the fetus begins at conception. For this reason, the nutrition of the mother is important from before conception (probably several months before) as well as throughout pregnancy and breast-feeding. An ever-increasing number of studies have shown that the nutrition of the mother will have an effect on the child, up to, and including the risk of cancer, cardiovascular disease, hypertension, and diabetes throughout life.

An inadequate or excessive amount of some nutrients may cause malformations or medical problems in the fetus, neurological disorders, and handicaps as a risk that is

run by malnourished mothers. Indeed, he further found out that 23.8% of babies worldwide are estimated to be born with lower than optimal weights at birth due to lack of proper nutrition (WHO, 2010). Personal habits such as smoking, alcohol, caffeine, using certain medications, and street drugs can negatively and irreversibly affect the development of the baby, which happens in the early stages of pregnancy.

Caffeine is sometimes assumed to cause harm to the unborn baby but there is not enough evidence to so say if this is true (Jahanfar, 2015). A recent review showed that more research is needed to show whether caffeine intake effects birth weight, preterm births, gestational diabetes, and other outcomes (Weiss, 2007). Approximately 300 extra calories are needed daily to maintain a healthy pregnancy. These calories should come from a balanced diet of protein, fruits, vegetables, and whole grains, with sweets and fats kept to a minimum intake. A healthy, well-balanced diet during pregnancy can also help to minimize some pregnancy symptoms such as nausea and constipation.

The Academy of Nutrition and Dietetics recommends the following key components of a healthy lifestyle during pregnancy: appropriate weight gain, eating a balanced diet, exercising regularly, and appropriate and timely vitamin and mineral supplementation. Fluid intake is also an important part of healthy pregnancy nutrition (Jahanfar, 2015). Women can take in enough fluids by drinking several glasses of water each day and in addition to the fluids, juices and soups. An expectant mother should talk with her healthcare provider or midwife about restricting her intake of caffeine and artificial sweeteners. All alcohol should be avoided in pregnancy.

The U.S. Public Health Service recommends that all women of childbearing age consume 400 micrograms (0.4 mg) of folic acid each day. Folic acid, a nutrient found in some green leafy vegetables, most berries, nuts, beans, citrus fruits, fortified breakfast cereals, and some vitamin supplements can help reduce the risk of birth defects of the brain and spinal cord called neural tube defects. This can lead to varying degrees of paralysis, incontinence, and sometimes, intellectual disability.

Folic acid is most beneficial during the first 28 days after conception, when most neural tube defects occur. Unfortunately, many women do not realize they are pregnant before 28 days. Therefore, folic acid intake should begin prior to conception and continue through pregnancy (WHO, 2013). One's health care provider or midwife will recommend the appropriate amount of folic acid to meet your individual needs. Most health care providers or midwives will prescribe a prenatal supplement before conception, or shortly afterward, to ensure all of the woman's nutritional needs are met. However, a prenatal supplement does not replace a healthy diet.

The single most important thing that one can do for a baby is to eat a healthy, well-balanced diet. A well-balanced diet is one that includes foods from all food groups in appropriate amounts, to ensure proper nutrition. Proper nutrition ensures that all essential nutrients (carbohydrates, fats, protein, vitamins, minerals, and water) are supplied to the body to maintain optimal health and well-being. Good nutrition is essential for normal organ development and functioning; normal reproduction, growth and maintenance; for optimum activity level and working efficiency; for resistance to

infection and disease; and for the ability to repair bodily damage or injury. While pregnancy is a normal alternative condition for the female body, it is stressful, and all nutritional needs are increased in order to meet the needs of the pregnancy.

Dr. Tom Brewer found through more than 30 years of research stating that each day, pregnant women need a well-balanced, high-quality diet that includes 80 to 100 grams of protein, adequate salt (to taste), and water (to thirst), as well as calories from all of the food groups. The World Health Organization recommends that a pregnant woman eats a minimum of 75 grams of protein per day, but protein is just a marker for a nutritious diet. It must be obtained from a wide variety of whole food sources in order to get all of the important nutrients a woman needs during pregnancy. While the government's food pyramid is a good example of a well-balanced diet, pregnant women need more protein and calories in general.

While this may seem like a lot of food, it will supply the 2000 to 3000 calories needed per day to make a healthy baby. A study conducted at Harvard University found that by eating at least 75 grams of protein per day, pregnant women could prevent diseases of pregnancy such as preeclampsia (metabolic toxemia of late pregnancy). During pregnancy, a woman's blood volume increases as much as 40 to 60 percent and in order to reach this necessary level and maintain it, a woman's body needs adequate protein, salt, calcium, potassium, and water from her diet (Baras, 2003).

Other recent research indicates that pregnant women need adequate folic acid, such as a B vitamin, to prevent neural tube birth defects such as spina bifida. The Food

and Drug Administration (FDA) now recommends that bread and pastas be fortified with folic acid to ensure that all women of childbearing age get enough of it. Four hundred micrograms of folic acid a day is recommended. This can be obtained by eating whole grain bread, citrus fruits, and dark green leafy vegetables. As long as junk food and excessive sweets (sugar) are avoided, or kept to a minimum, weight gain should not be an issue. The diet listed above (or something similar) should provide all of the necessary nutrients, and a woman should have little problem obtaining everything she needs.

According to a WHO report on nutrition in sub Saharan Africa in 2014, whole food is one that is unprocessed and is as close to its natural state as possible. While vitamin supplements are very popular these days, there are risks to taking supplements of certain vitamins while pregnant (i.e., vitamin A), and others that are simply poorly assimilated (i.e., calcium or iron). The B vitamins, for example, must be taken in congress (B complex supplement), as absences, insufficiencies or excesses of one or another can cause problems. It is important to check with one's healthcare provider before taking anything while pregnant. Vitamins and minerals should be obtained from natural, whole sources, whenever possible in order to ensure quality and proper assimilation by the body. A qualified nutritional expert should assess special dietary needs.

Cravings for foods are common in pregnancy and in theory can indicate a need or deficit in a diet (Weiss, 2007). Cravings for healthy foods can be indulged but cravings for non-food substances such as clay or laundry starch, a condition known as Pica, can be



harmful and should be reported to your care provider. Milk, eggs, and other dairy products are inexpensive sources of calcium and protein. For those who are vegetarian, or simply to provide variety in an omnivorous diet, soy products, beans and nuts can be substituted (WHO, 2013).

Dark green vegetables provide carbohydrates, water, bulk fiber, vitamins A, C, and B, calcium, iron, and magnesium; the darker green, the better. It is best to eat these vegetables raw whenever possible, but steaming or baking will also retain most of the nutrients. According to Kramer and Kakuma (2001), citrus and berry fruits provide a great deal of vitamin C. Yellow fruits and vegetables such as cantaloupe, sweet potato, carrots and mango are also good sources of vitamin A. Both of these vitamins are important for fighting infection, boosting the immune system, cell structure development, and preventing placental detachment (abruption). Zinc is another important mineral for pregnant women, as it aids in supporting the immune system. According to the Journal of the American Medical Association, zinc also helps to improve birth weight and certain aspects of fetal development.

**Iron needs and pregnancy.** According to Briggs, (2011) iron supplements are an easy way to remedy iron deficiency anemia during pregnancy, but some women find them hard on the stomach. If a woman experiences difficulties, consider supplementing with carbonyl iron, which is naturally regulated by the body and may be easier to digest. According to UNCEF (2010) while a vegetarian diet is a good, healthy choice when well balanced, vegetarians do have to work harder to obtain all the protein needed to increase

their blood supply. If a woman follows a strict vegan diet, it may be even more difficult to get the necessary protein but it is possible with diligence. See the supplemental reading list for sources of information on this subject. From the research conducted it tried to identify certain good sources of suck nutrients. Protein: chicken, fish, beef, pork, turkey, tofu, nuts, legumes (beans), milk, eggs, cottage cheese, whole grains, wheat gluten, and soy cheese.

Whole grains: brown rice, kasha (buckwheat groats), whole oats, whole wheat bread, whole grain cereals, quinoa, wild rice, wheat gluten, wheat germ, and whole wheat pasta. Fruits: strawberries, kiwi fruit, apples, oranges, bananas, mangos, cantaloupe, pears, grapefruit, plums, nectarines, and peaches. Green vegetables: spinach, broccoli, zucchini, dark green lettuces, kale, Swiss chard, green beans, asparagus, arugula, lamb, and lettuce. Dairy: milk, yogurt, hard cheese, cottage cheese, and egg. Other good whole foods: baked potatoes, sweet potatoes, carrots, squash, green peas, soy products, and corn. Iron: red meats, organ meats, eggs, fish poultry, blackstrap molasses, cherry juice, green leafy vegetables, and dried fruits (raisins, apricots, etc.). Zinc: pumpkin seeds, squash seeds, sunflower seeds, seafood, organ meats, mushrooms, brewer's yeast, soybeans, eggs, wheat germ, meats, and turkey. Folic acid: spinach, asparagus, turnip greens, Brussels sprouts, lima beans, soybeans, organ meats, brewer's yeast, root vegetables, whole grains, wheat germ, bulgur wheat, kidney beans, white beans, salmon, orange juice, avocado, and milk.

According to Briggs (2011), good, healthy, and solid nutrition is especially important while planning to get pregnant for both partners, especially when one is having trouble getting pregnant. A healthy diet and consistent, effective exercise has shown to improve fertility in both women and men. When embarking on pregnancy, a woman with a well-nourished body that is stocked with necessary nutrients is also getting her child-to-be off to a good start.

A healthy lifestyle is necessary for normal organ development; normal reproduction, growth, and maintenance; for optimum activity level and working efficiency, for resistance to infection and disease, and for the ability to repair bodily damage or injury. Kramer and Kakuma (2001) revealed that a truly healthful diet would pull its nutrients from a wide range of food groups, ensuring that all nutritional requirements are met and done so in proper amounts. During the early stages of pregnancy, since the placenta is not yet formed, there is no mechanism to protect the embryo from the deficiencies. This may be inherent in the mother's circulation (Kramer & Kakuma, 2001). Thus, it is critical that an adequate amount of nutrients and energy is consumed.

Multiple micronutrient supplements taken with iron and folic acid can improve birth outcomes for women in low-income countries (Litze, 2008). These supplements reduce numbers of low birth weight babies, small for gestational age babies, and stillbirths in women who may not have many micronutrients in their usual diets. Undernourished women can benefit from having dietary education sessions and balanced

energy and protein supplements. A review showed that dietary education increased the mother's protein intake and helped the baby grow more inside the womb (Kremer, 2009). The balanced protein and energy supplement lowered risk of stillbirth and small babies and increased weight gain for both the mother and baby. Although more research is needed into the longer-term effects on the mothers and infants' health, the short-term effects look promising.

Supplementing one's diet with foods rich in folic acids, such as oranges and dark green leafy vegetables, helps to prevent neural tube birth defects in the fetus (Kramer and Kakuma, 2001). In addition, prenatal vitamins typically contain increased amounts of folic acid, iodine, iron, vitamin A, vitamin D, zinc, and calcium over the amounts found in standard multi-vitamins (USAID, 2008). Zinc supplements have reduced preterm births by around 14% mainly in low-income countries. No other benefits were seen.

The WHO does not routinely recommend zinc supplementation for pregnant women because there is not enough good quality evidence. For women with low calcium diets, taking calcium supplementation can reduce their risk of preeclampsia. It has also been suggested that calcium can reduce numbers of births that happen before the 37th week of pregnancy (preterm birth). However, a more recent review looking into other benefits of calcium supplementation did not find any improvement in numbers of preterm or low birth weight babies. According to UNICEF (2013), it is indicated that there is not enough good quality research to suggest best doses and timing of calcium supplementation. Pregnant women are advised to pay attention to the foods they eat

during pregnancy, such as soft cheese and certain fish, in order to reduce the risk of exposure to substances or bacteria that may be harmful to the developing fetus (Kakuma, 2001). This can include food pathogens and toxic food components, alcohol, and dietary supplements such as vitamin A and potentially harmful pathogens such as listeria, toxoplasmosis, and salmonella.

Dietary vitamin A is obtained in two forms, which contain the preformed vitamin (retinol) that can be found in some animal products such as liver and fish liver oils. This can also be found as a vitamin A precursor in the form of carotene, which can be found in many fruits and vegetables (Kramer and Kakuma, 2001). Intake of large amounts or, conversely, a deficiency, of retinol has been linked to birth defects and abnormalities. It is noted that a 100g serving of liver may contain a large amount of retinol, so it is best that it is not eaten daily during pregnancy. Excessive amounts of alcohol have been proven to cause fetal alcohol syndrome.

The WHO recommends that alcohol should be avoided entirely during pregnancy, given the relatively unknown effects of even small amounts of alcohol during pregnancy. Although seafood contains high levels of Omega-3 fatty acids, which are beneficial for both mother and the baby, there is no consensus on consuming seafood during pregnancy. Pregnant women are advised to eat seafood in moderation.

Folic acid, which is the synthetic form of the vitamin folate, is critical both in pre- and peri-conception. Deficiencies in folic acid may cause neural tube defects; women who had 0.4 mg of folic acid in their systems due to supplementing three months before

childbirth significantly reduced the risk of NTD within the fetus. The development of every human cell is dependent on an adequate supply of folic acid. Folic acid governs the synthesis of the precursors of DNA, which is the nucleic acid that gives each cell life and character. Folic acid deficiency results in defective cellular growth and the effects are most obvious in those tissues, which grow most rapidly.

During pregnancy, one's mass increases by about 12 kg. Most of this added weight (6 to 9 L) is water because the plasma volume increases, 85% of the placenta is water and the fetus itself is 70-90% water (Kramer, 2001). This means that hydration is an important aspect of nutrition throughout pregnancy. The European Food Safety Authority recommends an increase of 300 mL per day compared to the normal intake for non-pregnant women, taking the total adequate water intake (from food and fluids) to 2,300 mL, or approximately 1,850 mL/ day from fluids alone.

**Importance of nutrition to children between 1 day and 3 years.** According to USAID (2008), report nutrition is very important for everyone but it is especially important for children because it is directly linked to all aspects of their growth and development; factors which will have direct ties to their level of health as adults. For example, a child with the right balance of omega fatty acids in their daily diet has a much better chance at creating a more solid foundation for brain activity and cognitive capabilities later on.

A child who practices a low fat and cholesterol diet on a daily basis significantly improves their chances of preventing a heart attack; even if heart disease tends to be

hereditary within their family (Williamson, 2006). People with high levels of health also consistently report that they enjoy elevated feelings of wellness and wellbeing (UNICEF, 2003). As part of this, children are also able to fight off colds with improved efficiency with the support of proper nutrition. This brings up a vital point in communication with children: one should always be on the lookout for different ways to make solid connections for the children.

According to UNICEF (2003), another huge reason why nutrition is so important for children is because they simply do not know enough on their own to naturally choose to eat well. Unfortunately, the foods and snacks that taste the best are usually the worst for our bodies and a child left to their own devices will usually choose junk food over fruits and vegetables. Provide them with the right nutrition now and they will learn at an early age what is necessary for good health. This will also help to set them up for a life of proper eating and nutrition, almost certainly helping them to live longer. Countless studies show that what someone learns as a child is then perpetuated throughout their life. Teaching healthy eating habits now will perpetuate a healthy lifestyle for them and put them on autopilot on their way to lasting wellness.

Getting the proper nutrients are essential to help a child's brain grow and develop (Barasi, 2003). The National Center for Infants, Toddlers, and Families state that the nutrition the child gets—either through her mother's diet during pregnancy, breastfeeding or solid food--affects the size and development of her brain. The University of Washington adds that certain foods are needed during the developing years, as they

contain the precursors of neurotransmitters. Without proper nutrition, the child suffers from multiple deficits (Briggs, 2011).

**Time frame of early brain growth.** According to the report for the National Center for Infants in America, the time frame for early brain growth begins at mid-gestation, while the child is still in his or her mother's womb, and goes until age two. The mother's diet during her pregnancy can determine the child's brain size and birth weight. If the mother does not provide enough nutrients to the child while he is in utero, his or her brain will not develop to its full potential. In order for the child to get enough nourishment during the pregnancy, the mother should gain an additional 20 percent from her ideal pre-pregnancy weight (Briggs, 2011).

According to UNCEF (2014), breast milk provides the best nutrients for brain development, according to the National Center for Infants, Toddlers and Families. The National Institutes of Health (NIH) states that breast milk contains antibodies to help a child fight infection and provides digestive proteins, minerals, vitamins, and hormones. At six months, children will start to receive iron supplementation from the breast milk. If a child is being bottle-fed, formula with iron supplements is recommended, as an iron deficiency can cause cognitive deficits.

**Growth, health, and development.** According to Williamson (2006), adequate nutrition during infancy and early childhood is essential to ensure the growth, health, and development of children to their full potential. Poor nutrition increases the risk of illness, and is responsible, directly or indirectly, for one third of the estimated 9.5 million deaths



that occurred in 2006 in children less than five years of age. Inappropriate nutrition can also lead to childhood obesity, which is an increasing public health problem in many countries and a major cause of death in neonates and children under five in the world.

Early nutritional deficits are also linked to long-term impairment in growth and health. Malnutrition during the first two years of life causes stunting, leading to the adult being several centimeters shorter than his or her potential height (Williamson, 2006). There is evidence that adults who were malnourished in early childhood have impaired intellectual performance. They may also have reduced capacity for physical work (WHO, 2014). If women were malnourished as children, their reproductive capacity is affected, their infants may have lower birth weight, and they have more complicated deliveries. When many children in a population are malnourished, it has implications for national development. The overall functional consequences of malnutrition are thus immense.

According to Schaefer (2001), the first two years of life provide a critical window of opportunity for ensuring children's appropriate growth and development through optimal feeding. Based on evidence of the effectiveness of interventions, achievement of universal coverage of optimal breastfeeding could prevent 13% of deaths occurring in children less than five years of age globally, while appropriate complementary feeding practices would result in an additional 6% reduction in under-five mortality. In 2002, the World Health Organization and UNICEF adopted the Global Strategy for infant and young child feeding. The strategy was developed to revitalize world attention to the

impact that feeding practices have on the nutritional status, growth and development, health, and survival of infants and young children.

**Importance of nutrition to breast-feeding mothers.** Breastfeeding is important not only for your baby but for you as well. Breast milk is the perfect milk for your baby as it covers all his nutritional needs for the first 6 months of life as well as provides him with immunity factors. As the mother, they can benefit from this natural phenomenon; it will help you get rid of the fat tissues that were stored during pregnancy by using this fat as a source of energy to produce milk.

A woman body will not only store fat during pregnancy to use in breastfeeding, but will also store other important nutrients such as proteins which are important for milk production and quality. That is why it is so important to get a varied, healthy, and balanced diet during both pregnancy and breastfeeding in order to get all the needed nutrients. Some nutrients' needs during breastfeeding are increased mainly to account for milk production. They are, calories: Increased by 500 kcal/day of normal needs, protein: Increased by 15gm/day of your normal needs and this translates to two additional servings of meat, legumes, dairy products or eggs, and vitamin A: Needs reach to 1200-1300 micrograms/day due to its high secretion in the milk. Its sources are green leafy vegetables and yellowish fruits and vegetables, also found in the kidneys and liver. Vitamin C: Might reach to 90 milligrams/day due to its high secretion in milk. Rich sources are citrus fruits, mango, melon, strawberries and green peppers.

Calcium and phosphorous: Multiple pregnancies and lactation would lead to extra amounts of these nutrients needed by the body in order to maintain healthy bones. 1200 milligrams/day is the daily requirement and the best sources are milk and all dairy products. Therefore, a healthy diet is quite important for breastfeeding women as it helps maintain a healthy milk production and composition as well as keeps her body healthy. Low intake of food or going on crash diets during the breastfeeding period can lead to many health complications such as osteoporosis (later in life) and low storage of vitamin A in the body.

**Nutrition planning.** In nutrition, diet is the sum of food consumed by a person or other organism. Individual dietary choices may be more or less healthy. Complete nutrition requires ingestion and absorption of vitamins, minerals, and food energy in the form of carbohydrates, proteins, and fats. According to Schaefer (2001), meal planning can be defined as taking the time to plan nutritious meals and snacks for a specified time. Once a meal plan is drawn up, corresponding ingredients can be purchased for the specified meals on the plan.

The Mayo Clinic states that meal planning can help someone lose weight and stick to a healthier diet. A meal plan can be made for a week or it can be made for several weeks at a time. Meal planning decreases the chances of a person eating unhealthy items because it is more convenient. It is a good way to save money because planning ensures all the ingredients that have been bought will be used, minimizing the amount of food that goes to waste. It should be no secret there is a big difference between the latest diet

fad and a real nutrition plan or meal planning strategy that is supported by scientific research and proven methods to get results. According to Williamson (2006), an effective nutrition plan focuses on five things:

- **Balance:** Getting the right amount of the right things and limiting the things that can have a negative effect on health.
- **Calorie Control:** This is not just reducing calories it's about making sure that one has the right amount of calories throughout the day to keep body system working effectively.
- **Moderation:** One should not take in an excess amount of those things that can have a negative impact on health but also do not cut them out entirely and forever.
- **Variety:** Ensure that not only are one is eliminating the monotony of a diet that can be difficult to maintain for the long term but by including a variety of foods, flavors and textures in your diet one will ensure proper nutrition.
- **Adequacy:** Make sure that getting all of the essential nutrients one needs to maintain health and replace what is lost on a daily or weekly basis. Many short-term diet strategies recommend cutting or drastically reducing entire food groups leaving room for nutritional deficiencies.

Williamson (2006) indicated that the best meal planning should focus on these five guidelines – and it is a rock-solid foundation. Even if clients stray now and then, just by using this plan as a guide, they will be learning to eat better and create the behavioral changes needed for the long haul. No matter what your clients are asking you about their

diet, bringing them back to these basics can help them stay on track and achieve the results they want. It is time to guide clients to a more sustainable, science-based nutrition plan and away from the short-term diets that often lead to unhealthy cycles of rapid weight loss and steady weight gain. Nutrition, like exercise, takes an ongoing commitment not just for a week or a month but also for the long haul.

### **Nutrition Challenges in Sub-Saharan Africa**

Sub-Saharan Africa, according to Fanzo (2012), is home to some of the most nutritionally insecure people in the world. Poor infrastructure and limited resources compounded with conflict, HIV, and poor access to health services are factors that contribute to the staggering levels of malnutrition and food insecurity in the region and on the continent.

According to a UNICEF Report (2013), globally more than one quarter (26 per cent) of children under five years of age were stunted in 2011, amounting roughly to 165 million children worldwide. But this burden is not evenly distributed around the world. Sub-Saharan Africa and South Asia are home to three fourths of the world's stunted children. Cited by Lartey (2008), Linkage Project (2001), UNICEF (2005), and Abdoelae (2006) observed that inadequate pregnancy weight gain is reflected in the high prevalence of low birth weight among 14 percent of infants in Sub-Saharan Africa. Although pregnancy is considered a normal physiological event in the life cycle, for most African women it is a life-threatening situation.

The probability of dying from pregnancy-related causes is one in sixteen for Sub-Saharan African women, compared with one in 4000 for industrialized countries. About 40 percent of women aged 20–24 years in Sub-Saharan Africa marry early at <18 years of age. With many years of child bearing ahead, pregnancies occur frequently and at short intervals, giving the mother insufficient time to replenish her nutrient stores before the next pregnancy. The poor quality of the diet contributes to the widespread energy and micronutrient deficiencies.

The Sustainable Nutrition Research for Africa in the Years to come (SUNRAY, 2012), warned that only nine out of the 46 countries in Sub-Saharan Africa are on track to achieve the MDG 1 to eradicate extreme poverty and hunger. Recent events including the food price crisis, global recession, and climate change are having a profound global influence on hunger, health, and agriculture. Future environmental, economic, technological, socio-cultural, and political changes are likely to present new challenges to the field of nutrition. They further reveal that within the next decade, new nutritional problems, and nutritionally vulnerable groups will emerge and as a result pose new challenges for nutrition research and programming.

With full knowledge that poor nutrition in the first 1,000 days of children's lives can have irreversible consequences and that poor nutrition is equally detrimental to pregnant and lactating mothers, it is imperative to explore facts on malnutrition in the region.

Malnutrition. Malnutrition is a broad term commonly used to describe people who are malnourished due to the fact that their diet does not provide adequate calories, protein for growth and maintenance, and micronutrients; or they are unable to fully utilize the food they eat due to illness or lack of safe water. A lack of these essential vitamins and minerals often results in “hidden hunger,” where the signs of malnutrition and hunger are less visible in the immediate sense. This can result in the nutrition disorder of under nutrition. One of the major long-term determinants of malnutrition is poverty, in both developed and developing countries (Fanzo, 2012).

Maternal malnutrition has compounding effects and so nutrition for both women and children must be talked. According to (Watson & Anderson, 2010), in the developing world, malnutrition is the single largest killer of children under the age of five, trapping regions in a cycle of extreme poverty. Malnutrition can take several forms including hunger, under nutrition, over nutrition, and micronutrient deficiencies. In its common usage, hunger describes the subjective feeling of discomfort that follows a period without eating.

For the last 10 years, hunger has been measured against the achievement of the Millennium Development Goal (MDG). This goal has a target to reduce the proportion of people who suffer from hunger by half between 1990 and 2015 (UN, 2001); with hunger measured by two indices: as the proportion of the population who are undernourished and the prevalence of children under five who are underweight (UN, 2000). Many countries remain far from reaching this target and much of the progress made has been eroded by

the recent global food prices and economic crises in 2007-2008 and in 2011. Africa has also suffered a lack of progress as measured by these globally monitored indices.

While a number of countries have globally made substantial gains in reducing levels of those suffering from hunger and stunting, declines in children who are stunted in the African region have been marginal - from an estimated 38% in 1990 to 34% in 2008 (Watson & Anderson, 2010). Moreover, with population growth, the overall number of African children who are stunted has increased from an estimated 43 million in 1990 to 52 million in 2008. In 2008, the ratio of children who were underweight in rural to urban areas in sub-Saharan Africa was 1:4 (UN, 2004). These challenges are enormous and any contribution to nutrition security in the region gains more than welcome nod.

Nutrition in Uganda. In Uganda, as in many parts of the developing world, disease burden and inadequate dietary intake are the immediate causes of malnutrition in children under the age of five. Malaria, neonatal diseases, diarrheal disease, acute respiratory infections (ARIs), and to some extent the risk of HIV/AIDS contribute significantly to the disease burden in young children. However, malnutrition directly or indirectly contributes to about 60% of child mortality, making it the most critical factor in childhood mortality in the country (FANTA II, 2010). FAO (2009) reports that 15% of households are food insecure and many more households likely lack access to diverse diets year round. Achieving food security means ensuring quality and continuity of food access, in addition to quantity, for all household members.



The Uganda Demographic and Health Survey (2011) report confirmed that 38% of children in Uganda under the age of five are stunted, while 16% are underweight, and 6% are considered wasted. Approximately 14% of infants are born with a low birth weight. The FANTA II (2010) established that under nutrition in Uganda affects over two million children under the age of five. Stunting (or chronic malnutrition, measured as “height-for-age”), which occurs when a child fails to grow to the expected height or length compared to a healthy child of the same age, remains a major public health problem in Uganda. Related discoveries in other studies conducted by UDHS reported that approximately two of five children under the age of five (39%) were stunted, more than a third of them severely (based on the WHO Growth Standards). Underweight is often considered a composite measure of both acute and chronic malnutrition.

The Uganda National Nutrition Action Plan (2011-2016) recognizes that maternal nutrition plays a critical role in the reduction of maternal morbidity and mortality. During periods of pregnancy and lactation, women’s nutrition becomes particularly vulnerable. Maternal malnutrition in Uganda is cyclical: Many women are undernourished at birth, stunted during childhood, become pregnant during adolescence, are underfed as well as overworked during pregnancy and lactation, and, consequently, give birth to low birth weight babies. It is these children who eventually become stunted women, perpetuating the intergeneration cycle of malnutrition among women. Under-nutrition weakens a woman’s ability to survive childbirth or give birth to a healthy baby, translating into increased morbidity and mortality of mothers and their infants.

Using the WHO (2006) Growth Standards, the UDHS (2006) reported a prevalence of underweight of 16% for children under the age of five. The new WHO Growth Standards have led to a downward revision of the prevalence of underweight. The prevalence dropped from 19% in the year 2001. Underweight remains an important indicator to track because it is one of the MDG 1 indicators in measures of progress. While the lower prevalence rate of underweight children might make it seem that the MDG goal is achievable, effecting change at much lower levels of prevalence requires much more effort.

It is said that 20% of children aged 6-59 months and 19% of women of childbearing age were vitamin A deficient in 2006. Vitamin A deficiency (VAD) levels among children and women are similar within the regions of the country (UDHS, 2007). The 2010 Uganda Bureau of Statistics (2010) reported that Vitamin A deficiency in Western Uganda's children at ages 6–59 months was at 30.4% and a whopping 43.9% stunted growth among children under the age of five.

### **Summary and Conclusions**

There is evidence of associations between access to food and purchasing habits, dietary intake and quality, and diet-related health outcomes. Nutrition is the food you eat and how the body uses it. During pregnancy, a woman's macronutrient (energy) and micronutrient (vitamins and minerals) requirements increase and it is even more important that she consumes food in which will give her both the energy and the specific micronutrients that are essential for maintaining her and her growing baby's health.

Nutrition for children is based on the same principles as nutrition for adults. Everyone needs the same types of nutrients such as vitamins, minerals, carbohydrates, protein, and fat. Children, however, need different amounts of specific nutrients at different ages. Everyone needs the same types of nutrients such as vitamins, minerals, carbohydrates, protein, and fat.

A woman's body has increased nutritional needs during pregnancy. Although the old adage of "eating for two" is not entirely correct, a woman requires more micronutrients and macronutrients to support her and her baby. Thus, nutrition is very important for everyone, but it is especially important for children because it is directly linked to all aspects of their growth and development; factors which will have direct ties to their level of health as adults.

Poor infrastructure and limited resources compounded with conflict, HIV, and poor access to health services are factors that contribute to the staggering levels of malnutrition and food insecurity in the region and on the continent of Africa. Malnutrition is a broad term commonly used to describe people who are malnourished due to the fact that their diet does not provide adequate calories, protein for growth and maintenance, and micronutrients; or they are unable to fully utilize the food they eat due to illness or lack of safe water. Maternal malnutrition has compounding effects and so does nutrition for both women and children. This study will provide evidence on the quality of nutrition service delivery in the Ntungamo District, implemented to improve

the nutrition status of children and pregnant women through cross sectional secondary data analysis.

## **Section 2: Research Design and Data Collection**

In this study, I focused on the quality of nutrition services for children and pregnant women in Ntungamo District in southwestern Uganda. Without provision of the right kind of nutrition care to children and pregnant women, the benefits are less likely to be realized. In this, I worked to determine the relationship between the quality of nutrition services being offered to children and pregnant women and those who are not being offered nutritional services in the Ntungamo District, as indicated by percentage of children and pregnant women who were provided with appropriate nutrition assessment, counseling, and support (NACS) services.

In this chapter, I provide a detailed description of the study methodology including the research design and rationale, study population, ethical procedures, the procedure for gaining access to the data set, necessary permissions to gain access to the data, data analysis plan, and threats to validity of study findings. To better understand the quality of nutrition services offered to children and pregnant women in Ntungamo District, I used quantitative data from the health facilities in which the relevant nutrition programs were implemented. By using secondary data collected within the targeted health facilities, the study will inform the Ministry of Health, the Government of Uganda and development partners on the quality of nutrition care services provided to children and pregnant women using the NACS framework in Uganda.

The study established the relationship between the quality of nutrition services being offered to children and pregnant women in and those who are not being offered

Nutritional services in Ntungamo District indicated by percentage of children and pregnant women who were provided with appropriate nutrition assessment, counseling and support services (NACS). I reviewed data from the different clinical contact points including the outpatient department, young child clinic, antenatal clinic, postnatal clinic, and antiretroviral therapy (ART) departments. The independent variables were a) percentage of health workers trained in the standard NACS package, b) availability of nutrition assessment equipment (such as weighing scales and MUAC tapes), c) availability of nutrition supplies (such as RUTF and therapeutic milk), availability of nutrition treatment protocols and IEC materials, d) percentage of health facilities with functioning quality improvement teams, and e) percentage of facilities with appropriately motivated health workers. The research came timely when the Ugandan government and all development partners were scaling up the NACS services across all regions of the country. This will be informed by the assessment of the quality of nutrition services that are provided at the various contact points in health facilities.

This study includes policy and programmatic evidence as to whether the investment by USAID and the Government of Uganda in integrating NACS into routine health service delivery had contributed to the quality of nutrition care and influenced uptake of the services by children and pregnant women. Hence, programmatically, I helped identify services that were used in improving the quality of nutrition care for children and pregnant women. Program planners may use the findings to ensure that they refine the approach used to integrate nutrition services into routine health delivery for children and

pregnant women.

### **Research Design and Rationale**

The independent variables of the study were the quality of nutrition services for children and pregnant women in Ntungamo District, mediated by percentage of children and pregnant women who were provided with appropriate nutrition assessment, counseling, and support (NACS) services. I used these variables because they directly impacted the independent variables, which included the number and type of NACS services provided to children and pregnant women, documentation, and reporting of NACS. I used the level of health facilities (Health Center II, III, IV and Hospital) as covariates to test for differences in quality of nutrition services provided.

I use a retrospective cross sectional study design to analyze the quality of nutrition specific services provided to children and pregnant women in the Ntungamo District. According Mann (2003), cross sectional studies are relatively quick and easy to use in determining prevalence, but do not permit distinction between cause and effect of a particular issue.

Use of previously collected data resulted into sampling bias, since the secondary data was collected for other purposes. Thus, the data may not have been ideally suited to testing my research hypotheses and may have been incomplete. Second, though I obtained authorization from different organizations to use the available data for study purposes, I was based far away from the study area. This proved quite expensive in terms of coordinating all the research preparations required. However, I reached out to the various

organizations and explained the purpose of the study. I backed up their pitch with introduction letters from the university so as to gain access to the available, relevant data sources necessary for the study. The retrospective study was advantageous in that observer bias during data collection was greatly diminished, less time was required for completion, it was comparatively inexpensive for me, and was efficient.



### **Study Population**

The population for this study comprised children under 2 years of age and pregnant women who participated in the SPRING/Uganda project in Ntungamo District between 2012 and 2016.

### **Secondary Data Types and Data Access**

I used secondary quantitative NACS data that was collected by USAID's SPRING/Uganda project between 2012 and 2015 in health facilities in Ntungamo District, southwestern Uganda. Before gaining access to the data, I requested access to the data collection tool to gain understanding of the different variables the dataset contains. This helped to refine the research questions to suite the dataset. Upon Walden University IRB approval of my research proposal, I took further steps requesting access to the dataset from SPRING Uganda.

A written letter of introduction from the university was shared with the SPRING/Uganda organization. Thereafter the organization and I signed a memorandum of understanding (MOU) on the use of data. The MOU spelled out the right of access and use, disclosure, and other appropriate ethical considerations.

### **Data Analysis Plan**

The purpose of this study was to better understand the quality of nutrition services offered to children and pregnant women in Ntungamo District by examining the research questions and hypothesis below:

Research Question 1: What is the relationship between the percentage of children who receive appropriate nutrition assessment using MUAC tapes and weighing scales and those who do not?

$H_01$ : There is no relationship between the percentage of children who receive appropriate nutrition assessment using MUAC tapes and weighing scales and those who do not.

$H_a1$ : There is a relationship between the percentage of children who receive appropriate nutrition assessment using MUAC tapes and weighing scales and those who do not.

Research Question 2: What is the relationship between the percentage of pregnant and lactating mothers who receive nutrition assessment using MUAC tapes and weighing scales and those who do not?

$H_02$ : There is no relationship between the percentage of pregnant and lactating mothers who receive nutrition assessment using MUAC tapes and weighing scales and those who do not.

$H_a2$ : There is a relationship between the percentage of pregnant and lactating mothers who receive nutrition assessment using MUAC tapes and weighing scales and those who do not.

Research Question 3: What is the relationship between the percentage of children who are reported with physical signs of malnutrition and deficiency of vitamins and micronutrients and those who have good nutrition signs?

$H_{03}$ : There is no relationship between the percentage of children who are reported with physical signs of malnutrition and deficiency of vitamins and micronutrients and those who have good nutrition signs.

$H_{a3}$ : There is a relationship between the percentage of children who are reported with physical signs of malnutrition and deficiency of vitamins and micronutrients and those who have good nutrition signs.

Research Question 4: What is the relationship between the percentage of pregnant and lactating mothers who are reported with physical signs of malnutrition and deficiency of vitamins and micronutrients and those who are not?

$H_{04}$ : There is no relationship between the percentage of pregnant and lactating mothers who are reported with physical signs of malnutrition and deficiency of vitamins and micronutrients and those who are not.

$H_{a4}$ : There is a relationship between the percentage of pregnant and lactating mothers who are reported with physical signs of malnutrition and deficiency of vitamins and micronutrients and those who are not.

### **Analytic Strategy**

Variables on availability (e.g., that of nutrition assessment equipment) were expressed as dichotomous variables, with 1 denoting availability of the equipment, material, service, or team and 0 denoting unavailability.

Descriptive statistics provided information on health systems support for nutrition,

information and feedback, environment, motivation, knowledge and skills, and quality of nutrition services using the NACS framework. These were expressed as percentages, mean, and standard deviations where applicable. I used the Pearson chi-square test to assess the binomial association between the dependent variables and independent variables to understand how they influenced the quality of nutrition services offered to clients at the facility level.

I used stepwise backward multiple logistic regression to identify the independent variables that influenced the provision of quality NACS services to clients. Only the independent variables with  $p < 0.05$  were retained in the final model. Odds ratios (ORs) with 95% confidence intervals (CIs) were used to estimate the strength of association between the independent variables and the dependent variables. Statistical analysis was performed with IBM SPSS 25.0. All associations with  $p < 0.05$  were considered statistically significant.

I used secondary quantitative NACS data that was collected by USAID's SPRING/Uganda project between 2012 and 2015 in health facilities in the Ntungamo District, southwestern Uganda. According to Smith et al. (2011), secondary data analysis is the analysis of data that was collected by someone else or for another purpose. Secondary data analysis allows for high impact research that would otherwise be too expensive to conduct in a situation where time constraints exist as well. It allows junior investigators to conduct research even when resources and time are limited. Secondary data set analysis is an established research methodology (Smith et al., 2011). There are

several data sets readily available online. However, such datasets can be complex for a junior investigator to navigate and in many cases a statistician may be required. According to Aponte (2010), secondary data analysis represents an under-utilized low cost area for research. Secondary data analysis is relatively cheap and time efficient particularly for junior researchers. Web advancements coupled with improved statistical software have made secondary data a very interesting approach for research. These host vast datasets that have been established over a period of years would not make it possible using primary data collection methods. According to Aponte (2010), secondary data analysis has the advantage of being representative and therefore generalizable. Therefore, basing on this information, accessible NACS data sets can be used as the sole source of information for the study.

### **Threats to Validity**

#### **Internal Validity**

**Low Statistical Power:** An insufficiently powered experiment may incorrectly conclude that the relationship between treatment and outcome is not significant in addition, violated Assumptions of Statistical Tests. This can lead to overestimating or underestimating the size and significance of an effect.

**Fishing and the Error Rate Problem:** Repeated tests for significant relationships, if uncorrected for the number of tests, can artificially inflate statistical significance.

**Unreliability of Measures:** weakens the relationship between two variables and strengthens or weakens the relationships among three or more variables. Restriction of

Range: Reduced range on a variable usually weakens the relationship between it and another variable.

Effect of internal validity are more pronounced in an experimental design study, so there is not much of a threat of internal validity for this cross sectional design, though the study seeks to establish relationship between the independent and dependent variables. Indeed, there are no extraneous variables or confounding variables affecting relationship measurement. All subjects assessed are random with all subjects having equal chances for being assessed. The measurement is not about establishing causality. All the same, the analysis will control covariates (level of health facilities) to control for any internal and external validity in making conclusions. As such, the study does not suffer from design contamination since data is cross sectional across all the different level of health facilities.

### **External Validity**

The degree to which the results of an investigation were generalized was limited to the study region, but the study was replicable to other places. The sample was ought to be representative of the study population by covering the universe of all health facilities in the district, so there was confidence in the generalization of results. There were no effects of interaction, as there was no attempt to establish causality. This was a case study with a cross sectional design, though it examined group comparison. In addition, there were no selection biases, since the study examined all health facilities in the district.

### **Construct or Statistical Validity**

To measure the appropriateness of inferences made on the results or the observations or measurements of the study, the study used standard statistical test scores correlation coefficients, P-values and confidence intervals to establish relationship. This helped to establish whether the measurements relate to proven theories such as ‘ a significant relationship was where the  $P < 0.05$ ) as an evaluative judgment of the degree to which empirical evidence and theoretical rationales support the adequacy and appropriateness of inferences and actions based on test scores.

### **Ethical Procedures**

To officially obtain data from the organization, I shared with them an introduction letter from the university and relevant department heads that detailed the purpose of the study and to obtain the data. However, I got assurance of obtaining the data from prior discussion and inquiry of the possibility of undertaking a PhD study using this organizational data. Data that was considered confidential was treated as such and no part of it shall be shared or published in any form.

Ethical concerns relate to protection of research participants from research activities that may result into harm of participants either physically or psychologically. Where there is a certain bearable ‘harm,’ the benefit must outweigh the costs. In this study, there were no personal identifiers; the study assessed quality of nutrition services not the beneficiaries (patients) of the services in the different health facilities.

The data collected by SPRING Uganda was kept confidential and was only be accessed by I and data was stored on password protected computer. The data had no personal

identifier as it seeks to analyze service quality and not the beneficiaries. Therefore, the data anonymized (no personally identifiable information from data sets) by the organization providing the data, so that the people whom the data described (patients-children and pregnant women who obtained the services) remain anonymous to the study findings.

The data obtained was for the sole purpose of the PhD research and not for any other purpose without notification and getting approval from the SPRING Uganda project. In accordance with the University's approval of the PhD theses, the researcher will destroy the research data set, regardless of format, immediately upon successful defense and award of the doctorate degree.

### **Summary**

The study utilized a retrospective cross sectional study design to analyze the quality of nutrition specific services provided to children and pregnant women in the Ntungamo District. The independent variables of the study were the quality of nutrition services for children and pregnant women in the Ntungamo District, mediated by percentage of children and pregnant women who were provided with appropriate nutrition assessment, counseling and support (NACS) services. While the independent variables included the percentage of health workers trained in the standard NACS package, availability of nutrition assessment equipment, availability of nutrition supplies, availability of nutrition treatment protocols, and IEC materials, percentage of health facilities with functionality of quality improvement teams and percentage of facilities with appropriately motivated



health workers.

The relationship between the quality of nutrition services being offered by children and pregnant women and those who are not being offered nutritional services in the Ntungamo District was established by examining the following research questions and hypotheses respectively, through performing different analyses. These included descriptive statistics to provide information on health systems support for nutrition, information and feedback, environment, motivation, knowledge and skills, and quality of nutrition services using the NACS framework.

The relationship between variables by using Pearson chi-square test to assess the association between the dependent variables and independent variables was measured to understand how they influenced the quality of nutrition services offered to clients at the facility level. In addition, the study performed a stepwise backward multiple logistic regression to identify the independent variables that influenced the provision of quality NACS services to clients. The model tested significance at  $p < 0.05$ , use Odds Ratios (ORs) with 95% confidence intervals (CIs) to estimate the strength of association between the independent variables and the dependent variables. The results from this analysis were presented in chapter four of this study, using tables, graphs, and charts to describe and discuss results in line with the specified research questions and study hypotheses.

### **Section 3: Presentation of Results and Findings**

The purpose of this study was to better understand the quality of nutrition services offered to children and pregnant mothers in the Ntungamo District. I used quantitative data from the health facilities in which the relevant nutrition programs are implemented. Findings from this study will inform the Ministry of Health, the government of Uganda, and development partners about the quality of nutrition care services provided to children and pregnant women in Uganda.

In this study, I show the relationship between the quality of nutrition services being offered to children and pregnant women and those who are not being offered nutrition services in the Ntungamo District, indicated by percentage of children and pregnant women who were provided with appropriate nutrition assessment, counseling, and support (NACS) services.. I used secondary data collected by SPRING Uganda project between the years of 2012 and 2015 in different health facilities in the Ntungamo District of southwestern Uganda. In what follows, I present evidence-based findings organized according to my four research questions:

#### **Research Questions and Hypotheses**

Research Question 1: What is the relationship between the percentage of children who receive appropriate nutrition assessment using MUAC tapes and weighing scales and those who do not?

$H_01$ : There is no relationship between the percentage of children who receive appropriate nutrition assessment using MUAC tapes and weighing scales and those who do not.

$H_a1$ : There is a relationship between the percentage of children who receive appropriate nutrition assessment using MUAC tapes and weighing scales and those who do not.

Research Question 2: What is the relationship between the percentage of pregnant and lactating mothers who receive nutrition assessment using MUAC tapes and weighing scales and those who do not?

$H_02$ : There is no relationship between the percentage of pregnant and lactating mothers who receive nutrition assessment using MUAC tapes and weighing scales and those who do not.

$H_a2$ : There is a relationship between the percentage of pregnant and lactating mothers who receive nutrition assessment using MUAC tapes and weighing scales and those who do not.

Research Question 3: What is the relationship between the percentage of children who are reported with physical signs of malnutrition and deficiency of vitamins and micronutrients and those who have good nutrition signs?

$H_03$ : There is no relationship between the percentage of children who are reported with physical signs of malnutrition and deficiency of vitamins and micronutrients and those who have good nutrition signs.

$H_{a3}$ : There is a relationship between the percentage of children who are reported with physical signs of malnutrition and deficiency of vitamins and micronutrients and those who have good nutrition signs.

Research Question 4: What is the relationship between the percentage of pregnant and lactating mothers who are reported with physical signs of malnutrition and deficiency of vitamins and micronutrients and those who are not?

$H_{04}$ : There is no relationship between the percentage of pregnant and lactating mothers who are reported with physical signs of malnutrition and deficiency of vitamins and micronutrients and those who are not.

$H_{a4}$ : There is a relationship between the percentage of pregnant and lactating mothers who are reported with physical signs of malnutrition and deficiency of vitamins and micronutrients and those who are not.

In this section, I present the result of a secondary data analysis. I used SPSS Version 25.0 to perform simple descriptive, univariate, bivariate, and multivariate analyses. I also present findings from inferential analysis and offer conclusions with a summary of findings at the end of this section.

### **Collection of Secondary Data Set**

Both qualitative and quantitative data collection methods were used in the survey process. Quantitative data methods were used to assess nutrition services and the capacity of systems that enable them to be carried out. This included a health facility survey and a

tool for observation. The health facility survey covered among other items, availability of nutrition supplies and equipment, ANC and nutrition services. The health worker survey assessed knowledge, skills, practices, and roles.

However, in this study I only focused on the secondary data that was collected from Ntungamo District and that was aligned with the four different research questions. I therefore focused attention on health facility data and only 16 health facilities in Ntungamo District. Reanalysis was run in SPSS 21, and I have presented findings as shown below.

### **Descriptive Statistics of the Health Facilities**

A total of 16 health facilities in Ntungamo District were sampled and data was collected from each of these facilities. Out of the 16 facilities, 1 was a major Hospital, 4 were at Health Centre IV level, and 11 were at Health Centre III level. In percentages, the health facilities that were reached were at 6.3% for hospitals, 25% for Health Centre IV, and 68.8% for Health Centre III respectively. According to the findings, the Ntungamo District has a high percentage of Health Centre IIIs.

Table 1: Health Facilities Reached by SPRING/Uganda in the Ntungamo District

Health Facilities	Frequency	Percent	Cumulative %
Butare Hc	1	6.3	6.3
Bwongyere	1	6.3	12.5
Itojo Ho	1	6.3	18.8
Kayonza HC	1	6.3	25.0
Kitonda HC	1	6.3	31.3
Kitwe Hc	1	6.3	37.5
Ngoma Hc	1	6.3	43.8
Ntungamo HC	1	6.3	50.0
Nyakyera HC	1	6.3	56.3
Rubaare HC	1	6.3	62.5
Rugarama HC	1	6.3	68.8
Ruhama HC	1	6.3	75.0
Rukoni HC	1	6.3	81.3
RwashamiH C	1	6.3	87.5
Rweikini HC	1	6.3	93.8
St Lucia	1	6.3	100.0
Total	16	100.0	100.0

Table 2: Level of Facilities

Level	Frequency	Percent	Cumulative %
Health Centre III	11	68.8	68.8
Health Centre IV	4	25.0	93.8
Hospital	1	6.3	100.0
Total	16	100.0	

### Health Centers Offering Maternal Child Health Services in the Ntungamo District

According to the SPRING/UGANDA data, all 16 facilities offer maternal child health (MCH) services included antenatal care (ANC), nutritional services, and HIV/AIDS services like PMTCT and TB.

Table 3: Health Facilities Offering MCH Services to Pregnant Mothers and Children

	<i>N</i>	Minimum	Maximum	Mean	<i>SD</i>
MCH services offered	16	1	1	1.00	.000
Valid <i>N</i> (list wise)	16				

**Cross tabulation.** The table below shows the number of pregnant mothers that are able to attend antenatal care services during pregnancy and postnatal services, versus the number of mothers who attend antenatal services and are offered nutritional services

on a monthly basis. In my analysis of the secondary data, I found that 10 out of 16 health facilities had between one and 50 mothers attending ANC on a monthly basis and were offering nutritional services like assessment of nutrition to these mothers. Five out of the 16 health facilities had between 51 and 100. Mothers attending ANC on a monthly basis, and one hospital (ITOJO Hospital) receives 101 to 150 mothers.

Table 4: Pregnant mothers attending ANC monthly \* mothers being offered nutrition services

		Number of mothers being offered nutrition services			Total
		1-50	51-100	101-150	
Number of pregnant mothers attending ANC monthly	0-50	10	0	0	10
	51-100	0	5	0	5
	101-150	0	0	1	1
Total		10	5	1	16

### Health Facilities with Functional Nutrition Assessment Equipment

I ran a descriptive analysis to determine the percentage of health facilities that have functional nutrition assessment equipment especially, MUAC tapes and weighing scales. As shown in Table 5 and Figure 1 below, only 56.3% of the sampled health facilities in Ntungamo District that were supported by SPRING Uganda had functional a nutrition assessment equipment. This means that 43.8% of the health facilities do not have functional nutrition assessment equipment, which has a great implication on the percentage of the mothers and children who are being assessed for nutrition in these health facilities. This finding indicates a great need for a nutrition intervention in this

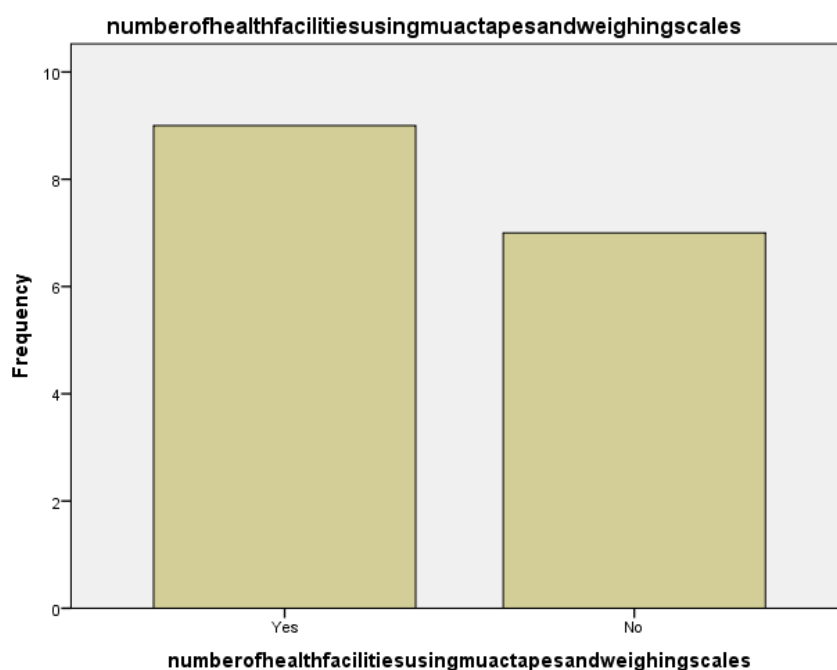


area.

Table 5: Percentage of Health Facilities Using Nutritional Assessment Equipment Appropriately

		Frequency	Percent	Valid percent	Cumulative percent
	Yes	9	56.3	56.3	56.3
Valid	No	7	43.8	43.8	100.0
	Total	16	100.0	100.0	

**General NACS in all facilities in the Ntungamo District.** Nutrition assessment methods varied by type of both health facilities and service contact points in SPRING/Uganda districts. A more comprehensive nutrition assessment (dietary, clinical, and anthropometric) across all service contact points was reported by the different hospitals (80%), Health Centre IV (60%), and Health Centre III (40%). All facilities performed nutritional assessment relatively well across all ART service points (90% hospitals, 80% Health Centre IV 55% Health Centre III). Assessing nutritional status can be relatively simple, especially the basics like weight, weight, MUAC. Weight and pallor were found to be the most common assessments, the least being height/length.



*Figure 1.* Number of health facilities using MUAC tapes and weighing scales.

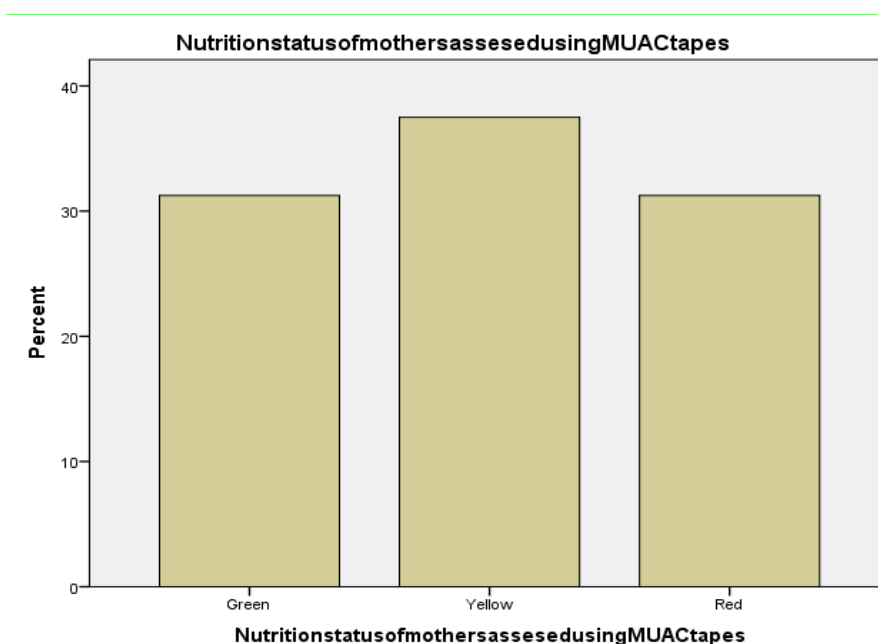
Table 6: Health Facilities Offering Nutrition Assessment at Facility Different Levels

Average % of facilities that include practice in nutritional assessment. (All service points)	Hospital (n = 1)	HC IV (n = 4)	HC III (n = 11)
Taking MUAC	100%	25%	15%
Taking height	55%	32%	12%
Taking weight	100%	93%	67%
Checking for odema	100%	96%	92%
Taking dietary history	80%	100%	95%
Average % of facilities who include practice in nutritional assessment (ART point only)	Hospital (n=1)	Health Centre IV (n=4)	Health Centre III (n=11)
Taking MUAC	100%	75%	20%
Taking height	100%	75%	20%
Taking Weight	100%	100%	50%
Checking for edema	100%	100%	83%
Taking dietary history	100%	100%	100%

Percentage of pregnant and lactating mothers who receive nutrition assessment using MUAC tapes and weighing scales. Based on the above findings, I reanalyzed the data set with specific attention to pregnant mothers who were assessed for nutrition using MUAC tapes. I found that 100% of the health facilities sampled used MUAC tapes to assess for nutrition status of pregnant mothers. A mean distribution of 1.25 was established and a SD of 0.447 established from a descriptive statistical analysis that was run. According to

these findings, there is a negligible difference between the pregnant and lactating mothers who receive nutrition assessment using MUAC tapes and those who do not.

**Nutritional outcomes in pregnant and lactating mothers after assessment using MUAC tapes.** From the findings as shown in the table below, the nutrition status is categorized in three stages, Green, which represents Good nutrition status, Yellow, which represents moderately malnourished and Red which represents highly malnourished or severely malnourished. The findings therefore show that 31.3% of the pregnant and lactating mothers are reported to be having a good nutrition status, while 37.5% of the pregnant and lactating mothers are reported to be moderately malnourished and 31.3% of the mothers are severely malnourished and needs attention.

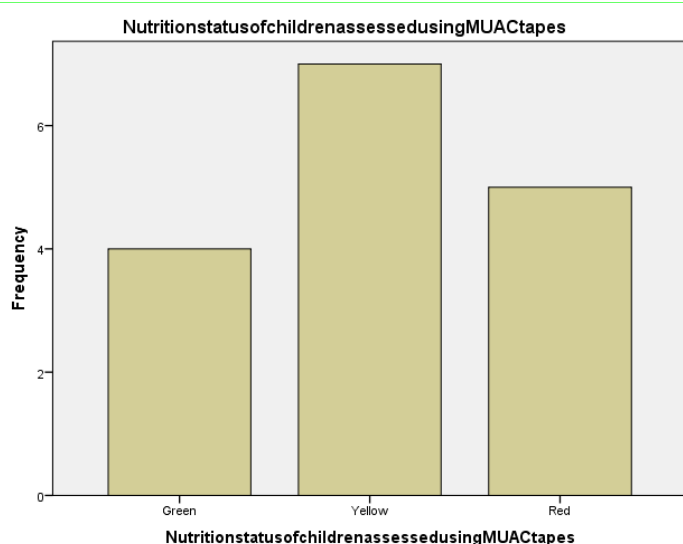


*Figure 2.* Nutritional Outcomes of pregnant and lactating mothers after assessment using MUAC tapes.

**Nutritional status/ outcomes in children after assessment using MUAC tapes.** Based on the findings as shown in the table below, the nutrition status among children was still categorized in three stages, Green which represents good nutrition status, Yellow which represents moderately malnourished, and Red which represents highly malnourished or severely malnourished. The findings, therefore, show that 25.0% of the children who were assessed for malnutrition using MUAC tapes are reported to have a good nutrition status, while 43.8% of the children assessed are reported to be moderately malnourished, and 31.3% of the children assessed are severely malnourished and need attention.

Table 7: Showing different Nutritional status/Outcomes of children after assessment using MUAC tapes

	Frequency	Percent	Valid %	Cumulative %
Valid	Green	4	25.0	25.0
	Yellow	7	43.8	68.8
	Red	5	31.3	100.0
	Total	16	100.0	100.0



*Figure 3.* Nutritional Outcomes of children after assessment using MUAC tapes.

### **Assessment for Nutrition using MUAC tapes and weighing scales**

**Percentage of pregnant and lactating mothers assessed using MUAC tapes.** I run an analysis to assess whether there is a relationship between the percentage of pregnant mothers who receive appropriate nutrition assessment using MUAC tapes and those who do not. The findings were as below at a 0.05 level of significance, there was a 0.033 low positive correlation between the pregnant and lactating mothers who are assessed using MUAC tapes and those who are not, This therefore implies we shall reject the null and accept the alternative thus concluding that there is a relationship between mothers who receive nutrition assessment using MUAC tapes and those who do not as shown in table 8 below.

Table 8: Pregnant Mothers Who Receive Nutrition Assessment Using MUAC Tapes

		Number of pregnant mothers attending ANC monthly	Number of pregnant mothers assessed for nutrition using MUAC tapes (P-Value)
	Pearson Correlation	1	.533*
	Sig. (2-tailed)		.033
Number of pregnant mothers attending ANC monthly	N	16	16
	N	16	16

\*. Correlation is significant at the 0.05 level (2-tailed).

**Percentage of pregnant and lactating mothers assessed using Weighing scales.** I run analysis to assess whether there is a relationship between the percentage of pregnant mothers who receive appropriate nutrition assessment using weighing scales and those who do not. The findings were as below at a 0.05 level of significance, there was a 0.265 high positive correlation between the pregnant and lactating mothers who are assessed using weighing scales and those who are not. Therefore, this implies we shall accept the null and reject the alternative thus concluding that there is no relationship between mothers who receive nutrition assessment using weighing scales and those who do not as shown in table 9 below.

Table 9: Pregnant Mothers Who Receive Nutrition Assessment Using Weighing Scales

		Number of pregnant mothers attending ANC monthly	P-Value
Number of pregnant mothers attending ANC monthly	Pearson Correlation	1	.296
	Sig. (2- tailed)		.265
	N	16	16

### **Children Being Assessed For Nutrition Using MUAC Tapes and Weighing Scales**

**Percentage of children being assessed using MUAC tapes.** Different analysis was run to assess whether there is a relationship between the percentage of children who receive



appropriate nutrition assessment using MUAC tapes and those who do not. The findings were below at a 0.05 level of significance. There was a 0.00 correlation between the children and infants who are assessed using MUAC tapes and those who are not. Therefore, this implies we shall reject the null and accept the alternative thus concluding that there is a relationship between children and infants who receive nutrition assessment using MUAC tapes and those who do not as shown in table 10 below.

Table 10: Children Who Receive Nutrition Assessment Using MUAC Tapes.

		Number of children being assessed for nutrition services	Number of children being assessed for nutrition using MAUC tapes ( P-Value)
Number of children being assessed for nutrition services	Pearson Correlation	1	1.000**
	Sig. (2-tailed)		.000
	N	16	16

\*\* . Correlation is significant at the 0.05 level (2-tailed).

**Percentage of children being assessed using weighing scales.** I run an analysis to assess whether there is a relationship between the percentage of children and infants who receive appropriate nutrition assessment using weighing scales and those who do not. The findings were as below at a 0.05 level of significance, there was a 0.001 correlation between the children who are assessed using weighing scales and those who are not, This therefore implies we shall accept the null and reject the alternative thus concluding that there is relationship between mothers who receive nutrition assessment using weighing scales and those who do not as shown in table 13 below.

Table 11: Children Who Receive Nutrition Assessment Using Weighing Scales

		Number of children being assessed for nutrition services	Number of children being assessed for nutrition using weighing scales(P-Value)
Number of children being assessed for nutrition services	Pearson Correlation	1	.745**
	Sig. (2-tailed)		.001
	N	16	16

\*\* . Correlation is significant at the 0.05 level (2-tailed).

### **Percentage of pregnant and lactating mothers with physical signs of malnutrition**

**and deficiency of vitamins.** From the findings that I run through a descriptive frequency analysis, out of 16 health facilities, an average percentage of 31.3% health facilities said that most of the mothers shown a physical sign of weight loss followed by 25%. This was the highest percentage of health facilities who also said that weak immunity is very common among mothers suffering from malnutrition and deficiency in vitamins.

Approximately 18.8% said the mothers normally experience hair loss and 12.5% said they experience dizziness and fatigue. Another 12.5% continued to say that the mothers normally become anemic and lack blood as a sign of malnutrition and deficiency of vitamins. This is shown in table 14 below.

Table 12: Pregnant and Lactating Mothers with Signs of Malnutrition and Deficiency In Vitamins

	Frequency	Percent	Valid %	Cumulative %
Weak immunity	4	25.0	25.0	25.0
Weight loss	5	31.3	31.3	56.3
Hair loss	3	18.8	18.8	75.0
Dizziness and fatigue	2	12.5	12.5	87.5
Anemia	2	12.5	12.5	100.0
Total	16	100.0	100.0	

### Regression analysis

The percentage of pregnant mothers with physical signs of malnutrition and deficiency of vitamins depends on the number of facilities that are able to provide ANC services and also other NAC services. The independent variables therefore includes the number of health facility's providing ANC services and are able to offer nutrition services like NACs and others. The dependent variables, therefore, are the percentage of pregnant mothers with signs of malnutrition and deficiency of vitamins (Dependent and independent variables) from the study, 0.01 which is 10% of pregnant mothers with malnutrition and deficiency in vitamins depends on the Number of health facilities providing ANC services and are able to offer nutrition services. Therefore we shall conclude that there is a positive 10% significant relationship between the percentage of pregnant and lactating mothers who are reported with physical signs of malnutrition.

Table 13: Pregnant Mothers with Physical Signs of Malnutrition and Deficiency of Vitamins

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	10.611	1	10.611	8.574	.011 <sup>b</sup>
Residual	17.326	14	1.238		
Total	27.938	15			

a. Dependent Variable:

b. Predictors:

### **Children Who Are Reported With Physical Signs of Malnutrition and Deficiency Of Vitamins And Micronutrients.**

**Descriptive analysis.** Through a descriptive frequency analysis, out of 16 health facilities, an average percentage of 31.3% health facilities, which was the highest percentage, said that most of the children and infants shown a physical sign of severe wasting and weight loss. This is followed by 25%, which said that weak or low immunity is also very common among children suffering from malnutrition and deficiency in vitamins. 25.0% said children normally experience signs of goiter as a result of malnutrition and 12.5% said they experience dizziness and fatigue. 6.3% continued to say that the children normally get bruising as a sign of malnutrition and deficiency of vitamins. This is shown in the table 14 and 15 below.

Table 14: Percentage of children with signs of malnutrition and deficiency in vitamins

	Frequency	Percent	Cumulative %
Low immunity	4	25.0	25.0
Wasting and loss of weight	5	31.3	56.3
Goiter	4	25.0	81.3
Fatigue and Dizziness	2	12.5	93.8
Bruising easily	1	6.3	100.0
Total	16	100.0	

**Regression analysis.** Percentage of children with physical signs of malnutrition and deficiency of vitamins, depends on the number of facilities that are able to provide ANC services and also other NAC services, the independent variables therefore includes the Number of health facility's providing ANC services and are able to offer nutrition services like NACs and others, The dependent variables therefore are the percentage of pregnant mothers with signs of malnutrition and deficiency of vitamins (dependent and independent variables) from the study, 0.812 which is 80% of children and infants with malnutrition and deficiency in vitamins depends on the Number of health facilities that are having functional equipment to assess children for malnutrition services and are able to offer nutrition services.

Therefore we shall conclude that there is a positive 80% significant relationship between

the percentage of children and infants who are reported with physical signs of malnutrition and deficiency of vitamins and micronutrients and those who are not.

Table 15: Children and infants reported with physical signs of malnutrition and deficiency of vitamins and micronutrients

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	.016	1	.016	.059	.812 <sup>b</sup>
Residual	3.734	14	.267		
Total	3.750	15			

a. Dependent Variable:

b. Predictors: (Constant),

## **Section 4: Application to Professional Practice and Implications for Social Change**

### **Introduction**

The quality of nutrition services offered to children and pregnant mothers is still extremely critical, especially in Uganda, where a lack of appropriate nutrition care affects health and the quality of life. Without the provision of the right kind of nutrition care to children and pregnant women, the benefits are less likely to be realized.

For the study, I used secondary quantitative data that was collected by SPRING Uganda project between 2012 and 2015 in health facilities in the Ntungamo District. I reanalyzed the data in SPSS 21 and presented findings in the previous section.

### **Concise Summary and Interpretation of Findings**

A total of 16 health facilities in the Ntungamo District took part in the study, and data was collected from each of these facilities. Of the 16 facilities, one was a major hospital, four were Health Centre IV, and 11 were at Health Centre III. Based on the findings, the Ntungamo District has a high percentage of Health Centre III. All 16 of the health facilities offer maternal child care services. Ten out of 16 health facilities supported by SPRING/Uganda had between one and 50 mothers attending ANC on a monthly basis. They were also offering nutritional services like assessment of nutrition to these mothers. Five out of the 16 health facilities had between 51 and 100 mothers attending ANC on a monthly basis. One hospital (ITOJO Hospital) receives 101 to 150 mothers and more. I found that 56.3% of the sampled health facilities in the Ntungamo District that were being supported by SPRING Uganda had functional nutrition assessment equipment,



such as MUAC tapes and weighing scales. Another 43.8% of the health facilities do not have functional nutrition assessment equipment. I found that taking weight, checking of edema, and measuring MUAC were the most common assessments performed. The least common were the length/height measurements, hemoglobin estimation, and checking for dietary history. However, one-third of the nutritionists performed nutrition assessments. There is a negligible difference between the pregnant and lactating mothers who received nutrition assessment using MUAC tapes and those who did not.

I also assessed the different nutritional statuses of pregnant mothers and found that 31.3% of the pregnant and lactating mothers were reported to have a good nutrition status, 37.5% of the pregnant and lactating mothers were reported to be moderately malnourished, and 31.3% of the mothers were severely malnourished and needed attention. Of the children who were assessed for malnutrition using MUAC tapes, 25.0% were reported to have a good nutrition status, 43.8% were reported to be moderately malnourished, and 31.3% of the children assessed were severely malnourished and needed attention.

At a 0.05 level of significance, there was a 0.033 low positive correlation between the pregnant and lactating mothers who were assessed using MUAC tapes and those who were not. For mothers who were assessed using weighing scales, there was a 0.265 high positive correlation between the pregnant and lactating mothers who were assessed using weighing scales and those who were not. At a 0.01 level of significance, there was a 0.00 correlation between the children and infants who were assessed using MUAC tapes and

those who were not. For children who were assessed using weighing scales, there was a 0.001 correlation between the children who were assessed using weighing scales and those who were not.

From the study, 10% of pregnant mothers with malnutrition and deficiency in vitamins, depends on the number of health facilities providing ANC services and are able to offer nutrition services whereas 80% of children and infants with malnutrition and deficiency in vitamins depends on the number of health facilities that are having functional equipment to assess children for malnutrition services and are able to offer nutrition services.

### **Interpretation of Findings**

#### **General Findings**

There was generally a positive and high response from the 16 health centers that were visited in the Ntungamo District in relation to willingness to offer nutrition services to the pregnant mothers and also to children and infants. Of the health facilities that SPRING/UGANDA collected data from, all 16 offered MCH and these services included ANC, nutritional services, and HIV/AIDS services like PMTCT and TB. This is a positive indication that a greater percentage of the facilities in southwestern Uganda realize the importance of nutrition assessment of pregnant mothers and children to the health of both the mothers and the children and the community at large. Of the sampled health facilities supported by SPRING Uganda in the Ntungamo District, I found that 56.3% had functional nutrition assessment equipment such as MUAC tapes and weighing

scales. Approximately 43.8% of the health facilities did not have functional nutrition assessment equipment.

### **Access to Nutrition Services**

#### **Pregnant and lactating mothers assessed using MUAC tapes and weighing scales.**

According to the findings, there was no significant difference between pregnant and lactating mothers who receive nutrition assessment using MUAC tapes and those who could not be assessed. The findings at a 0.05 level of significance showed that there was a 0.033 low positive correlation between the pregnant and lactating mothers who were assessed using MUAC tapes and those who were not. While for those that were assessed using weighing scales, there was a 0.265 high positive correlation between the pregnant and lactating mothers who were assessed using weighing scales and those who were not, thus showing a significant difference.

The findings involving mothers who were measured using MUAC tapes also showed that 31.3% of the pregnant and lactating mothers reported to have a good nutrition status, while 37.5% of the pregnant and lactating mothers reported to be moderately malnourished and 31.3% of the mothers were severely malnourished and needed attention in terms of food supplements like RUTF. A study from UNICEF (2003) indicated that during pregnancy a woman's macronutrient (energy) and micronutrient (vitamins and minerals) requirements increase, and it is even more important that she consumes food that will give her both energy and the specific micronutrients, which are essential for

maintaining her and her growing baby's health. For example mothers require an additional 240 calories of energy per day in the 2<sup>nd</sup> trimester and 452 calories per day in the 3<sup>rd</sup> trimester of pregnancy to account for fetal growth. An additional 975 milligrams of iron is required in the course of pregnancy to form fetal and additional maternal blood. The UNICEF study further indicated that while nutritional supplements can provide large quantities of particular nutrients, a healthy balanced diet should form the basis of a woman's nutritional intake. It is therefore important for women to maintain a healthy diet throughout their childbearing years, particularly if they are planning to become pregnant.

**Children and infants assessed using MUAC tapes and weighing scales.** Based on the findings, at a 0.01 level of significance, there was a 0.00 correlation between the children and infants who are assessed using MUAC tapes and those who are not. This is very similar to the findings from pregnant and lactating mothers, showing that there is no significant difference between children who are assessed using MUAC tapes and those who are not assessed using MUAC tapes. This relates to Kramer and Kakuma (2001) that confirm nutrition for children is based on the same principles as nutrition for pregnant mothers. The findings, therefore, show that 25.0% of the children who were assessed for malnutrition using MUAC tapes reported to have a good nutrition status, while 43.8% of the children assessed reported to be moderately malnourished and 31.3% of the children assessed are severely malnourished and need attention.

**Nutrition deficiency in children and mothers.** According to the findings, 0.01, which is 10%, of pregnant mothers with malnutrition and deficiency in vitamins depend

on the number of health facilities providing ANC services and are able to offer nutrition services. This implies a positive 10% significant relationship between the percentage of pregnant and lactating mothers who reported with physical signs of malnutrition and deficiency of vitamins and micronutrients and those who were not. Some of the physical signs of malnutrition and deficiency of vitamins included weak immunity, severe weight loss, hair loss, dizziness, fatigue, and anemia. This is very similar to the signs in children, which included: low immunity, wasting and loss of weight, goiter, fatigue, dizziness, and bruising.

### **Limitations of the Study**

The findings of this study could be generalized to all the districts that SPRING Uganda was operating in, therefore, making both size and power adequate and fully representative of this population size. Despite the fact that secondary data was used and the data set has been fully validated by both SPRING Uganda project and Ugandan Ministry of Health, (MOH) and it was found to be valid, accurate, and reliable data. In being utilized and consumed for development purposes, it is however necessary not to generalize the entire Uganda or east Africa, as there might be different findings in different parts of the country and east Africa and Africa at large due to the different socio-economic status of the different regions.

### **Recommendations**

The secondary data analysis did not exhaustively explore, assess, and establish the quality of nutrition services for children and pregnant women in the Ntungamo District in

southwestern Uganda. This is due to the key stakeholders, which were not interviewed using a tailored data collection tool. In depth interviews and FGDs were also not held to further investigate this by the researcher.

A study involving both quantitative and qualitative data collected primarily by the researcher is highly recommended. Although this may be more expensive and time involving, it will produce better insight and clearer and more specific insights to the root cause of the problem being studied. The current study will however serve as a baseline for the proposed study.

The study looked into details on the other factors and variables like HIV care and Treatment, PMTCT, Tuberculosis that this study did not place under consideration. Finally all the quantitative and descriptive analysis that was run to establish the quality of nutritional services offered to pregnant and lactating mothers and children will be followed with a qualitative measure to fully establish this.

These additional studies will help develop tailored mechanisms and processes to improve nutrition services in Ntungamo District. The findings shall be properly documented for accurate baseline analysis of data. This shall support in provision of strategies that shall be adopted to improve on the nutrition status of the country and the Ntungamo District.

Finally the study will be of importance to a) other researchers investigating the integration of high impact nutrition services into routine health service delivery for children, pregnant and lactating women with the NACS framework. b) To address quality improvement gaps in Nutrition programming thus improving the health service delivery

process c) To ensure quality care given to pregnant and lactating women and children. As a potential social change implication of the project, d) To create and raise awareness among health care service providers across the country on the role of quality NACS service delivery in prevention and management of maternal and child under nutrition. This can best be done by use of the positive deviance approach, a model that can promote uptake of quality nutrition services hence promoting social behavioral change.

### **Implications for Professional Practice and Social Change**

The current study has widely showed that different nutritional services offered to pregnant and lactating mothers and children could either positively or negatively affect the quality of nutrition in the Ntungamo District and Uganda as a country. This study has widely looked into the major factor that is the quality of nutrition assessment and the deficiency of vitamins in pregnant mothers and children.

### **Professional Practice**

This study has shown that secondary data analysis is cost and time saving and provides relevant, accurate, and reliable information that can be used for decision making by relevant stakeholders and primary users. The secondary data used is widely collected by development partners like SPRING Uganda Hospitals, District health offices and also ministry of health.

The data collected can be used by any other upcoming professional researchers and development partners like USAID, UNICEF, WHO as baseline information for any nutritional and health projects and interventions in the Ntungamo District. In addition,

data sets that have already been analyzed can be used for new insights into various issues in relation to nutrition and health. The data collected has a number of other variables ranging from PMTCT, HIV/AIDS, and others that can widely be re-analyzed and used by other researchers and thus draw insights to be used to improve the health sector of the Ntungamo District. This would widely improve the health sector of the Ntungamo District.

### **Positive Social Change**

There are numerous NGOs and CBOs that clients can be linked to for improved nutrition outcomes, The NACS approach aims to link individuals to community-based interventions that help improve food security and nutritional status. The survey found that there are numerous NGOs and CBOs operating in the catchment areas of the health facilities that clients could theoretically be linked to. The focus areas of these organizations varied widely. Most facilities are linked with CHWs (Community Health Workers) who provide community based services related to health, nutrition, HIV and AIDS. Qualitative data highlighted the critical role that CHWs play in providing services and linking health facilities and communities; CHWs reported involvement in the provision of numerous public health services in their communities. Among the many services they provide, nutrition was a small component, such services included distributing vitamin A and deworming capsules and providing nutrition counseling. In addition to these strong roles, the CHWs act as intermediaries in referring individuals to facility based services. However, despite all these, only 50% health facilities in the



Ntungamo District held a direct link to the community.

### **Conclusion**

The main focus of this study was to provide evidence on quality of nutrition service delivery in the Ntungamo District implemented to improve the nutrition status of children and pregnant women through cross sectional secondary data analysis. Findings indicated that the delivery of nutrition services at optimal level the surveyed health facilities will be challenging, the facilities did not have adequate capacity in terms of equipment to implement the nutrition interventions for the populations in their catchment areas. The majority of the health workers identified building their nutrition related capacity and provision of nutrition related supplies as the most important source of motivation that would enable them improve the quality of nutrition services.

The main focus of the study was also to determine the relationship between pregnant and lactating mothers and children who are assessed using MUAC tapes and weighing scales. The study also mainly focused on finding the relationship between pregnant mothers and children who are assessed for malnutrition and deficiency in vitamins. Findings indicated that most pregnant mothers and children are assessed using MUAC tapes and Weighing scales and also that there is a high increase of the pregnant mothers and children who are malnourished and have deficiency in vitamins in Ntungamo District. This therefore implies that there is need for the government and stakeholders to intervene.

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