DEVELOPING A NUTRITION INTERVENTION TO IMPROVE THE CHILD-FEEDING BEHAVIORS OF RURAL MOTHERS IN WESTERN UGANDA

BY

MARGARET KIIZA KABAHENDA

(Under the Direction of Dr. Rebecca M. Mullis)

ABSTRACT

Malnutrition is a major problem in developing countries. It is a challenge to communicate nutrition information in countries with limited resources. A four-week nutrition education intervention was developed and piloted in western Uganda to help rural mothers improve their food knowledge, food beliefs, and child-feeding behaviors. The participants (N = 71) were two groups of mothers: a nutrition intervention group (n=36) and a control group (n = 35) that attended sewing classes. Women who participated in the cooking classes had improved nutrition knowledge (P = .001), improved perceptions about what they believed were appropriate foods for children (P = .005), and selected a variety of foods (P = .011) more frequently (P = .003). This intervention has potential in improving the child-feeding behaviors of rural mothers.

INDEX WORDS: Nutrition education, Nutrition intervention, Feeding behaviors, Feeding beliefs, Picture sorting technique, Uganda, Africa.

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MARGARET KIIZA KABAHENDA

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MARGARET KIIZA KABAHENDA

Approved:

Major Professor: Rebecca M. Mullis

Committee: Elizabeth L. Andress
Sharon Y. Nickols

Electronic Version Approved:

Gordhan L. Patel
Dean of the Graduate School
The University of Georgia
May 2002

DEDICATION

To my beloved uncle, friend, and mentor Seth Irumba Bintabara Apuuli.

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CHAPTER 1

INTRODUCTION

Malnutrition is a worldwide problem and a major public health concern. A report by the International Food Policy and Research Institute indicated that developing countries have the largest proportions of malnourished children. According to this report, over one third of the children in developing countries are malnourished (Smith and Haddad, 2000a). Although the number of malnourished children in some regions is decreasing, the proportion of malnourished children in Sub-Saharan Africa seems to be increasing rapidly. A report by Smith & Haddad (2000) indicates that sub-Saharan Africa's share of malnourished children could increase by 15.9% between 1995 and 2020 (from 18.8% to 34.7%). According to these projections, if measures are not taken to improve the nutritional status of young children, the number of under 5-year old undernourished children in Sub-Saharan Africa could increase to 48.7 million in the year 2020 (Smith and Haddad, 2000a).

Malnutrition is a major health concern because a large number of young children die each year due to complications resulting from poor nutritional status. Malnutrition coupled with the high incidences of infections account for the high mortality rates observed among children in developing countries (De Onis et al., 2000; UNDP, 2001).

According to the World Health Organization, malnutrition accounted to about 55% of all child deaths that occurred in developing countries in 1995 (UNICEF, 1998).

Preventing malnutrition is also becoming a major health issue since research is showing stronger associations between the incidence of malnutrition and development of chronic diseases later in life. Childhood nutritional stunting has been associated with an increased risk for obesity (Florêncio et al., 2001; Popkin et al., 1996) and chronic diseases (Gopinath, 1997; Lore, 1993) such as coronary heart disease and diabetes mellitus. As more developing countries transition to modern lifestyles and eating patterns, there is concern that the incidence of chronic diseases will be increased especially among countries that currently have high incidences of malnutrition.

There are many strategies that have been proposed for eradicating malnutrition. Malnutrition can be controlled by increasing national food supplies, improving the health and sanitation environment, and the social status and the quality of care for women and children (Smith and Haddad, 2000b). Studies in both developed and developing countries (Hatloy et al., 1998; Parvanta et al., 1997; Sur et al., 1997; Weaver, 1984) suggests that providing education improves the dietary intake of young children.

A review of literature reveals strong relationships between maternal education and children's nutritional status. Women illiteracy has been correlated with stunting, wasting, underweight, and micronutrient deficiencies. This pilot intervention was developed to improve Ugandan mother's nutrition knowledge, food beliefs and behaviors that were believed to influence child-feeding behaviors. The mother's attitudes were also recognized to have influence on feeding behaviors but were not investigated because change in attitude tends to be temporary (Bandura, 1969).

To develop a culturally appropriate program with suitable nutritional messages, measures were taken to engage the target mothers in the planning process. The intervention involved 3 major steps that are hereby treated as three different studies for clarity purposes. The three major studies conducted were: (1) assessing the needs of the target mothers using focus groups; (2) developing the model curriculum; and (3) piloting the model intervention. The first two studies are described in detail in chapter 3. The third study is discussed in chapter 4. The study protocol was approved by the University of Georgia Human Subjects Institutional Review Board.

CHAPTER 2

REVIEW OF LITERATURE

Background of the Study

Ugandan is one of the developing countries with high rates of childhood malnutrition. A large number of Ugandan children under 5 years of age are susceptible to malnutrition (Statistics Department, 1996). Studies conducted in different regions of Uganda indicate a high prevalence of malnutrition across the country. This section will discuss the prevalence of malnutrition in Uganda, review the risk factors for the kinds of malnutrition seen among Ugandan children, and explore strategies that have been proposed to combat malnutrition.

Prevalence of Malnutrition in Uganda

The 1995 Uganda Demographics and Health Survey, reported high rates of chronic undernutrition among children 0 - 47 months of age. In this survey 38.8% of the children were classified as stunted, 14.9% severely stunted, while 25% were considered underweight (Statistics Department, 1996). This report also pointed out that more than 40% of all deaths that occurred in 1995 among children under 5 years of age were linked to malnutrition. It was suggested that malnutrition could have been induced by poor dietary patterns.

A study conducted by Vella and colleagues (1994) also reported a high prevalence of malnutrition among children in northwest Uganda. This was a longitudinal study in which 1072 children (less than 5 years old) were selected from 30 villages in Arua district to assess the prevalence of stunting (Vella et al., 1994). The investigators were also interested in determining whether stunting was reversible. All the children who were selected for this study were measured for length/height at baseline and these measures were repeated 2 years from baseline. A high incidence of stunting (a major indicator of chronic malnutrition) was observed. The investigators also noted a trend in which the risk for future stunting was higher if a child was stunted at 6 -11 months. This risk increased with age. However, after 2 years, the odds ratio for future stunting of a child stunted at <6 months was similar for a child that was stunted at 54-59 months (Vella et al., 1994). In general, this study found that both young and older children were susceptible to stunting; and all children were likely to recover from stunting. The probability of a child recovering from stunting was strongly related to the mother's education.

Another assessment of 4320 children in southwest Uganda also revealed high incidences of malnutrition (Cortinovis et al., 1997). In this survey, children 0-59 months were selected as part of the Primary Health Care baseline survey. The investigators noted a trend whereby nutritional status seemed to deteriorate after the first 3 months of life. Children 12-35 months had the highest risk of being underweight, while stunting was prevalent among all age groups above 6 months (Cortinovis et al., 1997). Malnutrition was associated with prolonged breastfeeding, poverty, diarrheal infections, and other environmental factors. The authors suggested that the incidence of malnutrition could be

reduced by interventions that focus on preventing diarrheal infections, improving education standards, and reducing poverty conditions.

Kikafunda and colleagues (1998a) also reported high rates of undernutrition among children in central Uganda. In this study 261 children who were all under 30 months of age were randomly selected to assess the risk factors and prevalence of malnutrition in rural and semi-urban areas of Mubende District, central Uganda. A high prevalence of undernutrition was noted among these children. Almost a quarter of the children surveyed were classified as stunted (23.8%), while 6.9% were severely stunted (had heights >3 standard deviations below the United States National Center for Health Statistics reference). In addition to the high rates of stunting, this study also reported a large proportion of underweight children. Of the 261 children surveyed, 24.1% had low weight for age and a 21.6% had low mid-upper-arm circumferences (MUAC lower than 135 mm). However, few cases of severe forms of malnutrition were reported. Only 15 children (5.7%) were marasmic while kwashiorkor was observed in only 10 children (3.8%). (Kikafunda, 1998a)

The prevalence of malnutrition in Uganda has mainly been described using anthropometrical parameters. Little is known about micronutrient status. The high incidences of stunting and low-weight-for-age observed from different parts of the country indicate that Ugandan children could be at risk for a number of micronutrient deficiencies. For instance, the findings from the zinc supplementation intervention conducted in central Uganda (Kikafunda et al., 1998b) suggest that young children could be at risk for deficiencies in nutrients that are vital for optimal growth. In this study, children who were supplemented with zinc did not significantly gain more height than the

controls that did not receive zinc supplementation. The authors concluded that zinc was possibly not the only limiting factor.

Other observations have also reported micronutrient deficiencies among young children. Iron deficiency anemia has been reported among infants (Totin et al., 2002) and pregnant women (Kasumba et al., 2000). It is estimated that about one half of the Ugandan population is likely to have iron deficiency anemia (UFNC, 2000). Deficiencies in Vitamin A (Gilbert et al., 1995) and various antioxidants (Metzger et al., 2001) have also been reported. Despite the availability of low cost vitamin A rich foods, Uganda has high incidences of xerophthalmia and other vitamin A deficiency eye diseases (UFNC, 2000). Iodine deficiency is also a major health issue (UFNC, 2000). Given the high prevalence of malnutrition, more studies are needed to investigate the micronutrient nutriture of Uganda children.

Factors that Determine the Prevalence of Malnutrition

The factors that explain the high prevalence of malnutrition in developing countries are so varied. Malnutrition has been strongly correlated to limited food availability, limited parental education, poor food processing and storage methods, and poor sanitation and water supply that increase the risk for infections (Kikafunda, 1998a; Metzger et al., 2001; Smith and Haddad, 2000b; Vella et al., 1995).

In central Uganda the incidence of malnutrition was related to the socioeconomic status of the family, duration of breastfeeding, amount of food consumed, and the health status of children. Environmental factors such as the quality of water supply and place of resident also influenced children's nutritional status. Household food patterns also

influence children's nutritional status. For instance, children who live in households that consume meat or milk are less likely to become marasmic (Kikafunda, 1998a). These are same factors that have been indicated for the high incidence of malnutrition reported in other parts of Uganda (Vella et al., 1992b; Vella et al., 1994; Vella et al., 1992a; Vella et al., 1995). In general, limited dietary intake and the high incidence of infections are the two factors that are considered to have a direct influence on nutritional status (Smith and Haddad, 2000b).

Incidence of Infections

The interaction between nutritional status and the incidence of infections has been described as synergistic. Malnutrition in most cases compromises cellular immune response thereby reducing resistance to infections (Torun and Chew, 1994). Infections, on the other hand, interfere with nutrient intake, absorption, and utilization causing secondary malnutrition (Torun and Chew, 1994)). Frequent infections are associated with increased nutrient needs; in the absence of adequate nutrition the child's growth is compromised. In this regard, the children's dietary intake and health status have been considered as the two factors that directly influence nutritional status (Smith and Haddad, 2000a; Statistics Department, 1996).

Dietary Intake of Ugandan Children

There are many factors that influence dietary intake. Factors that influence the dietary intake of young children include the availability of food in the household, time and resources allocated to childcare, and the feeding practices of the caregivers (Smith

and Haddad, 2000a). The amount of food available to Ugandan children partly depends on the amount of food produced in the household, the number of people in the family, and income available to purchase food (Vella et al., 1995).

Generally, there is hardly any widely published literature that clearly documents the quality of Ugandan children's diets. An investigation by Rutishauser and Frood (1973) revealed feeding practices whereby Ugandan children 2-5 years of age were consistently fed on diets low in calories and protein. In this study, hospitalized children in western Uganda consumed an average of 70% calories and only 7-10% of these calories came from protein sources. Rutishauser and Frood (1973) also documented feeding practices characterized by a limited number of meals. Children under 5 years of age consumed an average of only 2.7 meals daily. According to these investigators, these diets were not nutritionally adequate for growing children.

The diets of Ugandan children seem be vegetarian (Hoorweg and McDowell, 1979). However, there are differences in the variety of foods consumed among different households. These differences seem to be related to an individual family's resources. Since more than 80% of Ugandan families grow their own food (MGCD and MPED, 1998), the type of foods provided to children depend on what the family produces. Bananas, sweet potatoes, cassava, millet and maize are the major staples for the majority of Ugandan families while beans, cowpeas, groundnuts, and green vegetables serve as the main relishes and protein sources (Crawford, 1985; Hoorweg and McDowell, 1979; UFNC, 2000).

Differences in diets are also linked to different food processing and preservation methods. In rural areas, traditional food processing and preservation methods determine

the quantity and quality of the household food supply (UFNC, 2000). At the household level, these food processing and preparation methods are determined by the mothers' beliefs and the health status of the children (Serunjogi and Tomkins, 1990). The processing methods are also influenced by the time available to process food in addition to other household chores (Essers et al., 1995). Since food processing is usually done by child-caregivers (usually the mothers and grandmothers) time is usually a constraint in terms of how different foods are processed to improve nutrition quality (Motarjemi and Nout, 1996).

Influence of Maternal Literacy and Social Status on Child Health

In developing countries, women play a key role in community development and maintaining household welfare. In Uganda, rural women have been credited for taking care of children, providing food for their families, providing water and fuel (firewood) to their families, and undertaking 70-80% of the agricultural activities (UNDP, 2001). Unfortunately, women's efforts to improve their families' status are always compromised by their social situation. Factors such as limited literacy, unawareness of healthy behaviors, and lack of decision-making power limit women's health-seeking activities (Bharmal, 2000). Most women are thus not able to make decisions that would improve their children's health.

Maternal education has also been identified as one of the factors that influence the nutritional status of young children (Smith and Haddad, 2000). Studies done in the central, northwestern, and southwestern parts of Uganda have all noted significant relationships between the education level attained by the mother and the health status of

her children (Kikafunda et al, 1998a; Vella et al, 1995). The incidence of malnutrition has been reported to decrease as the mother attains more education (Cochrane et al., 1982; Ighogboja, 1992). Mothers and caretakers with formal education tend to feed their children more frequently and pay more attention to what their children eat (Cochrane et al., 1982; Guldan et al., 1993). Even when malnutrition occurs among children of educated mothers, these children tend to recover faster than those children whose mothers are illiterate (Vella et al., 1995). Mothers who attain education level below secondary school tend to engage in inappropriate child-feeding practices. These risky feeding behaviors predispose young children to infections and malnutrition. For instance, uneducated mothers are more likely to wean children directly onto the staple at a very early age. However, illiterate mothers also tend improve their child-feeding behavior when they are taught how to appropriately feed their children (Hoorweg and McDowell, 1979).

Improvement in women's literacy and education has also been associated with a reduced risk for infections and malnutrition that is induced by infections. It has been suggested that mothers influence the risk for infections by their role of determining the types and amounts of foods available to their households and to individual children (Haddad et al., 1998; Lutter et al., 1992). Well-fed children have improved immune response and thus have a reduced risk to infections. Feeding practices before and during infections influence the prevalence, severity, and rate of recovery from some infections (Haddad et al., 1998; Lutter et al., 1992) – further determining children's nutritional status. It has been projected that educating women and improving the status of women

could reduce the prevalence of malnutrition in developing countries by as much as 43% by the year 2020 (Smith and Haddad, 2000a).

Accessibility to Nutrition Information

The government of Uganda recognizes malnutrition as one of the major public health problems and has advocated for nutrition education at the national and local levels to improve the health status of all citizens (UFNC, 2000). However, nutrition education is still unavailable to the majority of Ugandans since most people cannot read or do not have access to nutrition information. Effective channels through which health messages can be delivered are lacking. It is estimated that only 0.2% of the rural population has access to television while radios are available to 23% and 66% of the rural and urban households respectively (UFNC, 2000). This indicates that the majority of Ugandans cannot benefit from nutrition information delivered through the mass media.

Health care workers, teachers, and agricultural extension workers are often the people that provide nutritional education (UFNC, 2000). The extension workers and teachers are often limited in number and thus do not reach very many people. Healthcare workers are the ones that reach most people. Traditionally, nutrition information is provided as part of counseling when people present to hospitals with various ailments. Nutrition information is also availed to parents, mostly mothers, at health centers and hospitals during antenatal clinics and immunization visits (Statistics Department, 1996).

Malnutrition rehabilitation centers have played a big role in treating malnutrition and providing nutrition education (Hoorweg and McDowell, 1979). These centers are designed to teach mothers of malnourished children how to feed their children. The

mothers who go through these clinics are not only provided with information, but are also engaged in activities which demonstrate better food preparation and child-feeding skills. Nutrition rehabilitation clinics are praised in this respect because the mothers who participate in the nutrition programs rarely return to these clinics for nutrition-related consultations (Hoorweg and McDowell, 1979). This could be due to the fact that nutrition information is provided at the right teachable moment and thus is retained and utilized. The limitation with malnutrition clinics is that they do not reach many people. Due to accessibility problems, malnutrition rehabs end up serving only those people who live in their catchment areas (Statistics Department, 1996). Mwanamugimu, which is Uganda's major malnutrition clinic, had attempted to resolve this problem by using the nutrition scouts (women who went through clinic) to teach better feeding practices to other mothers in their home villages (Hoorweg and McDowell, 1979).

Effectiveness of Community-Based Nutrition Interventions

There are hardly any published studies that have investigated the effectiveness of community-based nutrition education interventions in Uganda. Community nutrition education programs have been successful in countries that have demographic and socio-economic characteristics comparable to Uganda (Kavishe, 1995; Parvanta et al., 1997). These studies have demonstrated that nutrition education directly improves the mother's feeding practices. Regardless of the family's socio-economic status and environmental factors, mothers exposed to nutrition education tend to exhibit improved decision-making abilities concerning the choice of food crops, food processing and preparation techniques,

and food budgeting skills (Kavishe, 1995). This study proposed that rural Ugandan mothers would also change their feeding practices when exposed to nutrition education.

Statement of the Problem and Hypotheses Tested

Given the high prevalence of undernutrition and the associated incidence of nutrition-related child morbidity and mortality rates, the investigators identified a need for designing a community-based nutrition intervention to improve the nutritional status of young children in Uganda. Maternal education has proven an effective strategy in improving dietary intake even among limited-resource communities (Kavishe, 1995; Parvanta et al., 1997; Schurch, 1983; Sur et al., 1997). This study was designed to determine whether a nutrition education intervention targeting rural women would significantly improve the food knowledge, beliefs, and food selection and preparation behaviors of limited literacy, rural mothers in western Uganda. Figure 1.1 depicts the conceptual model for this study. It was speculated that the mothers who would participate in this pilot intervention would:

1. be able to identify and classify locally available foods into their appropriate food groups with improved accuracy,
2. demonstrate change in their beliefs about appropriate foods and amounts of food for children, and
3. increase the number of foods and the amounts of foods provided to young children.

In testing the first hypothesis, this study speculated that a mother was likely to serve foods she considers appropriate for her child. Thus, 'knowledge' in this study refers

to the mother being aware of the available food choices that comprise an appropriate and an adequate diet for her young children. Nutrition knowledge was operationalized as the mothers' ability to classify foods into the specified food groups. It was assumed that if the mothers were provided with appropriate nutrition information they would gain nutrition knowledge and consequently improve their child-feeding behaviors. Although nutrition knowledge is not always directly correlated to change in feeding behavior (Cochrane et al., 1982), it was important to assess the mothers' nutrition knowledge especially since this was a new study in this population.

The second hypothesis was based on the belief that the mother's values and practices significantly influence the dietary intake of young children. Research has shown that the mother's beliefs influence food processing and preparation methods used in a household (Essers et al., 1995; Serunjogi and Tomkins, 1990) and this in turn determines what kinds of foods are prepared (UFNC, 2000). The dietary intake of young children is also influenced by the mother's beliefs in regard to what food is 'good' for children and how the mother perceives young children's dietary needs (Mabilia, 1996). In this study, it was important to understand the mother's beliefs with respect to what kinds of foods are perceived 'appropriate' for young children.

The third hypothesis sought to determine whether nutrition education would improve the mothers' food selection practices. In testing this hypothesis, it was assumed that food was available. The mothers were expected to improve their feeding behaviors by providing a variety of locally available foods to their children. In this research, change in food selection habits was used as one measure of change in child-feeding behavior. The details of the intervention are discussed in the next two chapters.

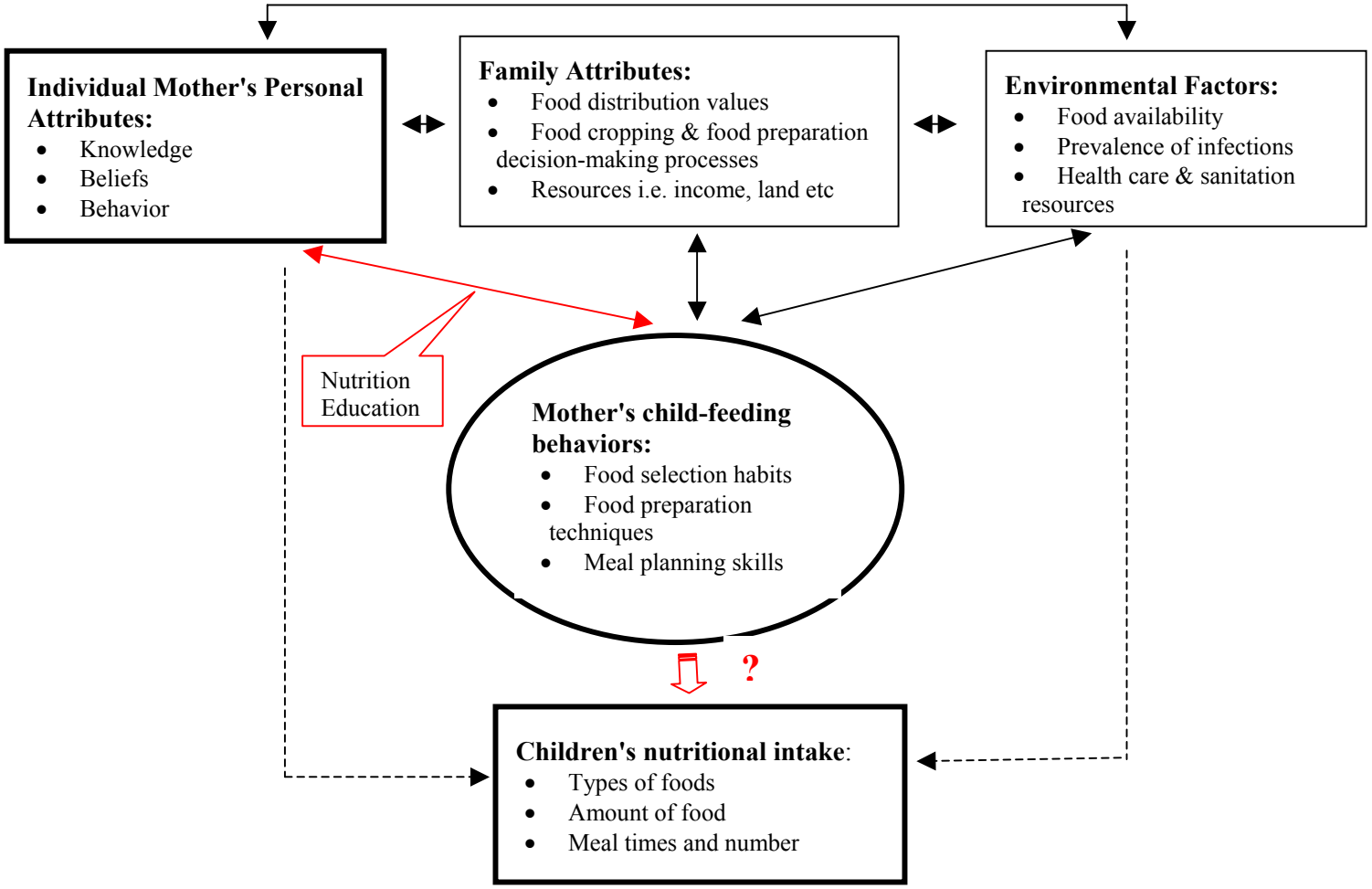


Figure 1.1: Factors that Influence the Mothers' Child-Feeding Behaviors

CHAPTER 3

DESIGNING AN INTERVENTION TO IMPROVE THE FOOD KNOWLEDGE, BELIEFS, AND FEEDING BEHAVIORS OF RURAL UGANDAN WOMEN

Introduction

Promoting good nutrition is one of the priorities of the Uganda government. According to Objective XXII of the 1995 Uganda Constitution, the state is required to "encourage and promote proper nutrition through mass education and other appropriate means" in order to foster a healthier state (UFNC, 2000). In line with this objective, the Uganda Food and Nutrition Council has outlined nutritional issues that need urgent attention. Non-governmental and governmental organizations have also undertaken initiatives to educate people about good nutrition. Despite the efforts to promote good nutrition, malnutrition remains a major problem especially among young children and women (Statistics Department, 1996).

The proposal of educating the masses about good nutrition is noble but difficult to implement in a country like Uganda where much of the population is hard to reach. Illiteracy and poverty limit peoples' access to the mass media (Statistics Department, 1996). This creates a barrier in communicating nutrition information. Nutrition information is available to individuals who can read and those with access to radio or television. The major issue in promoting and encouraging good nutrition in Uganda is

finding a channel that would effectively deliver appropriate nutrition messages to the people who need it most.

In this study, a nutrition education program was developed and piloted in effort to increase nutrition information accessibility among women in rural areas. This decision was based on published literature that indicated trends of high rates of women's illiteracy in rural areas that were paralleled with high rates of malnutrition among children (Statistics Department, 1996). This intervention was specifically developed to help women (mothers) plan and prepare nutritionally adequate meals for their children. The model curriculum used in the intervention was tailored for improving the child feeding behaviors of rural mothers whose main occupation was subsistence farming.

To develop a culturally appropriate program with appropriate nutritional messages, measures were taken to involve the target audience in the planning process. Consequently, planning the intervention involved two major steps that are hereby treated as two different studies for clarity purposes. The two major studies conducted were: (1) assessing the needs of the target mothers and (2) developing the model curriculum.

Study 1: Assessing the Needs of the Target Mothers Using Focus Groups

In developing any program, it is always important to characterize the needs of the target audience. This was a major factor in designing this intervention since there was hardly any published literature documenting the food beliefs and child-feeding behaviors of child-caretakers in western Uganda. Studies conducted in the early 1970s suggested that the diets provided to young children in western Uganda were nutritionally inadequate (Hoorweg and McDowell, 1979; Rutishauser and Frood, 1973). Recently published

literature has not clearly identified the food customs, beliefs, and behaviors that influence these inappropriate feeding behaviors. This lack of information regarding the beliefs and specific food habits presented limitations in designing an intervention that would address the particular needs of the target mothers. To overcome these limitations, focus group discussions were conducted.

Focus groups have been used successfully in planning interventions to assess the needs, attitudes, and nutrition practices of the target population (Iszler et al., 1995; Quatromoni et al., 1994). Focus groups have also been used to assess cultural food patterns (Airhihenbuwa et al., 1996) and characterize food choices (James et al., 1996). In Uganda, focus groups have been used successfully to assess community health beliefs and the efficacy of health interventions especially in regard to prevention of sexually transmitted diseases (Hart et al., 1999; Nuwaha et al., 2000).

Focus groups were used in this study to assess the needs of the target mothers and to characterize the factors that influence the mothers' feeding behaviors. This information was needed in order to design an intervention that would appeal to the participants and consequently help them improve their food selection habits and child-feeding behaviors. The main objectives of the focus group discussions were to: (1) assess the nutrition knowledge and information needs of the mothers; (2) determine the food resources available to the mothers; (3) get an insight of the mothers' specific beliefs about foods in general and their perceptions about foods appropriate for children; and (4) to assess the mothers food selection and preparation behaviors that needed to be targeted by the intervention.

Focus Group Participants and Study Setting

The subjects were recruited from villages in Kabarole district, western Uganda. All women who had young children and resided in the target villages were enlisted and then each possible participant was visited at her home and asked to attend. The focus group participants were all mothers who (1) had children of ages 2 to 5 years, (2) had not completed secondary school, (3) were not employed or working outside their homes, and (4) were typified as low-income. Two high-school graduates who lived in the same village were hired to help recruit the subjects.

Of the total 31 mothers asked to participate, 28 agreed to attend and only 21 subjects participated in the focus groups. The focus groups were conducted between December 23 and December 29, 2000. A total of five mini-focus groups of 3 -5 participants each were conducted.

Collection of Focus Group Data

The investigator served as the moderator for all the focus group discussions. Two high school graduates were recruited to assist with taking notes. Krueger's guidelines on using focus group data were adhered to in collecting and analyzing this data (Krueger, 1994). At the beginning of each focus group discussion, all participants were read a consent form as a group and each individual was asked to either express verbal consent or sign the consent form (Appendix A). Open-ended questions were structured to assess the target mothers' nutrition knowledge, their food-related beliefs, and to characterize their child-feeding behaviors. The questions asked are included in Appendix A. In most cases, these questions were asked in the order they appear.

To assess nutrition knowledge, the participants were asked to give examples of foods that can be grouped as body-building foods, identify foods that can protect children from getting sick easily, and to name foods that provide energy. This information was needed to determine whether the participants had prior nutrition education. The availability of food resources was assessed by asking the participants to list the foods they prepare for their families and to explain how they obtain the food items that they do not produce themselves. Food beliefs were determined by asking the participants to name the foods they considered appropriate for children. Participants were also requested to identify the kinds of fats or oils, meats, fruits, and starchy foods they perceived appropriate for young children. Questions were also asked about the mothers' food selection and preparation habits. The participants were also asked to describe how they fed their children on a typical day; to indicate whether or not they prepared separate meals for young children, and to specify the age at which children are weaned to regular family meals. In addition, the focus group participants were also requested to provide their opinions about serving each child on his/her own plate, to provide their opinions on the cooking technique whereby different kinds of foods are mixed and cooked in one pot, and to verbalize “the problems they encountered in feeding their young children”.

Focus Group Results:

The first focus group discussion served as a pilot. These results reflect responses from three focus group discussions.

Nutrition Knowledge:

The participants' responses varied somewhat when asked to name the foods that belong in each of the three food groups. Eggs were identified in all focus groups as a body-building (protein-rich) food. Most groups also identified beans, milk, groundnuts (peanuts) and meat as body building foods. Cabbage and *dodo* (amaranth) were wrongly identified as body-building foods in two groups. Members in one focus group named high carbohydrate foods like bananas, sweet potatoes, yams, millet and cassava flour as body building foods.

The mothers' responses on protective foods were also varied. All the groups identified green vegetables (especially *amaranth*) as a protective food. Fruits were mentioned in only two focus groups. Most mothers were not familiar with foods that belonged to the protective food group. The majority of the participants indicated that their children pick fruits on their own and in most cases consumed fruit as snack in between meals. Generally, the mothers believed that foods from all food groups were protective against diseases.

With regard to energy-yielding foods, sweet potatoes were verbalized as the most energy dense food. Bananas, maize meal, millet, cassava, and yams were correctly identified as energy-yielding foods. However, yams were considered inappropriate for young children because "yams are too hard to chew". Soft foods were incorrectly associated with higher nutritional value. In general, soft food items such as Irish potatoes were considered the most appropriate foods for young children.

Food-Related Beliefs and Beliefs on Feeding Children:

When the mothers were asked to name the foods they believed were appropriate for children, there were mixed reactions (Table 3.1). Some mothers indicated that they did not know which foods are appropriate for children and felt that they were not feeding

Table 3.1: Summary of Beliefs Verbalized in the Focus Group Discussions

Food Item	**Reason why the Mothers Felt Food Item was Inappropriate**
*Yams	Too hard to chew
	Induces swelling of young children's stomachs (kwarshiokor)
*Meat	Child will develop intestinal worms if provided meat before first teeth appears
Beans	Give gas to children
*Cold foods (i.e. leftovers)	Cause kwarshiokor
Sweet potatoes	Cause diarrhea
Maize meal porridge	Causes heartburn
*Cooking oil	Causes heartburn
*Cassava	Too hard to chew

* Verbalized in 2 or 3 focus groups

their children properly. Others reluctantly named the foods they often prepare for their families as the most appropriate for children. Soft foods like *dodo* (amaranth), avocado,

millet porridge, Irish potatoes, bananas, and soy porridge were associated with high nutritional value. In the meats group, only goat meat and beef were verbalized as appropriate for children. Fish was identified as appropriate for children in only one focus group. Pork was branded 'inappropriate' by all focus groups.

Overall, the investigator noted a trend whereby most focus group participants seemed confidence when listing the foods they believed were 'inappropriate'. On the other hand, the participants also tended to hesitate when listing foods they believed were 'appropriate' for young children.

Feeding Behaviors

A good understanding of the mothers' feeding behaviors was very important in this assessment. It was important to identify the specific behaviors that were to be targeted by the nutrition messages. The focus group participants were asked to report on their food selection habits, feeding patterns, and meal planning habits. When asked about their child feeding practices, most mothers indicated that they did not make special meals for children. Children ate the same food prepared for adults in the family unless the food was 'inappropriate' for children for young children. "Inappropriate" food was characterized by all focus groups as "a staple without a relish or food that seemed dry". When the food prepared for the whole family was 'inappropriate' for young children, ghee was added to the young children's food plate "to increase nutritional value". Most participants specified that they often prepared special drinks for children to ensure that children had something to drink whenever they felt hungry. Tea, millet porridge, and

milk were the drinks commonly prepared for young children. Milk was often mixed in tea or porridge.

The time when children were fed varied depending on the ages of the children. Most participants indicated that they provided their children with three meals daily. Like adults in the family, children were fed in the morning before the mothers went to work in the fields, around mid-afternoon when the mother returned, and at suppertime (around 7-9 pm). In times of food shortage or during the seasons when the mothers work for long hours, children are provided with two meals (morning and evening). In such events, children are often reserved some food (in most cases leftovers from the previous meal) to snack on.

Snacking in between meals was considered appropriate. The foods considered appropriate for snacking included tea with milk, ripe apple bananas, fruit juice, and any available fruits. There were disagreements on whether or not tea is appropriate for children. The majority of the participants felt that it was better to give children tea rather than let them go hungry.

Food Resources Available to the Mothers:

Focus group discussions revealed food selection habits whereby a limited variety of foods were provided to children. All the mothers who participated in the focus groups reported that they grew much of their families food supply. One focus group identified land shortage as the major factor that determines what kinds of foods are grown. Bananas, sweet potatoes, and cassava were verbalized as the main staples consumed by most participants. Some food items like cassava flour and corn meal were often bought

to supplement what was produced, especially during periods of food shortage. All participants indicated that they would like to buy more food but were often limited by not having enough money. There was no report of bartering food items between families or even friends.

Nutrition Information Needs:

The focus group participants were also asked to indicate what they wanted to learn about in regard to feeding young children. The participants indicated that they wanted to gain knowledge of (1) what times are appropriate to feed children, (2) the "types of foods that are good for children", (3) preparing foods like soy beans which they had been informed were good for children, and (4) to know the "foods that can help children grow without getting sick". Some participants indicated that they would like to learn everything about feeding children.

Limitations of Focus Group Discussions

One of the limitations of the focus group discussions points to the reliability of the questionnaire used. Due to time and distance limitations, the questionnaire used in the focus group was not piloted in the target population. This questionnaire was piloted with some African students at the University of Georgia who were obviously more educated than the target audience. Consequently, some questions did not solicit the desired information. For instance, question #6 (Appendix A) asked the focus group participants to indicate 'problems they encounter in feeding their children'. Most mothers responded that they "did not encounter any problems".

Conclusions

Overall, the focus group results indicated a need for the intervention. It was clear that the participants were not informed about the food groups. The participants' responses did not show that these participants had been educated about food groups. The results also revealed a variety of food beliefs that most likely influenced food choices. The reported food selection practices and feeding behaviors seemed to be related to environmental factors and cultural norms. The major issues related to feeding behavior were the availability of food, convenience of food, and the daily activities of the mothers. This information derived from the focus group discussions was very helpful in finalizing the model curriculum.

Study 2: Development of the Model Curriculum

As stated earlier, this model curriculum (Appendix C) was designed to improve the child-feeding behaviors of rural women in western Uganda. Specific messages were developed to help the target mothers improve the nutritional adequacy of their children's diets.

Curriculum Design and Objectives

Based on the literature review and focus group discussions, the curriculum was designed to (1) to increase the mothers' ability to select and incorporate a variety of food types into their family's (children's) diets and (2) to teach the mothers' food preparation and cooking techniques that maximize the number of food types provided to children. Emphasis was placed on making sure that the nutrition messages would appeal to the

needs of rural, low-literacy, adult learners who had limited resources. Guidelines on developing materials for adult learners and people with low-literacy (Doak et al., 1996) were employed in designing this curriculum.

In general, this curriculum was designed to help participants understand the importance of good nutrition to their children's development. Simple nutrition messages were constructed to help the mothers separate facts from the popular beliefs verbalized in the focus group discussions. Interactive discussions and hands-on activities were incorporated in the curriculum to help the participants retain the information and utilize it.. Constructs of the social learning theory of observational learning and behavior change (Bandura, 1969) were operationalized in planning the cooking classes. It was postulated that the participants would change their food selection and preparation habits when taught appropriate skills.

Description of the Lessons

The model curriculum consisted of seven lessons. Each lesson was planned in such a way that the mothers would receive 15–20 minute classroom style lectures followed by 30-45 minute cooking class sessions. Each lesson focused on a single theme (Table 3.2). The key theme in all the lessons was increasing variety food variety among and within food groups. Food variety was a central theme in this study because research shows that diets that comprise a variety of foods tend to be adequate in most nutrients (Heber and Bowerman, 2001; Krebs-Smith et al., 1987).

Table 3.2: Summary of Lesson Themes and Objectives

Lesson Themes	**Objectives**
Lesson 1: Identifying and choosing a variety of foods from the three food groups	1. To increase the mothers knowledge of the 3 food groups 2. To increase the mothers' ability to incorporating foods from all three food groups in children's meals
Choosing and preparing body building foods Lesson #2: Plant food sources Lesson #3: Animal food sources	1. Increase the mothers' awareness of protein-rich food sources (plant protein sources and animal protein sources) 2. Modify the mothers' beliefs about which protein-rich foods are appropriate for children 3. Teach the mothers the skills they need in order to select and prepare a variety of protein-rich foods for their children
Choosing and preparing energy yielding foods Lesson 4: Rich carbohydrate sources Lesson 5: Fats, oils and sweets	1. Increase the mothers' awareness of other local foods that can be added to or substituted for the staple food (bananas). 2. Modify the mothers' beliefs about which energy-yielding foods are appropriate for children 3. Coach the mothers on how to select and appropriately incorporate fat and sweets in children's meals
Lesson 6: Choosing and preparing protective foods (Fruits and vegetables)	1. Enhance the mothers' awareness about the benefits of incorporating fruits and vegetables in children's diets 2. Modify the mothers' beliefs about which fruits and vegetables are appropriate for children 3. Provide the mothers with tips on how they can increase the varieties and amounts of fruits and vegetables in their children's diets
Lesson 7: Planning and scheduling meals for children	1. Emphasize the benefits of providing children foods from all the food groups 2. Coach the mothers on how to prepare meals that incorporate foods from all the food groups 3. Enhance the mothers' food apportioning skills and emphasize the need to increase the amounts of food served to their children 4. Instruct the mothers on how to increase the number of meals/snacks they provide to their children

The Food Plate Schematic

There are many food guides that have been developed to help individuals make appropriate food choices and adhere to nutritionally adequate diets. The Food Guide Pyramid is the most popular food guide and is now available in many languages, and has been adapted to meet the needs of various cultural groups (USDA and DHHS, 2001). At the time we developed this curriculum, we did not find a suitable food guide that could effectively communicate the concepts of variety and proportionality to the target population. Since the target mothers had low literacy it was necessary to design a food guide that they would easily understand. We needed a graphic that would not intimidate the participants and yet help them internalize the concepts of variety, proportionality, and diet adequacy. A food plate guide (Figure 3.1) was developed for this purpose.

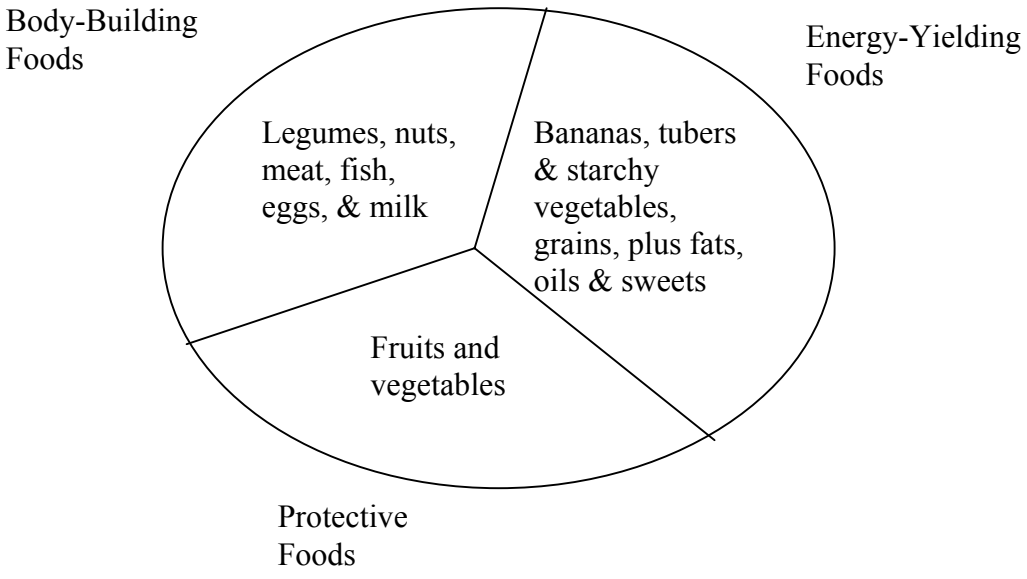


Figure 3.1: Components of the Food Plate Schematic

This food plate guide was designed to mimic the American Food Guide Pyramid (USDA and DHHS, 2001). For simplicity purposes, the five food groups of the pyramid were condensed into three food groups. The three food groups emphasized in this study were: (1) the energy-yielding foods group, (2) the body-building foods group, and (3) the protective foods group. These groups have been emphasized in earlier studies conducted in Uganda (Hoorweg and McDowell, 1979). Hoorweg and McDowell (1979) also used these food groups to evaluate the effectiveness of nutrition education at Mwanamugimu Nutrition Unit.

In developing this graphic, efforts were taken to ensure that the participants would relate the schematic to their usual dietary intake. This explains why a plate was used as opposed to the pyramid or an abstract shape (Appendix B). The food items depicted on the graphic were carefully chosen to reflect the diversity of indigenous foods. These foods are very common in western Uganda and could easily be accessed by the target population. Since the target participants were subsistence farmers, the investigators felt it was important to portray the food items in raw form. The food plate graphic also depicts complete food items instead of individual serving portions shown by most food guides (USDA and DHHS, 2001).

Evaluation and Modification of the Curriculum

In developing an intervention, the main concern is to ensure that the messages are accurate, culturally appropriate, and delivered in a manner that would appeal to the participants. In the early stages of developing this curriculum, the investigator consulted with Ugandan women living in the United States and some African students at the

University of Georgia to ensure that the program would be culturally appropriate. The first draft of the curriculum was reviewed by professionals in Uganda and modified accordingly. The people in Uganda who reviewed this curriculum for cultural appropriateness included: a food science and nutrition professor who has conducted research on child nutrition in Uganda; a university lecturer and researcher on gender issues in Uganda; a community nurse who also worked as a community educator; and a primary school teacher who headed a women's self-development club and also served as a community educator.

The final draft was reviewed by peers from the Nutrition Intervention Laboratory at the University of Georgia. This group of reviewers were asked to assess the accuracy and appropriateness of the nutrition messages. The curriculum that was reviewed by this group was the second draft that had already incorporated the comments and suggestions of the reviewers in Uganda.

Pre-testing the Model Curriculum

The curriculum was subjected to pre-testing when the intervention was piloted to a focus group of women in Kabarole district. This pre-test exercise was originally planned to mimic the actual intervention but this was not possible because the community educators did not have sufficient time to commit to this exercise. Thus, the pre-test exercise was in form of an 8-hour workshop conducted in one day. The investigator went through the curriculum and at the end of each lesson the group would take a brief break and give suggestions on what things needed to be changed or added to the curriculum.

The participants mostly provided suggestions on what kinds of dishes should be prepared during the classes and how various tasks could be assigned to the target mothers.

The women who participated in this pre-test exercise indicated that the lessons were very informative and interesting but advocated for the lengthening of the cooking class sessions to 2 or 3 hours. Most participants felt that the cooking classes were interesting and would benefit the mothers. This was taken as expert advice since some of the participants had served as community leaders or educators in the target community.

Discussion

Getting information from the target audience was very instrumental in developing this intervention. Focus groups provided valuable information with regard to the target mothers' needs for nutrition education. Focus groups also provided an insight of the target mothers' perceptions on what foods are appropriate for children and also helped us to characterize the mothers' feeding practices and to determine the issues surrounding the target mothers' food choices. Only those issues that were verbalized in two or more focus groups were addressed by the intervention.

Since the target population was involved in the curriculum development process, we believed that this curriculum has high face validity and can be adapted for other rural populations in developing countries. We also believed that this curriculum addressed the needs of rural, low-income mothers and was culturally appropriate. The lesson plans also had a variety of demonstrations and hands-on activities that encouraged the participants to develop their skills. Overall, we felt that this curriculum was appropriate for the target

population because the learners were not obligated to make drastic changes in their daily lives. All they had to do was to use their available resources and gradually improve their feeding behaviors. It was thus speculated that this curriculum would improve the feeding behaviors of rural women in western Uganda.

CHAPTER 4

EFFECTIVENESS OF THE INTERVENTION

Introduction

Educating people who take care of children has been suggested as one of the most effective strategies for improving children's health status (Bharmal, 2000; Smith and Haddad, 2000a). Nutrition education is especially important for countries that have high rates of illiteracy paralleled with child malnutrition. Uganda is one the Sub-Saharan African countries in this situation (MGCD and MPED, 1998).

The 1998 survey conducted by the Ministry of Gender & Community Development in collaboration with the Ministry of Planning and Economic development reported high rates of illiteracy among Uganda women. This survey reported that 23.7% and 58.1% of Ugandan females over the age of 15 years in urban and rural areas respectively were illiterate (MGCD and MPED, 1998). A survey conducted by the Ministry of Finance and Economic Planning also echoed these findings. About 38.8% of women in rural areas had received no education at all; 55.8% were only able to attend primary school, while 5% of had attained secondary school (Statistics Department, 1996).

Improving women's awareness about appropriate nutrition is particularly important since women are the ones that often produce food for their families (UNDP,

2001). Research has shown significant positive relationships between women's (mother's) educational status and nutritional status of young children. Children whose mothers receive education above primary level tend to be well nourished (Kikafunda, 1998a; Vella et al., 1995). On the other hand, significantly high rates of malnutrition have been reported among children of illiterate mothers (Vella et al., 1995). Although it is not clear how exactly parental education influences child health, there is strong evidence that suggest that improving women's education would result in improvements in young children's health status. A meta-analysis of studies from different countries revealed that maternal education influences child health regardless of whether health status is assessed by nutritional status or mortality rates (Cochrane et al., 1982).

The objective of this study was to determine whether a nutrition education intervention targeted to rural women would improve the food knowledge, food-related beliefs, and the child feeding behaviors of low literacy, rural mothers in western Uganda. It would speculated that if the mothers are provided with nutrition information, they would be more aware of what foods comprise an adequate diet; change their food selection and preparation behaviors; and consequently provide their children with adequate amounts of a variety of foods from all food groups.

Study Design

This study was a controlled intervention trial. Two groups of mothers (N = 71) were recruited on a first-come-first-served basis from 2 two sub-counties. Both groups attended classes concurrently for four weeks.

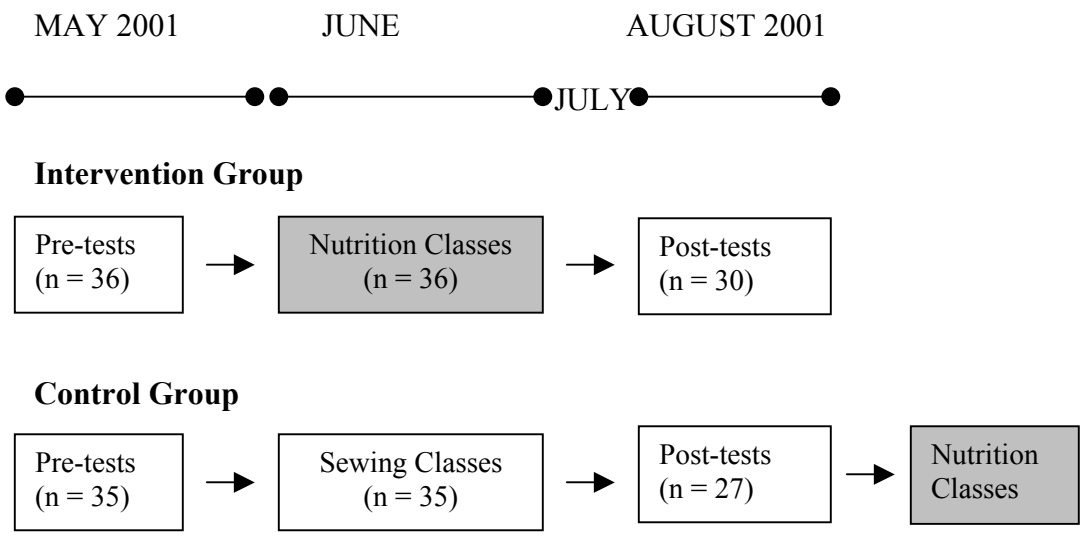


Figure 4.1: Intervention Overview

Setting and Study Participants

The study was conducted in Kabarole district, western Uganda. The participants (N = 71) were composed of two groups of mothers: the nutrition intervention group (n = 36) and the control group that attended sewing classes (n = 35). The subjects in the intervention group were recruited from three villages in Bukuuku sub-county whereas the controls were recruited from two villages in Kyakabaseke-Kabaswiswi sub-county. All the participants in the study were mothers who had at least one child of 2 to 5 years of age. The mean ages of the participants' in the intervention group (mean = 28.6) and the control group (mean = 27.4) were approximately the same. All the subjects belonged to the Batooro tribe or were married to someone who belonged to the Batooro tribe. Table 4.1 provides more details about the study participants.

Table 4.1: General Characteristics of the Study Participants

Variable	Intervention Group (n=36)	Control group (n=35)
Age (years)	28.6 ± 7.8 (20 - 53)	27.4 ± 6.7 (16 - 43)
Number of years attended school	4.3 ± 2.2 (0 - 7)	2.8 ± 3.0 (0 - 10)
Number of children	3.7 ± 1.9 (1 - 8)	3.2 ± 1.9 (1 - 7)
Total number of children in household (Number in parentheses indicate range)	4.4 ± 2.3 (1 - 9)	3.4 ± 2.0 (1 - 8)
Occupation(s):	23	17
Homemaker/subsistence farmer		
Homemaker/farmers who also engaged in other activities:		
Trade in small items	6	4
Brew and sell *Waragi*	1	3
Make and sell quick breads	0	3
Owns a butcher	1	0
Make crafts for sale	1	1
Potter	0	4
Could not describe their occupations	3	3

Although there were minor differences between the education levels attained by the participants, their occupations were approximately the same. All the mothers worked at home. Most of the mothers in both the intervention group (66.7%) and control group (54.3%) earned their living from subsistence farming. The rest of the participants (31.0%) depended largely on farming but also engaged in other money generating activities like trading in food items and clothes, brewing or selling beer (*Waragi*), selling quick breads, and making and selling crafts. Since the two groups engaged in similar activities it was anticipated that they would also have comparable food selection habits and child feeding practices.

Description of the Intervention

The intervention was a 4-week nutrition education program, comprised of seven 4-6 hour nutrition lectures and cooking classes conducted by the local community educator. These classes were designed to coach the participants to provide a variety of foods to their children and to provide children with appropriate servings of foods from all food groups. The intervention participants were also taught food preparation skills and cooking techniques that maximize the number of food types included in children's meals. To relate the class activities to the home environment, the participants were always challenged to role-play preparing the most appropriate meals for their children. Indigenous foods were always used in cooking to help the participants relate the intervention activities to their family environments.

Visuals Aids

Samples of local foods were used as models during each class session. The participants were always presented with an array of indigenous foods from all food groups. The investigator always made sure that the participants had a variety of foods from the food group that was under discussion. In this study, variety was conceptualized as diversity in terms of food types, processing methods, and packaging. For instance during the lesson on plant proteins the participants were introduced to a variety of local nuts, peas, and legumes. For the legumes sub-group the food samples used as models included different varieties of raw beans and peas (fresh and dried), different varieties of processed bean products like *Soymil* (millet/soybean flour), fermented bean paste, peeled

beans, and canned beans. This was to help the participants internalize the concept of having variety within a particular food group.

In addition to the actual food models, posters were also used. The posters were developed by the investigators to aid in getting the participants interested in class activities, help them visualize the concepts being discussed, and to foster discussions. The posters depicted the concepts of food variety and diet adequacy. Participants were always encouraged to interpret the posters and discuss the message conveyed by each poster.

Data Collection

Dietary data was collected from all participants before and after the intervention to assess changes in food knowledge, beliefs, and child-feeding behaviors. This data was collected through interviews. All interviews conducted before the intervention were carried out at the participants' homes. Each participant was visited and interviewed individually at her home. However, due to time limitations, the post-intervention interviews were not all conducted at the participants' homes. Those participants that were difficult to get were asked to congregate at the learning sites and each participant was interviewed privately. All interviews followed a structured questionnaire (Appendix D) that was composed of a 24-hour dietary intake recall, questions on food knowledge and feeding behavior, and a food frequency questionnaire that was complemented by the food picture cards. For consistency in data collection procedures, the same questionnaire was used for both groups and during both interviews.

Development and Use of the Food-Picture Cards

The food picture cards used in this study were developed by the investigator. Pictures of raw indigenous foods were taken in gardens, local food markets, and local shops using an Olympus 1.3 Megapixel Digital Camera (Model: OLM BRIOD150ZOOM). These pictures of individual food items were then developed into food picture cards of approximately 5 X 4 inches in size (Appendix D).

A total of 103 food-picture cards were developed and used to evaluate the participants' food selection habits. All participants were presented with the food pictures and asked to sort out the foods they prepare in their homes. The food cards were also used to assess food knowledge and food-related beliefs. During the interview sessions, the participants were given the option to use the food cards to identify and classify the food items into the three foods groups; identify which foods they believed were appropriate for their children; and identify the foods they were willing and able to feed their children.

Assessment of Food Knowledge and Beliefs

In this study, food knowledge was conceptualized as awareness of what foods comprise a nutritionally adequate diet. For assessment purposes, food knowledge was operationalized as the ability to classify different foods into their appropriate food groups. Improvement in food knowledge was assessed by asking the mothers to identify or name at least 5 foods for each food group. Each participant received a score based on the number of foods accurately classified to the correct food group (Appendix E,

Items Q3 – Q5). The first five foods verbalized or sorted out were the only ones included in the analysis.

Food beliefs were operationalized as the mothers' perceptions about which foods were appropriate for young children. A score of 1-3 was assigned based on the mothers' responses. Details on how the subjects' responses were coded are provided in Appendix E, items Q6a and Q6b.

Assessment of Food Selection Habits

A semi-quantitative food frequency questionnaire (Appendix D) was used to assess changes in the participants food selection habits. The food frequency questionnaire has been validated against other dietary assessment measures and is known to provide consistent results (Andersen et al., 1999; Krall and Dwyer, 1987; Pijls et al., 1999). In this study, the food frequency questionnaires were used to determine what kinds of foods were selected. The mothers self-reported their food selection patterns by indicating how many times a particular food item was provided to their children.

Since most participants could not complete the questionnaires on their own, to reduce interviewee influence, the food picture-sorting technique (Kumanyika et al., 1997) was employed. The food-sort technique has proven effective in assessing dietary patterns. This assessment method is simple and its effectiveness has been validated against the conventional food frequency questionnaire (Kumanyika et al., 1996). The food-sort technique also keeps the interviewee interested without affecting the quality of data (Kumanyika et al., 1996) and has potential in assessing the food selection habits of people with limited literacy (Yaroch et al., 2000).

Assessing the Adequacy of Meals Provided to Young Children

One of the key objectives of this study was to help the mothers prepare nutritionally adequate meals for their children. The adequacy of children's diets was used as one measure for assessing improvement in the mothers' feeding behaviors. Dietary recalls (Appendix D) were used to assess changes in types of foods provided to children, amounts, and the number of times children were fed. The mothers (participants) were asked to recall all the foods and drinks their children consumed during the last 24 hours preceding the interview. Only the recalls of children 2-5 years of age were included in the analysis. Food models (ground beef and vegetable models) and household utensils (cups, plate and spoons) were used to help the participants estimate the quantities of foods they provided to children.

In spite of efforts to help the participants quantify their children's dietary intake, some mothers were unable to report the amounts of food served or eaten by their children. This could have been due to the fact that most mothers were not used to reporting their children's dietary intake quantitatively. Consequently, the data obtained through the 24-hour dietary recalls was analyzed using the scoring method.

Diet scoring methods have been used by other investigators (Bowering et al., 1977) and are considered appropriate in describing dietary behavior (Guthrie and Scheer, 1981; Hatloy et al., 1998). In other studies that have used these scoring methods, the food groups of the American Food Guide Pyramid (Appendix B) were used as the basis for dietary adequacy. In this study we developed a modified food guide (Appendix B) that reflect the dietary patterns in rural areas of Uganda. We used this food guide as the basis for our scoring system.

Table 4.2: Using Food Groups to Compute Diet Adequacy Scores

Number of recommended servings	Food group	Points per serving	Ideal food group score
6	Energy-Yielding Foods Bananas Tubers and starchy vegetables Grains Porridge Fats and sweets	 1 1 1 1 1	6
4	Body-Building Foods Legumes Nuts Meat, fish, poultry, and eggs Milk and milk products	 1 1 1 1	4
 2 3	Protective Foods Fruits or fruit juice Vegetables	 1 1	5

Adapted from Guthrie & Sheer (1981)

Validity of the Scoring Method

To assess the validity of our scoring method, we sorted out the best dietary records and entered them into a diet analysis program. We started by sorting out all the records in which the mothers consistently reported the quantities of foods served to their young children. We then randomly selected 20 diet records from the stack of our best records. These 20 records were then and scored based on the 3 food groups as shown in Table 4.1above.

All foods were regarded as equally important in ensuring a nutritionally adequate diet. Thus, each food item served during a meal was considered important and assigned a

value of one (1) point. Scores computed for each participant (N = 20) were then compared to the amounts of selected nutrients. The nutrient content of the diets was assessed by analyzing each of the 20 dietary records individually using the diet analysis software, FoodWorks Version 3.0 . Pearson's correlations were used to assess the strength of the relationship between the dietary scores and the selected nutrients.

Overall, the total score was positively correlated with caloric intake ($r = .65$, $p < .005$), protein ($r = .71$, $p < .001$), total fat ($r = .48$, $p < .05$), calcium ($r = .53$, $p < .02$), iron ($r = .50$, $p < .05$), and zinc ($r = .72$, $p < .001$) intake. The only nutrients included in the analysis that were not significantly correlated with the total score were total carbohydrate, vitamin A, vitamin C, and folate. However, the score for the Banana group strongly paralleled total carbohydrate intake ($r = .58$, $p < .01$); vitamin A intake was significantly related to the score for the Fruit group ($r = .47$, $p < .05$) and also positively related to the score on the Tubers-starchy-vegetable group ($r = .57$, $p < .01$); while folate intake was strongly correlated with the score on Legumes ($r = .80$, $p < .001$) and moderated related to score on the Milk group ($r = .44$, $p = .05$). Estimated regression curves for significant correlations are depicted in Appendix F. In general, the scoring method provided a close approximation of the quality of the diets provided to young children (Table 4.3)

.

Table 4.3: **Correlations Between Dietary Scores and Amounts of Selected Nutrients**

Dietary intake variable	Protein (34.9g)	Carbo-hydrate (256.5 g)	Total Fat (18.3 g)	Calories (1268.1)	Vitamin A (2233 RE)	Folate (418 mcg)	Vitamin C (98.5 mg)	Calcium. (295 mg)	Iron (9.1 mg)	Zinc (5.6 mg)	Score 9.1
Energy yielding (5.1)											
Bananas (1.7)	.052	.577**	-.060	.338	-.099	.065	.290	-.204	-.013	.116	.097
Tubers & starchy veggies (1.6)	-.023	.039	-.140	-.012	.569**	-.049	.334	.234	.122	-.088	-.149
Grains (.7)	.269	-.320	.257	-.040	-.217	-.003	-.166	.165	.096	.468*	.480*
Porridge (.6)	-.081	-.208	.216	-.039	-.288	-.211	-.247	-.086	-.150	.003	.005
Fats and sweets (.5)	-.143	-.049	.395	.097	-.190	-.189	-.187	-.322	-.241	-.194	.094
Body-building (3.2)						.62*		.56*	.61*		
Legumes (1.8)	.378	.339	-.458**	.097	.084	.798***	.186	.378	.438*	.225	.181
Nuts (.2)	.347	.164	.548*	.422	.157	-.057	-.112	-.052	.139	.298	.600**
Meat, fish, poultry & eggs (.3)	.168	.196	.536*	.432	.356	-.338	.140	.059	.165	.239	.164
Milk and milk products (.8)	.498*	-.019	.127	.159	.248	.437	.196	.555*	.353	.383	.504*
Protective (.8)											
Fruits or fruit juice (.1)	.074	.002	.033	.041	.466*	-.106	.072	.253	.011	.063	.324
Vegetables (.7)	.029	.118	-.028	.069	.055	-.025	.072	.233	.092	.033	.165
TOTAL SCORE (9.1)	.713***	.410	.481*	.651**	.326	.334	.293	.532*	.501*	.716***	1.00

Correlation significant at *** $p < .001$, ** $p < .01$, * $p < .05$ ($N = 20$). Numbers in parentheses indicate the mean value for each variable.

Data Analyses Procedures

This study sought to determine if the intervention would improve the participants' food knowledge, beliefs, and child-feeding behaviors. In this regard, emphasis was placed on assessing changes that could be attributed to the intervention. These changes were determined by computing the mean group scores (gain scores) on the various variables included in the analysis and evaluating the significance of the differences between the two groups (intervention and control group). All quantitative data was analyzed using the computer software Statistical Package for Social Sciences (SPSS) Version 10.0. Analyses of variance (ANOVA) were carried out to examine group differences in nutrition knowledge, food-related beliefs, meal patterns, food variety, food frequency, and adequacy of children's diets. An alpha level (p value) of 0.05 was chosen to identify statistically significant differences between the two groups.

The Dietary Adequacy Score was computed by summing up the number of points scored for each food group (Table 4.2). Data collected using the food frequency questionnaire was coded as indicated under item Q2 of the data coding scheme (Appendix E). Scores for all the individual food items listed on the food frequency questionnaire (Appendix E) were computed; these scores were then summed up to calculate the food group Frequency of Use scores. The Food Variety score is a mere count of the number of foods selected from each food group. This score was calculated following the same procedures used to determine the Frequency of Use scores.

Results

Out of the 71 participants enrolled in the study, 77.5% (N = 55) participated in the final evaluation. The results on food knowledge, beliefs, and feeding behavior (Table 4.4) reflect data collected from these 55 subjects. However, two participants (3.6%) were not able to complete the second interview and thus most analyses (Table 4.5) reflect responses from 53 subjects (96.4%).

Overall, the participants in the intervention group had significantly improved knowledge of the food groups ($p = .001$) and changed their beliefs about what kinds of foods are appropriate for young children ($p = .005$). The intervention group also reported providing more meals to their children (Table 4.4) while the control group reported an increased number of snacks.

Food Knowledge and Food-Related Beliefs

An evaluation of the participants responses before and after the intervention indicates that the mothers in the treatment group had significantly improved knowledge of the food groups ($F(1,53) = 11.25$, $p = .001$). The intervention participants were more likely to classify a larger number of foods (mean = 4.89) into their correct food groups than the mothers who participated in the sewing classes (mean = 1.69). Of the three food groups discussed, the mothers who participated in the intervention were more able to identify foods from the protective foods group (1.93), while fewer foods were identified from the body-building food group (1.43). Table 4.4 provides details on changes in food knowledge, beliefs, and meal patterns.

Food beliefs were assessed by asking the mothers to list the foods they considered appropriate for young children. The mothers that participated in the intervention were more inclined to believe that all foods are appropriate for children when prepared in an appropriate manner (mean change = .61, $F(1,53) = 8.44$, $p = .005$).

Table 4.4: Changes in Nutrition Knowledge, Beliefs, and Meal Patterns

Variable	Mean Change		p-value
	Intervention (n = 28)	Control (n = 25)	
NUTRITION KNOWLEDGE	4.89 ± 3.65	1.96 ± 2.74	.001
Energy-yielding food group	1.54 ± 1.81	.59 ± 1.62	.048
Body-building food group	1.43 ± 1.73	.59 ± 1.18	.042
Protective food group	1.93 ± 1.82	.78 ± 1.12	.007
FOOD-RELATED BELIEFS			
Foods appropriate for children	.61 ± 1.42	-.52 ± 1.45	.005
FEEDING BEHAVIORS			
Number of meals	.06 ± .52	-.15 ± .72	.198
Number of snacks	.20 + .71	.26 + .76	.763
Number of people providing special meals	-.03 ± .61	-.30 ± .62	.111

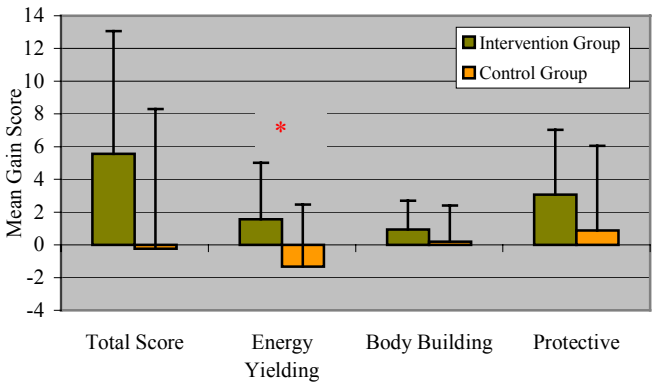
Food Selection Habits

Change in food selections habits was used as one measure of change in feeding behaviors. Food selection habits were assessed by looking at the number of foods

prepared in the household (Food Variety Score) and the number of times these foods were provided (Frequency of Use Score).

Food Variety:

The mothers who attended the cooking classes reported preparing an increased variety of foods (mean = 5.6) than they did before the intervention (Figure 4.2). These participants also choose more foods when compared to their counterparts that attended the sewing classes ($F(1,51) = 6.96$, $p = .011$). More food items were selected from the energy yielding food group ($F(1,51) = 8.50$, $p=.005$). Further analyses revealed that the participants in the intervention group, chose an increased number of grain products (mean = .50) than the controls (mean = -.68).



* Differences statistically significant, P<.05

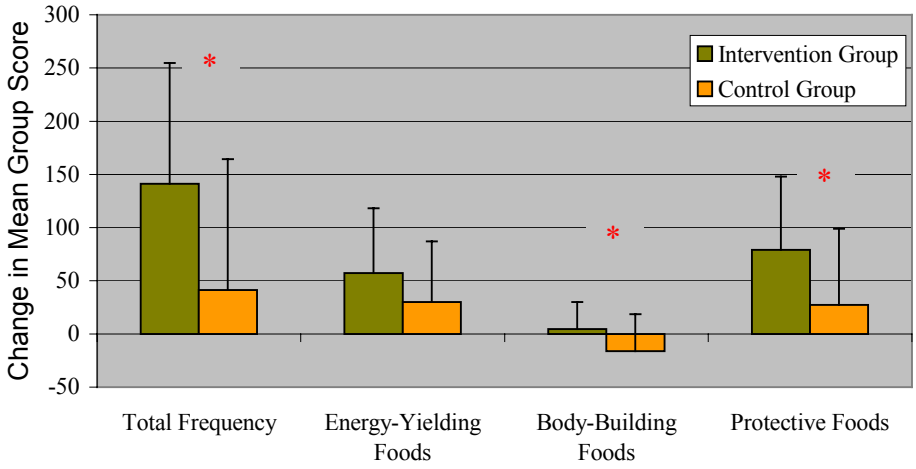
Figure 4.2: Change in Food Variety

The intervention group also selected an increased number of fruits and vegetables; however the differences between the two groups were not statistically significant.

Contrary to what was expected, the control group reported an increased number of milk products (Appendix F). Figure 4.2 below depicts the mean group gain scores on the food variety component.

Frequency of Food Item Use:

The mothers in the intervention group reported that they fed their children with a variety of foods more frequently than they did prior to the intervention. These mothers scored 100 points more than the control group on the frequency of use component ($p < .05$) (Table 4.5). Figure 4.3 below provide an overview on changes in food selection patterns in regard to frequency of food use.

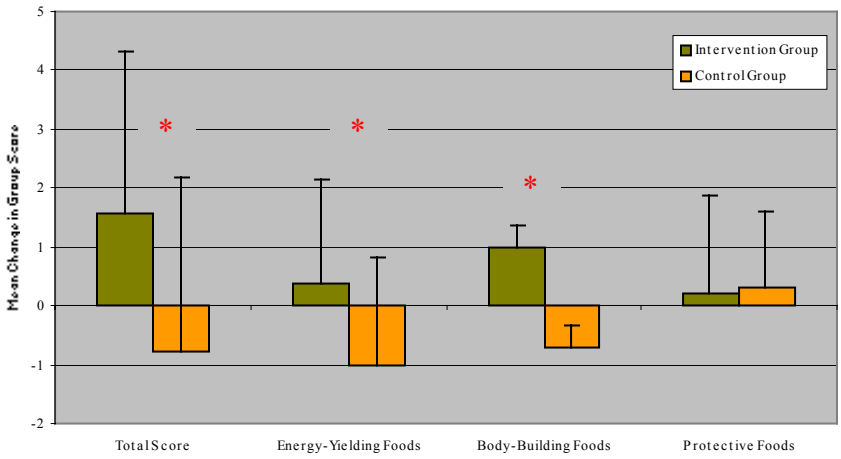


* Differences statistically significant, P<.05

Figure 4.3. Frequency of Food Use

Adequacy of Children's Diets

There were significant differences in the diets provided by the two groups (F (1,51) = 9.55, p = .003). Based on the mothers' reports, the children of the intervention participants were provided with more nutritionally adequate meals (mean = 1.57) than the children whose mothers served as our controls (mean = 0.78). The intervention participants provided more foods from the body-building food group (mean = 1.00) than the controls (F (1,51) = 18.6, p < .001). More Legume were provided by the intervention group, whereas the controls provided more foods from the Nuts group. However, these differences were not statistically significant.



* Differences statistically significant, P<.05

Figure 4.4: Change in Adequacy of Children's Diets

Discussion

The idea that educating the primary child-caretakers (mothers) can improve the nutritional status of young children (Smith and Haddad, 2000a) is partly based on the

belief that improving women's awareness of appropriate feeding practices would correlate with improvement in their feeding behaviors. This intervention demonstrated change in nutrition knowledge is not always correlated with change in feeding behaviors. In this study, more significant changed were observed in nutrition knowledge and beliefs. The changes in meal patterns were not statistically significant (Table 4.4). However, nutrition knowledge and beliefs seem had an influence on the mother's food selection habits. The women who participated in the nutrition intervention demonstrated improvement in knowledge of the food groups, their beliefs about what kinds of foods are appropriate for young children, and reported improvement in their food selection skills by providing their children with a large variety of foods. However, there were no significant differences in the number of meals or snacks proved by the intervention mothers when compared to the controls.

Lack of food resources or money to purchase food has been suggested (Frongillo et al., 1997; Vella et al., 1992b; Vella et al., 1995)) as one of the factors that limit dietary intake. This study demonstrated that lack of access to nutrition information heavily determines what kinds of foods are prepared in a household. It is possible that income might not always be a major factor in rural areas of western Uganda because a large proportion of the people in rural areas are farmers. Individuals who produce their own food (subsistence farmers) need information on how they can best utilize their food resources to improve their children's nutritional status.

One of the highlights of this intervention was providing the participants a chance to cook and taste various foods. This gave the participants a chance to try out new food

preparation techniques and taste unfamiliar foods. As a result, more women were willing to give their children non-traditional staples like yams and *obushera* (porridge made from sprouted-millet flour). Although bananas (the major staple) were abundant during the study period, other staples (grain products) were also provided more frequently (Table 4.5). The grain products that were prepared more frequently included *chapatti,* bread, and sorghum. Some women (5%) also reported preparing foods like yam flour and banana flour for the first time in their lives. Fruits like guavas, mangoes, and wild berries *(Entuutu)* were also selected more of because they were now considered 'appropriate' for young children. The mothers also reported that they were more aware of what their children ate. These changes could have been due to improved skills in food preparation or improved perceptions of what foods are appropriate for children.

Limitations and Implications for Future Research

The results from this intervention should be interpreted with caution because this was a new study in this population. This study needs to be replicated before these results can be weighed heavily. Since the mothers were not used to reporting on their feeding behavior, it is not clear whether this intervention improved the dietary intake of young children. One study conducted in rural Malawi reported inconsistencies in having a third party report children's dietary intake (Ferguson et al., 1989). Future research might consider assessing young children's nutritional status to determine whether the mothers' self-reported improvement in feeding behaviors correlate with improvement in children's nutritional status. Although more women in this study reported feeding their children better, it cannot be confirmed that the children's nutritional status improved. However, it

can be concluded that providing nutrition information to the mothers offers much promise in improving the adequacy of children's diets.

Table 4.5: **Group Mean Gain Scores on Food Variety, Frequency of Use, and Adequacy of Children's Diets**

VARIABLE	FOOD VARIETY SCORE		FREQUENCY OF USE SCORE		ADEQUACY OF CHILDREN DIETS	
	Intervention (n = 28)	Control (n = 25)	Intervention (n = 28)	Control (n = 25)	Intervention (n = 30)	Control (n = 27)
Total score	5.57 ± 7.49[1]	-.24 ± 8.54[1]	141.13 ± 113.57*	41.32 ± 123.12*	1.57 ± 2.76[2]	-.78 ± .97*[2]
Energy-yielding	1.57 ± 3.44*	- 1.32 ± 3.78*	57.27 ± 60.97	30.00 ± 56.97	.37 ± 1.79	-1.0 ± 1.82*
Bananas	.11 ± .50*	.04 ± .20*	24.68 ± 10.11	27.36 ± 6.13	.30 ± 1.32	-.11 ± 1.45
Tubers & starchy vegetables	.96 ± 1.88	.28 ± 1.74	17.54 ± 26.71	17.84 ± 28.56	.03 ± 1.47	-.41 ± 1.58
Porridge	-	-	-	-	-.33 ± 1.03	-.41 ±.89
Grains	.50 ± 1.32*	-.68 ± 1.86*	12.59 ± 19.40*	-.836 ± 24.51*	.33 ± 1.06	-.07 ± 1.04
Fats & Sweets	.00 ± 1.94	-.96 ± 2.13	2.46 ± 37.99	-.86 ± 22.32	.03 ± 1.33	-.00 ± .96
Body-building group	.93 ± 1.76	.20 ± 2.20	4.64 ± 25.45*	-16.02 ± 34.53*	1.0 ± .36*	-.07 ± .38*
Legumes	.07 ± .90	-.44 ± 1.50	-5.48 ± 24.25	-20.12 ± 33.32	.67 ± 1.52*	-.96 ± 1.32*
Nuts	.11 ± .57	.08 ± .40	1.86 ± 5.66	.00 ± 10.20	.33 ± 1.03	.59 ± 1.05
Meats	.50 ± 1.14	.24 ± 1.42	1.55 ± 6.24	-.82 ± 10.94	.03 ± .93	.19 ± .48
Milk	.25 ± .44	.32 ± .48	6.71 ± 12.31	4.92 ± 9.90	-.03 ± 1.22	.11 ± .93
Protective group	3.07 ± 3.97	.88 ± 5.18	79.21 ± 68.80*	27.34 ± 71.62*	.21 + 1.68	.30 + 1.30
Fruits	1.39 ± 2.23	.56 ± 3.10	68.32 ± 21.87*	29.36 ± 39.12*	.48 ± 1.21	.19 ± .48
Vegetables	1.68 ± 2.75	.32 ± 2.91	10.89 ± 56.39	-2.02 ± 44.40	-.28 ± 1.33	.11 ± 1.12

* Differences Significant P < .05

[1] Highest possible score is 103

[2] Highest possible score is 15

Chapter 5

SUMMARY AND CONCLUSIONS

Childhood is a period characterized by increased physical activity and changes in body size and body composition. At this stage, children need nutritionally adequate diets to cater for the increased nutrient needs. Since most children have not yet developed eating habits at this stage (Pipes and Trahms, 1996), child-caregivers need to encourage appropriate food patterns. The mother, who is in most cases the primary child-caregiver, holds a lot of responsibility in ensuring that children are provided with nutritionally adequate diets. When children's diets are not adequate to support normal growth, the risk for malnutrition is increased.

In this study low-income, rural mothers were empowered with skills needed to provide appropriate meals for healthy children. The results indicate that providing the mothers with appropriate nutrition information could lead to improvements in children's dietary intake. The mothers in the intervention group classified the indigenous foods into their appropriate food groups with improved accuracy ($p = .001$) and demonstrated change in their beliefs with regard to which foods are appropriate for children ($p = .005$). However, as has been determined by other studies (Cochrane et al., 1982; Wolfe and Behrman, 1987) this study shows that improvement in knowledge does not always lead to change in behavior. Although the mothers reported feeding their children an increased

amount and variety of foods, there were no significant changes noted in the mothers' meal planning skills. The participants did not report significant change in the number of meals they prepared to their families, the number of snacks, or the number of specials meals prepared for children. However, further analyses revealed an interaction between food-related beliefs and feeding behavior. Future studies need to focus on changing food beliefs.

This study is one the few published studies that have investigated the child-feeding behaviors of Ugandan mothers. The feeding behaviors reported in this study are not different from the behaviors reported by other investigators ((Kikafunda, 1998a; Rutishauser and Frood, 1973). Even after the intervention, the number of meals provided by both the intervention (mean = 3) and control (mean = 2) groups were not different from what was reported by Rutishauser (1973). Since the meal patterns seem to have remained fairly the same over the years, it is unclear whether the participants were able to change their feeding behaviors in such a short time. Future studies need to employ observational techniques to adequately assess changes in feeding behaviors.

Another area that needs further investigation is ascertaining the adequacy of children's diets. In this study, dietary adequacy was assessed by scoring the mothers' responses on the 24-hour dietary recalls. This was based on the view that consuming meals that comprise a variety of foods ensures nutritionally adequate diets (Krebs-Smith et al., 1987)). This method assesses the variety of foods consumed but does not determine the amounts of foods consumed from each food group. Although our scoring technique was validated and has been used successfully by other investigators (Guthrie and Scheer, 1981; Hatloy et al., 1998), it is important to assess the nutrient intake of

young children. Future studies might consider conducting spot observations to adequately determine whether children are provided with adequate amounts of food.

To adequately assess children's dietary intake, it might also be necessary to interview other adults in the household. In this study, two (2.8%) records were excluded from the analysis because the mothers reported that their children had been fed by other adults. Studies show that children's dietary intake is not always influenced by the mothers. Factors such as family relations also influence young children's dietary intake (Bharmal, 2000; Whyte and Karuiki, 1991). The nutritional status of young children can be improved if interventions also include other family members that are involved in purchasing food or feeding young children. This intervention could be improved if male householeads, grandmothers, mother-in-laws, and adult siblings are also engaged in the learning process.

In conclusion, this study supports the view that nutrition education has potential for improving feeding behaviors. If given enough time and skills to grow or access different types of foods, rural mothers are likely to provide their families with a wider variety of foods. This could lead to improvements in young children's dietary intake. However, for nutrition education to be effective programs need to be carefully designed to meet the needs of the target population. This intervention was a pilot and will need to be replicated with a larger sample size to evaluate its effectiveness. There is also a need for a follow-up study to determine whether the participants retained the reported improvements in feeding behaviors.

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APPENDIX A

Note: Estimated time for completing this consent form is 10 minutes.

Focus Group Participant Consent Form

I _____agree to take part in a group discussion for a research study titled "Feeding our children" that is being conducted by Ms. Margaret Kabahenda, a student in the Foods and Nutrition Department, University of Georgia under the direction of Dr. Rebecca Mullis, Foods and Nutrition Department, University of Georgia (Telephone: 1-706-452-4869). I do not have to take part in this study; I can stop taking part at any time without giving any reason, and without penalty. I can ask to have information related to me returned to me, removed from the study records, or destroyed.

I am taking part in this study to help provide information that will be used in making a curriculum for teaching other mothers about feeding their children. The information that I provide should not be used in any other way without my consent.

I understand that I am allowed to ask for more information about this project, and I can get this information by contacting Ms. Mary Kajoina, Chairperson, Bukuku Womens' Club, P. O. Box 134, Fort Portal or ask the investigator Ms. Margaret Kabahenda.

_____ _____
Signature of participant Date

_____ _____
Signature of witness Date

The Institutional Review Board oversees any research-type activity conducted at the University of Georgia that involves human participants. Questions or problems regarding your rights as a participant should be addressed to: Ms. Julia Alexander, Institutional Review Board, Office of the Vice President for Research, The University of Georgia, 606A Graduate Studies Research Center, Athens, Georgia 30602-7411, Telephone:1-706/542-6514 or by e-mail at IRB@uga.edu.

Focus Group Questionnaire

1. What foods do you normally prepare for your family?

2. What do you do when you know your child needs a particular food which you do not produce yourself?

3. Do you feel that you know what foods are appropriate for children <5 years of age? What kinds of foods do you consider appropriate for children?

4. Do you prepare separate meals for children? At what stage do you stop preparing separate meals for children? What kinds of foods are appropriate for children that have stopped breast-feeding?

5. Do you have enough food to fed your children. Describe how you often feed your child. When?

6. What kinds of problems do you encounter in feeding your children?

7. What is your opinion about serving each child on his/her own plate?

8. What kinds of fats or oils do you consider appropriate for children?

9. What kinds of meats do you consider appropriate for children?

10. What kinds of fruits do you consider appropriate for children?

11. How do children get these fruits?

12. What kinds of starchy foods are appropriate for children?

13. Who decides on what should be prepared at a particular meal?

14. When food is plenty, how do you decide on what to feed children?

15. Can you give examples of foods that can be referred as:
    a. Body-building foods:

    b. Foods that can protect children from getting sick easily.

    c. Foods that give energy.

16. What kinds of snacks do you give to your children? Do you think it is appropriate for children to have snacks?

17. In your opinion, what constitutes an appropriate meal for children?

18. Do you think it is okay to mix different kinds of foods in one cooking pot, just like the Bakiga's do?

19. What do you want to learn about feeding children?

20. What foods do you think your children need to eat more often?

APPENDIX B

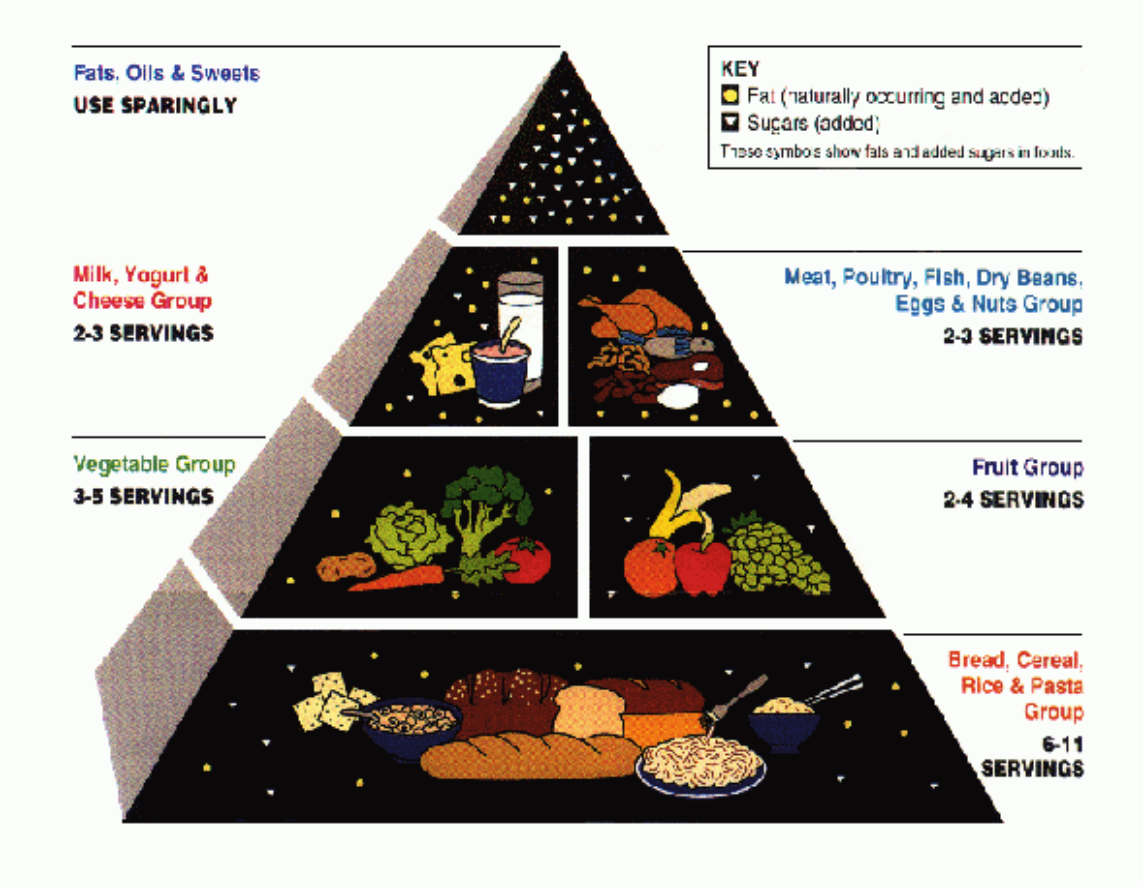
THE FOOD PLATE GUIDE

Body-building
Foods

Energy-yielding
Foods

Protective
Foods

THE AMERICAN FOOD GUIDE PYRAMID



Source: USDA & DHHS SEMDA website http://www.semda.org/info/pyramid.asp…

APPENDIX C

Developed by:

The Nutrition Intervention Lab,
Department of Foods & Nutrition, College of Family & Consumer Sciences
The University of Georgia

with adaptations from:

The University of Georgia Wellness First Program
&
Michigan State University Extension Program
"Eating Right is Basic"

Illustrated by Veronica Wright, GRD.

Overall message:
Encourage participants to "choose a variety of foods".
Proverb to reinforce message: “One by one makes a bundle” *(Try to recite proverb at least 2 times during the lesson)*

Program Purpose:
This program has been developed for rural women in western Uganda but it could be used by mothers and childcare-givers in other parts of the world. This program is specifically geared to improving the food selection behaviors of mothers in rural areas.

Program description:
The program is a stepwise approach to selecting a variety of foods. The program utilizes an experiential learning approach to teach mothers to select a variety of foods from all food groups. Cooking classes will be used to demonstrate ways in which rural mothers can select and prepare a large number of food types.

Community educator responsibilities:
The community educator is responsible for delivering the information to the participants. The educator is not allowed to influence the participants with his or her opinions and beliefs unless these opinions/beliefs are in line with what the program is teaching.

Contact information:
If there are any questions or concerns about this draft curriculum or the research project as a whole, contact the Foods & Nutrition Department, University of Georgia, Athens at (706) 542-4869 or send a fax to (706) 542-5059.

Program Outline:

LESSON I: Selecting foods from the three food groups

This lesson will focus on teaching the mothers to use the 3 food groups as a guide when selecting foods for their families. The three food groups that will be emphasized are: the body building foods (foods high in protein), the energy yielding foods (carbohydrates and fats), and the protective foods (fruits and vegetables).

LESSONS II & III: Choosing and preparing body-building foods

These lessons will explore in greater depth the types of protein-rich foods. One lesson will focus on plant protein sources and a separate lesson will cover animal protein sources.

LESSON IV & V: Choosing and preparing energy-yielding foods

These lessons will focus on increasing the variety of carbohydrate foods served to children; and coaching the mothers on appropriate ways to incorporate fat and sweets in children's diets.

LESSON VI: Choosing and preparing protective foods

This lesson is designed to motivate the mothers to increase the varieties and amounts of fruits and vegetables served to children.

LESSON VII: Planning and scheduling meals for children

This lesson will be a summary of lessons I to VI. The session will concentrate on teaching the mothers to provide enough food to their children by increasing the types of foods offered to children, the amounts of food children are served, and increasing the number of times children are fed.

Lesson 1: **Selecting foods from the three food groups**

Lesson Overview

Lesson objectives:

1. Increase the mothers' knowledge of the three food groups
2. Increase the mothers' awareness of the importance of including foods from all food groups in children's diets.

Learner Objectives:

The participants will be able to:

1. Acknowledge the diversity of local foods
2. Correctly classify foods in their appropriate food groups
3. List the foods, from each food group, that are appropriate for their children
4. List the food groups they incorporate the most/least of in their family/children's meals
5. List the foods or food groups they need to provide to their children (families)
6. Prepare a dish that incorporates foods from all the 3 food groups.

Materials Needed

Assortment of local foods (uncooked)
Cooking stoves, pans, spoons, paper plates, eating utensils, soap

Preparing for the lesson

Review the entire lesson
Make sure you have supplies for 35 participants

Suggested recipe:
None
Let participants be creative and prepare a dish that incorporate at least 5 food items. Group with most food item and dish that taste the best win.

Doing the lesson

1. Greet the participants and introduce yourself (5 min)
2. Ask the participants to introduce themselves (10 min)
3. Attention-getter question: Ask the participants to name their most favorite food. (5 min)
4. Preview the topics of what will be covered by the entire course (5 min)
5. Present the lesson using the flip chart. (10 min)
6. Ask the participants to sort actual foods from a basket and group them in their appropriate groups. (10 min)
7. **Activity:** Ask the participants to forms groups. Each group take a turn to pick food items until they have all the foods they need or until food is finished. Then each group prepares a dish that incorporates at least 5 foods (45 min).
8. Allow time for the participants to ask questions and share their experiences related to the lesson. (5 min)
9. Summarize the lesson and arrange the date and time for the next meeting and let the participants know what will be discussed in the next meeting. (2 min)
10. Ask each participant to bring a sample of the beans they prepare more frequently (no more than a handful)

Presentation:

We are lucky that we have so many foods to choose from.

Of course, there are so many foods that we can eat that are not among these foods.

Ask participants to name the foods they eat that are not among the food displayed on the graphic

All these foods in this picture are available locally. *(Draw the participants attention to the food samples)*.

It is important to provide your children with a variety of these foods.

Each food has its special value. Each food is important.

Children need all these foods to grow well.

(Inform participants that the group meetings will focus on selecting food for young children of 2 -5 years of age.)

To help you select a variety of foods for your children, we will classify these foods into food groups.

(*Emphasize*) When you choose foods from all the food groups, that's when you have an appropriate diet for a growing child.

Children under 5 years of age need special attention because they are growing fast. Children in this age also get sick easily.

These children need food that can build their bodies ***(baby),*** give them energy ***(body on swing),*** and protect them from diseases ***(girl with kwashiorkor).***

Giving these children only one type of food is like starving them.

Children need a variety of foods in the right amounts *(Give examples of foods commonly given)*

To help you provide appropriate foods to your children, we will classify all the foods available to us into 3 food groups.

We will group the foods according to their nutritional value.

The three food groups are: *(Draw participants attention to picture of children)*

1. The body-building foods that promote growth ***(Baby).***

2. The energy-yielding foods that give us energy to do work or play ***(Boy on swing).***

3. The protective foods that protect us from getting diseases ***(Girl with kwarshiorkor).***

Can you identify foods that belong to these three food groups.

Ask for volunteers to sort the food samples into their appropriate food groups.

Body-building foods

Energy-yielding foods

Protective foods

Here is how we normally classify the foods into the three food groups. *(Give plate graphic to each participant)*

Always try to provide your children with food from all these 3 food groups.

Draw the participant's attention to the individual foods in the graphic and ask them to name foods not included.

When you are preparing food for your children think of these 3 food groups.

This plate here shows that children need a balanced diet.

Children need enough food, from each food group to grow healthy.

Body-building foods

Energy-yielding foods

Protective foods

Can you think of the foods you eat the most. Which food group do you select foods from more frequently?

(Allow time for the participants to answer question)

Which foods are lacking in your children's diet? *(Allow time for the participants to answer question)*

How about the foods you don't like or never prepare for your family? *(Let the participants name the foods they never eat)*

Could the foods you don't like be beneficial to your children?

These are the questions you should ask yourself when you are preparing food for your children.

*Inform participants that you will be **discussing** and **preparing** foods from different food groups during each lesson.*

Prepare the recipe

Notes to the educator:

As the participants cook:

1. Interact with them and see what each group is cooking. Provide help where needed.
2. Emphasize the importance of choosing a variety of foods.
3. When all groups are done cooking, ask each group to prepare a plate for a 3-year old child.
4. Ask the participants to taste and evaluate each group's dish.
5. Let participants vote on which group prepared the most appropriate meal for a 3 year old child.
6. Ask them how they feel about the concept of preparing a variety of foods.
7. Allow the participants time to eat.

Closing remarks:

1. **Review what was discussed in this lesson and what will be discussed in all the other sessions.**
2. **Emphasize that each class will teach the participants how to choose a variety of foods. Ask the participants if they would be interested in learning about preparing any specific foods.**
3. **Let the participants know that you will be giving them tips on how to choose and prepare the body-building foods at the next lesson**
4. Ask each participant to bring a sample of the beans they prepare more frequently (no more than a handful)

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Lesson II: **Choosing and Preparing body building foods – *Plant sources***

Lesson Overview

Lesson objectives:

1. Increase the mothers' awareness of protein-rich foods
2. Modify the mothers' beliefs about which foods belong to this food group
3. Teach the mothers the skills they need in order to select and prepare a variety of protein-rich foods for their children
4. Couch the participants on how to plan meals that comprise of complementary proteins

Learner Objectives:

The participants will be able to:

1. Give examples of foods rich in protein and identify which of these foods are appropriate for children
2. Demonstrate creative ways to make nuts, beans and other legumes enjoyable foods for children
3. Plan a meal that incorporate at least 2 servings of these protein-rich foods
4. Combine legumes and cereals as a way of boosting the quality of protein

Materials Needed

Food items and equipment needed for the recipe

Suggested recipes:

Porridge mixed with groundnuts (peanut) or soybean flour
Ground soybean or cowpea sauce
Egg rolls *(samosas)* filled with mashed beans and peas

Preparing for the lesson

Review the entire lesson

Make sure you have supplies for 35 participants
Gather the food items

Doing the lesson

1. Greet the participants (1 min)
2. Ask each participant to show the audience the beans they have brought and give their views on whether they think the beans they have brought are appropriate for children (15 min)
3. Present the lesson using the flip chart. (10 min)
4. Prepare the recipe. Give each participant a task. (30 min)
5. Allow time for the participants to taste the food, evaluate the food, and share their experience related to the foods discussed in the lesson. (10 min)
6. Summarize the lesson. (5 min)
7. Arrange the date and time for the next meeting. Let participants know of next topic. (2 min)

Presentation

Body-building foods

Energy-yielding foods

Protective foods

Start by reviewing what was covered in the last lesson and emphasize the importance of selecting food from all the 3 groups.

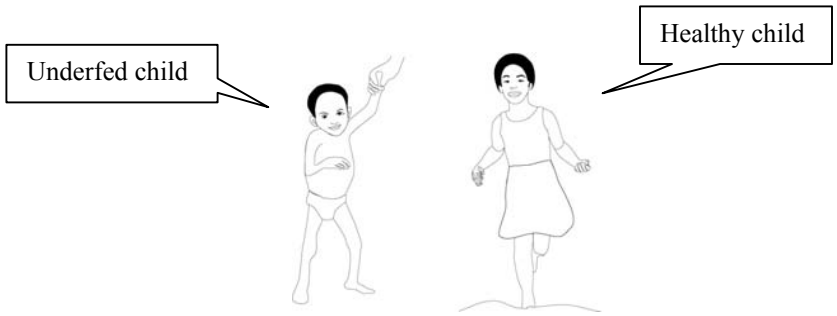
It is always important to provide children a variety of foods.

Always try to incorporate foods from these 3 food groups.

You many not always have all the 3 groups at every meal.

The key is to make sure that your children eat foods from all the food groups *regularly*.

At the end of each day, your children should have eaten foods from all the 3 food groups.



Inform participants that you will be discussing ways to incorporate body building foods in children's meals.

Children need foods from all the 3 food groups to grow well.

When children do not have enough food, they do not grow properly.

And when children are fed on only one type of food, they do not grow properly.

Ask the participants to interpret the picture and correct them where necessary.

Correct interpretation:

Boy is malnourished - has lost muscle tone, his growth is delayed, and lacks energy to move or stand on his own i.e. needs parental support.

Girl is well fed – looks healthy, can play and enjoy herself. She is not a bother to her parents.

(Emphasize) Given the right food, malnourished children ***(boy)*** can also recover and grow up into healthy children.

Growing children need foods that are rich in protein to grow properly.

Body-building foods

Energy-yielding foods

Protective foods

Introduce protein-rich foods as the body-building foods

Foods in the body-building group include meat, poultry, fish, dry beans, eggs, milk, & nuts.

Allow participants time to answer this question:

Why are these foods called body-building?

Correct answer:
They all contain protein and other nutrients that help the body to grow and repair fast.

Choosing a variety of foods will help you to provide enough body-building foods for your children.

You can choose these foods from animal food sources or from plant food sources.

Which of these foods are appropriate for your children? *(Give the participants time to answer this question.)*

All these foods are appropriate for children if you prepare them having the needs of your children in mind.

Focus on local food beliefs about which foods are or are not appropriate.

It is important to make sure that children eat a variety of these foods, and the right amounts of protein.

Some of these foods may be too hard for children to chew (meats) or children may not like these foods.

You are responsible for helping children to eat these foods.

A child that does not get enough protein can develop kwashiorkor or fail to grow.

BEANS, PEAS, & NUTS:

***(Introduce the plant protein sources)*

Most of you grow your own beans, peas, and nuts.

Do you prepare enough beans, peas, and nuts for your families? *(Give the participants time to answer this question)*

Be creative in your cooking. Always try to choose different types of beans.

There are many types of beans *(Show varieties on graphic and ask participants to name more)*.

Each variety of beans has unique nutritional value.

The key is to eat a variety of dry beans and peas.

(Emphasize) **Dry beans and peas are the best source of protein.**

Fresh beans and peas do not have as much protein as dry beans. There is hardly any protein in string beans.

NUTS:

Picture available on request

The same thing is true for nuts. There are many nuts besides groundnuts. *(Ask participants to name nuts common in the area)*

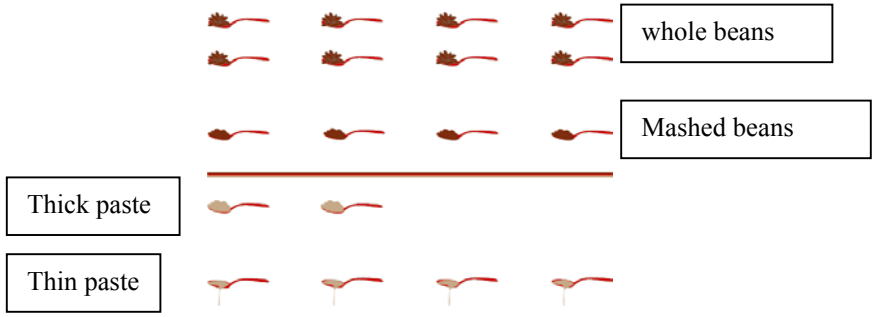
Children need nuts to obtain various nutrients needed by their growing bodies.

There are many ways you can prepare nuts. *(Give examples)*
Always pound the nuts finely so as to boost their nutritional value.

Mixing groundnut paste to foods will increase the nutrient density of the meal. Groundnut paste can be added to porridge, stews, vegetables, and meats.
Groundnut paste can also be spread on children's snacks. *(Give examples)*
Be creative in how you cook. Have some groundnut paste available at all times.

Groundnut paste does not need much cooking. You can add this paste to different foods that you provide to your children.

Preparing beans, peas & nuts for children:



The way you prepare beans, peas, or nuts will determine how much of these foods your children need.

Draw the participants attention to the graphic. Show actual food if available.
A child of 4 years needs a serving of 8 spoonfuls of beans. When beans are mashed, the same child will need only 4 spoonfuls. *(Top part of graphic)*

(Stress) Mashed beans are the most appropriate choice for children under 4 years of age.
Give examples of dishes with ground beans explain why they are appropriate for children.
When you mash beans or peas, make sure that the paste is **thick**. You need less amounts of the thick than when the paste is thin and runny ***(Bottom).***

Children will benefit more if you give them a thicker paste or sauce. Always remember that children have small stomachs and will eat small quantities.

COMPLEMENTARY PROTEINS:

Plants usually have protein of low quality when compared to animal protein sources like eggs, fish, meat or milk.

You can maximize the quality of protein from plants by choosing foods carefully.

You can improve the protein quality of plant foods by combining cereals with legumes.

Cereals like millet, rice, wheat, and maize can be prepared with legumes like beans, peas, or groundnuts to improve the protein quality.

Which cereals and legumes can you combine to improve the quality of protein from plants?
(Give participants time to interact and answer question).

Show dishes of how legumes can be combined with cereals to boost protein quality.

Notes for the educator:

1. While preparing the recipe:
   - Let the participants measure the foods.
   - Engage the participants in discussions concerning their beliefs about the food you are preparing.
   - Stress the importance of grinding or mashing foods for young children. Beans and nuts are more appropriate for young children when mashed or ground.
   - Reiterate the importance of choosing a variety of legumes and nuts
2. Let the participants taste the food and share their experiences.

Closing remarks:

1. Review what was discussed in this lesson.
2. Let the participants know that you will be giving them tips on how to choose and prepare more body-building foods at the next lesson

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Lesson III: **Choosing and preparing body-building foods – *Animal protein sources***

Lesson Overview

Lesson objectives:

1. Modify the mothers' beliefs about which animal food sources are appropriate for children
2. Teach the mothers the skills they need in order to select and prepare a variety of animal protein sources for their children

Learner Objectives:

The participants will be able to:

1. Give examples of animal food sources that are rich in proteins
2. Identify which of these foods are appropriate for children
3. Identify and prepare low cost meat types like pork, lamb, fish, and rabbit meat
4. Prepare meals that comprise of complementary proteins like beans with rice
5. State the recommended number of servings and show the amounts needed for children 2-5 years of age

Materials Needed

Food items and equipment needed for the recipe

Suggested recipes:

Mutton and spinach (doodo) stew
Egg soup
Fish/bean stew
Homemade yogurt

Preparing for the lesson

Review the entire lesson
Make sure there are supplies for 35 participants
Gather the food items

Doing the lesson

1. Greet the participants (1 min)
2. Ask the participants the participants if they have tried any of the new recipes at home. (10 min)
3. Present the lesson using the flip chart. (20 min)
4. Assign participants to groups and prepare the recipe. (50 min)
5. Allow time for the participants to taste the food and share their concerns about preparing such food to their children. (20 min)
6. Summarize the key points in the lesson. (5 min)
8. Arrange the date and time for the next meeting. Let participants know of next topic. (2 min)

Presentation:

Review what was covered in previous sessions using the Food plate graphic.

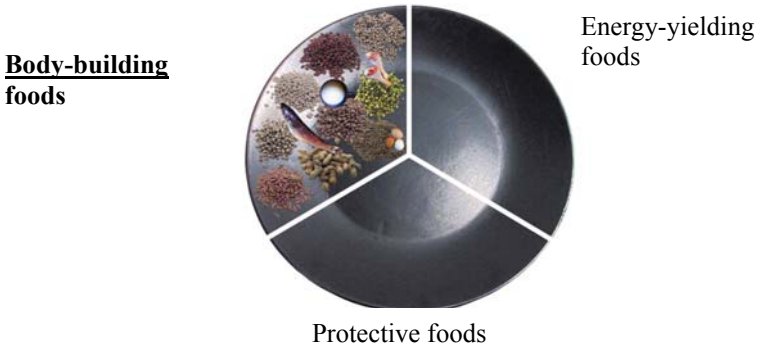
Meats, fish, poultry, milk, and fish are the richest sources of protein.

They all belong to the body- body building foods.

Just like the beans and nuts, these foods help build and repair our bodies.

Animal protein sources also give us iron and many other nutrients. So, they are very important to growing children.

Children need these foods to grow well.



Milk, meat, eggs and fish are all important to your children.

Ask participants if they provide milk, meat, fish, or eggs to their children.

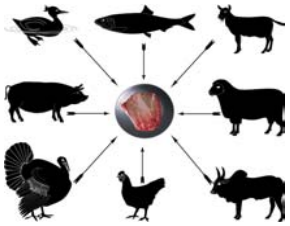
Each of these foods has its own unique nutritional value.

Children need these foods regularly because their bodies are growing at a fast rate.

You can provide all these foods to your children if you plan well and if you are willing to try new foods.

Ask participants to name types of meats they provide to their children.

Meats:



You can easily provide your children with enough meat is you try a variety of meats. *(Explain Graphic)*

Meat tends to be expensive. You can provide more meat to your children if you:

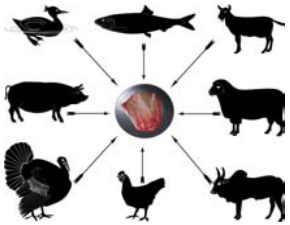
1. Buy cheaper cuts of meats like organ meats.

2. Buy less quantities of meat on a frequent basis.
   Example: Buy one kilogram of meat each week instead of buying 4 kilograms once a month
   There is no need to buy too much meat for one day and go without meat for days or weeks.

3. Mix meats with other foods
   Ask participants to give examples of how small quantities of meat can be prepared for a large family
   Example:
   Mix smaller quantities of meat with other foods to make stews and casseroles.

4. Buy the cheaper cuts of meat

Explain how some of the less desirable cuts of meats can be used.
Example: Bony and tough meats can be used to make stocks or soups.



When you prepare meat or fish, how much do you give to your children?
Give participants time to answer this question.

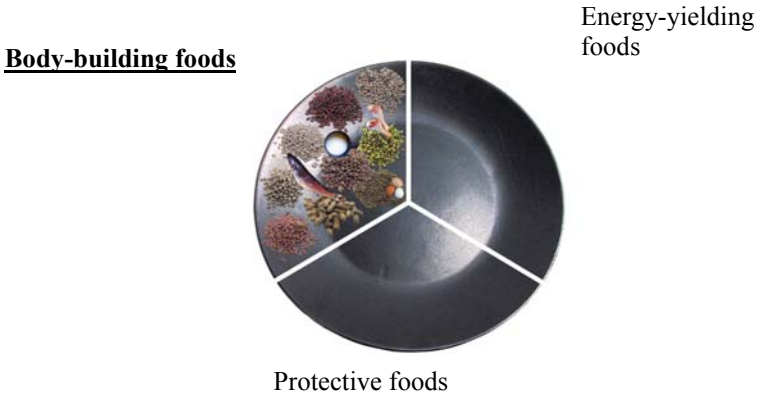
Children need a serving of about 60 grams (2 0z) of meat or fish.

Use fake meat to show what counts as a serving of meat or fish.

It is your responsibility to provide your children enough meat. You can provide enough meat to your children by trying out different types of meats.

Fish is relatively cheaper than meat. Fish is also softer compared to other meats so it good for children. Whether the fish is fresh, dried, or smoked, it is good for your children.

EGGS:



Eggs also belong to the body-building foods' group.

Eggs have the best protein children need.

Try to give your children at least one (1) eggs each week.

If you have many children, you can mix eggs in other foods that way all your children can eat some eggs.

Mixing eggs with other foods will add nutritional value.

Ask participants to give ideas on how they can make sure their children get enough eggs.

Milk:

Milk is not called ‘food for children’ for no reason.

Milk is important for children because it has protein and also has other nutrients that build children's bones.

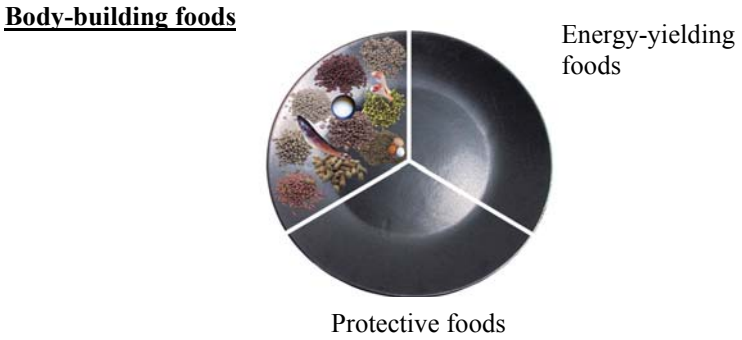
A child without strong bones cannot grow properly.

Try to provide different kinds of milk to your children. Fresh milk is expensive; you can use other kinds of milk instead. Dry milk or canned milk is as good as fresh milk.

When you buy milk always save some milk for young children. Do not wait until the child is sick to buy milk. A regular serving of milk will protect your children from diseases.

Children need milk on a regular basis. A child 2-5 years of age needs at least 2 servings of milk every day.

What counts as a serving of milk? (*Correct answer*: 1 cup)
Measure a cup of milk and show participants.
Caution parents from mixing milk with tea. Tea interferes with nutrients in milk.



How much protein do children need? *(Give participants time to answer)*

Children 2-5 years of age need 4 servings from the body-building food group everyday.

Children of this age should be provided with 2 servings of milk or milk products and 2 servings of meat, fish or beans or nuts everyday.

Show recommended serving sizes using actual foods to show what counts as a serving of beans/peas, meat/fish, and milk.

Notes to the educator:

As you prepare the food:

1. Encourage the participants to always:
   - Select and prepare fresh meats, fish and eggs whenever possible.
   - Cook meat, fish, and poultry immediately. Storing these foods for a long time is a health hazard.
   - Make sure the juices from these meats do not touch fresh foods.
   - Clean utensils carefully before and after use when preparing these foods.
   - Roast meats, fish, or poultry lightly. Charred meats are not healthy for children.
2. Give the participants tips on tenderizing meats.
3. Give the participants time to taste the food and evaluate the recipe.

Closing remarks:

1. Review the key points discussed in this lesson.
2. Ask the participants if they think they can prepare any of the recipes at home.
5. Let the participants know of what you will be cooking at the next meeting
6. Ask the participants if they would be interested in bringing any foods for the next cooking class. (Look at recipes) List the foods you will need and discuss ways in which you will reimburse those who volunteer to bring the food items.
   Note: Each participant that volunteers is allowed to bring only one food item.

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Lesson IV: Choosing and preparing energy-yielding foods

Lesson Overview

Lesson objectives:

1. Increase the mothers' awareness of other local foods that can be added to or substituted for the staple food, bananas.

2. Modify the mothers' beliefs about which energy-yielding foods are appropriate for children

Learner objectives:
The participants will be able to:

1. Identify which starchy foods they believe are appropriate for children.

2. State the recommended amounts of starchy foods and the number of servings for children.

3. Substitute or complement bananas with other starchy foods on a regular basis.

4. Provide children with at least 5 servings of energy-yielding foods on a daily basis.

Materials Needed
Food items and equipment needed for the recipe

Suggested recipes:
Yam meal or banana meal
Banana meal or dried bananas

Preparing for the lesson
Review the entire lesson
Make sure there are supplies for 35 participants
Gather the food items

Doing the lesson

1. Greet the participants. Ask the participants if they were able to try any of the recipes (10 min)

2. Present the lesson using the flip chart. (20 min)

3. Prepare the recipe. Ask the participants to help and Share person experiences related to the lesson as you prepare the recipe. (50 min)

4. Allow time for the participants to taste the food and share their concerns about preparing such food to their children. (10 min)

5. Summarize the key points in the lesson. (5 min)
9. Arrange the date and time for the next meeting. Let participants know of next topic. (2 min)

Presentation

Body-building foods

Energy-yielding foods

Protective foods

Review the last 2 lessons on body-building foods. Ask participants to name more protein-rich foods.

Give the participants time to answer each of these questions:

Which of those foods have you incorporated in your children's meals?

Are you finding it easier to prepare these foods?

Which foods do you find easier to prepare?

Which foods are you having difficulty preparing?

Have you tried to prepare a new dish in the last week?
Give participants time to describe what they prepared.

Introduce the energy-yielding foods group

All foods provide us with some energy. These are the foods we heavily depend on for energy.

Draw the participant's attention to the graphic.

Ask participants to name more carbohydrate-rich staples.

Foods like yams, cassava, potatoes, wheat, rice, millet, sorghum, and maize are what we depend on most for our energy.

Green bananas (*Ebitoke*) **contribute very little energy**.

You need to eat a large amount of bananas to get the energy your body needs.

Bananas are not the most appropriate food to depend on for all our energy needs.

Always try to provide your children other staples that are energy dense. *Give examples.*

Ask participants to name energy-yielding foods that are appropriate for children.

Children need energy, just like adults.

When children do not get enough energy from food, the body breaks up some substances in their bodies to make energy. If this continues, children will lose muscle tone and fail to grow.

Children without enough energy-yielding foods also get sick easily.

Do your children always eat enough of these energy-yielding foods?

Allow time for the participants to answer the question.

All these foods are appropriate for children when prepared appropriately.
Foods like yams, potatoes, and cassava are more appropriate when they are soft enough for children to chew and digest.

These foods can be prepared in so many ways.

Ask participants share experiences on how they prepare energy-yielding foods for young children.

Whatever method you prefer, make sure that the food will be soft and easy for children to digest.

Bananas, cassava, potatoes, yams and other tubers provide more energy when dehydrated.

You can mill these foods into flour.

Ask participants to name dishes that incorporate different types of flour.

Flour can be used to make porridge, mingled to make a main course dish, or added to stews and sauces.

Always provide your children with foods that are energy dense.

Avoid giving your children bulky meals that do not provide enough energy.
Give examples of traditional dishes that are bulky, but provide less energy.

Body-building foods

Energy-yielding foods

Protective foods

All these foods are so abundant.

Plan meals such that each day you eat more than one type of these energy-yielding foods.

Foods like yams can make a big difference in your children's diet.

When yams are processed into flour, they provide more energy and some protein.

You can use yam flour in many ways just like cassava flour.

Bananas yield the most energy when they are dehydrated than when they are fresh.

Fresh, green bananas are mainly composed of water.

Green bananas hardly yield enough energy.

Dry bananas or process them into flour to improve the energy value.

Ask for participants to show amounts of energy-yielding foods required for children 2-5 years of age.

Body-building foods

Energy-yielding foods

Protective foods

Show recommended serving sizes using actual foods.

What counts as a serving of the energy yielding foods:

Compare all these amounts to a serving of cooked green bananas.

1/2 cup corn meal

1/2 cup rice or pasta

1/2 cup thick porridge (maize, millet, sorghum etc)

1 slice of bread

Always, provide a variety of these foods to your children.

Notes to the educator:

While preparing the recipe:

1. Engage the participants in discussions concerning their beliefs about the food you are preparing.
2. Encourage the participants to prepare a variety of foods besides bananas.

Closing remarks:

1. Ask the participants how they feel about the recipes you prepared.
2. Review the key points covered by this lesson.
3. Challenge the participants to go and make a stew that incorporates at least 3 energy-yielding foods.

*****

Lesson V: **Choosing and preparing energy-yielding foods - Fats and sweets**

Lesson Overview

Lesson objectives:

1. Modify the mothers' beliefs about the types of fats, oils and sweets that are appropriate for children
2. Coach the mothers on appropriate ways to cook with fats and sweets.

Learner objectives:
The participants will be able to:

1. Identify which sweets and fats are appropriate for children.
2. Understand that it is appropriate to provide a moderate amount of fats and sweets to children.
3. Recognize that fruits are the best source of sugars.
4. Appropriately incorporate fat in children's diets.

Materials Needed

Food items and equipment needed for the recipe

Suggested recipes:
Oil & vinegar salad dressing
Avocado dip
Drop scones or doughnuts
Stewed guavas or guava jam

Preparing for the lesson

Review the entire lesson
Make sure there are supplies for 35 participants
Gather the food items

Doing the lesson

1. Greet the participants. Ask the participants if they were able to try any of the recipes (10 min)
2. Present the lesson using the pictures (10 min)
3. Prepare the recipe. Ask the participants to help and share personal experiences related to the lesson as they prepare the recipe. (50 min)
4. Allow time for the participants to taste the food and share their concerns about preparing such food to their children. (10 min)
5. Summarize the key points in the lesson. (5 min)
6. Arrange the date and time for the next meeting. Let participants know of next topic. (2 min)

Presentation

Fats, oils, and sweets also belong to the energy-yielding foods.

(*Explain that fats and sweets are not shown in picture because they are needed in very small amounts)*

Fat adds energy and other nutritional value to foods.

Fats and oils are also important because they help us to absorb some vitamins that are needed by our bodies.

It is important to incorporate adequate amounts of fats and oils in meals, especially in children's meals.

Children need some fat in order to mature well and have healthy membranes and skin.

Diets low in fat are associated with delayed sexual maturation and increased risk for bruising easily, getting skin infections, and developing sores.

Ask participants to name fats and oils appropriate for young children (2-5 years).

There are many kinds of fats, oils and sweets that you can provide to your children.

(Explain which fats are appropriate)

Cooking with fat is a good way to:

1. Improve the texture and taste of food.
2. Improve the energy value of a meal.
3. Help children get essential nutrients.

    Examples:

    (i) Palm oil is rich in a vitamin that protects children from getting blind

    (ii) Fish oils protect against many diseases

    (iii) Avocado has special vitamins that protect the skin and other organs like the heart

Try to use a variety of fats and oils.

Also use foods that naturally contain fat to improve the nutritional value of a meal.

Ask participants to name foods rich in fat and oils.

Foods that naturally contain fat include: groundnuts, sunflower seeds, simsim (sesame seeds), avocado, meats, and milk *etc*

There are more foods that contain fat. Generally, nuts, seeds and animal products are rich sources of fats and oils. Incorporate a moderate amount of these foods in your children's meals.

Discourage participants from using large amounts of fats and oils.

Remember that too much fat is not good.

Diets high in fat increase the risk for developing chronic diseases like heart diseases.

Having too much fat can also make children obese (too fat) and unhealthy.

Sweets:

Sweets improve the energy value of foods but should also be used sparingly.

Ask participants to name sweets and sugars appropriate for young children.

Sweets can be found in fruits, pastries, candy (sweets), honey, some vegetables, sweeteners etc. *(Give examples)*

Sweets contribute a lot of energy but should be used sparingly.

It is good to incorporate moderate amounts of sweets in your children's meals.

Fruits are the most appropriate source of sugars because they also have other nutrients.

Fruits also have vitamins and other nutrients that protect children from getting sick easily.

All the other sources provide sugars but do not always have the other nutrients that children need.

Notes to the educator:

1. Caution the participants on cooking with too much fat

2. Caution the participants to avoid burning the fat when frying foods. (Burned fat can cause heartburn and some children developed aversions from burned fat.)

3. Emphasize that foods in the body-building foods naturally have fat.

4. Encourage participants to provide fruits to children as snacks etc

Closing remarks:

1. Inform the participants that you will be talking about fruits and vegetables in the next lesson.

2. Encourage participants to bring any fruits or vegetables they may be interested in preparing at the next lesson. Discourage the participants from bringing large quantities. Make arrangements for reimbursing them for the food they will bring.

*****

Lesson VI: **Choosing and preparing protective foods**

Lesson Overview

Lesson objectives:

1. Enhance the mothers' awareness about the benefits of incorporating fruits and vegetables in children's diets
2. Modify the mothers' beliefs about which fruits and vegetables are appropriate for children
3. Provide the mothers with tips on how they can increase the varieties and amounts of fruits and vegetables in their children's diets

Learner Objectives:

The participants will be able to:

1. Understand that fruits and vegetables are an essential component of children's diets.
2. Identify which fruits and vegetables are appropriate for children.
3. State the recommended amounts and number of servings needed for children.
4. Prepare dishes that incorporate a variety of vegetables.
5. Provide their children with a total of five (5) servings of fruits and vegetables daily.

Suggested recipes:

Banana/vegetable stew
Homemade yogurt with fresh fruit

Preparing for the lesson

Review the entire lesson
Make sure there are supplies for 35 participants
Gather the food items

Doing the lesson

1. Greet the participants (2 min)
2. Ask the participants if they tried to make the stew they were challenged to make at the last meeting. Let the participants share their experiences. (10 min)
3. Present the lesson using the flip chart. (10 min)
4. Prepare the recipe. Ask the participants to help. Share person experiences related to the lesson as you prepare the recipe. (50 min)
5. Allow time for the participants to taste the food and share their concerns about preparing such food to their children. (10 min)
6. Summarize the key points in the lesson. (5 min)
7. Arrange the date and time for the next meeting. Let participants know of next topic. (3 min)

Presentation:

Body-building Foods

Energy-yielding foods

Protective foods

1. Review the previous lessons about energy-yielding foods.

2. Ask the participants if they have tried anything new and how they feel about whatever they tried.

3. Ask the participants whether they have found it easy to prepare other types of the energy-yielding foods.

Always use the food groups as a guide when preparing meals for your children.

When you use the food groups as a guide, it is easy to tell which foods are missing on your children's plate.

This region is endowed with plenty of fruits and vegetables.

Ask the participants to show any food items they have brought and explain why they chose to bring that item in particular.

Allow participants time to answer these questions:

How many fruits and vegetables do you have in your garden or farmland?

How many vegetables do you grow?

How many vegetables grow wild in your garden?

How about fruits?

There are so many fruit trees growing wild.

Do you provide enough fruits and vegetables to your children?

Or do you let your children gather fruits on their own?

Body-building foods

Energy-yielding foods

Protective foods

Fruits and vegetables provide us with nutrients that protect the body from diseases and also provide some energy.

In this lesson, we will refer to fruits and vegetables as the "protective foods".

Growing children need these protective foods on a regular basis to protect them against many diseases

Examples :

Carrots keep the eyes healthy and protect against blindness.

Fruits like guavas and oranges help wounds to heal faster and membranes to grow well.

Dark green vegetables are rich in so many nutrients.

Ask participants to give examples of fruits and vegetables that are appropriate for young children

Choose a variety of fruits and vegetables for your family.

Each fruit and each vegetable has some nutritional value.

VEGETABLES:

Ask participants to identify vegetables in the picture. Also ask them to indicate if they have ever eaten any of the 2 vegetables.

There are so many vegetables to choose from.
Draw participants attention to actual vegetable sample.

Try to prepare as many vegetables as you can. Avoid selecting the same vegetables everyday.

Each vegetable has its unique nutritional value.

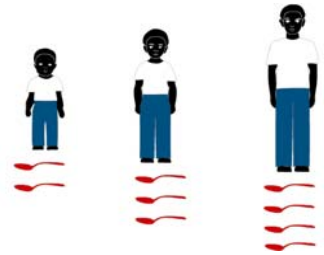
Vegetables can also be used to add color to different foods.

Always add vegetables to your favorite dishes to improve nutritional value of the meal.

(*E.g. Mix vegetables with staples (Akatogo)*

Ask participants for ideas on how to incorporate a variety of vegetables in children's meals.

Use a variety of vegetables and make sure that each child gets enough vegetables.



Ask participants to indicate the recommended amount of vegetables for young children.

The rule of thumb is to serve each child one (1) tablespoon of cooked vegetables per year of age.

Example: A 2-year child should be served two (2) tablespoons of vegetables. A four year old should eat four (4) tablespoons.

All children older than 4 years should be served four (4) tablespoons until the age of 12 years.
After 12 years, the child is served as an adult. *(Draw participants attention to the graphic)*

Children need 3 servings of vegetables daily. These are the amounts that count as a serving of vegetables:

Show participants recommended servings of various vegetables.
Ask volunteers to estimate recommended amounts using household utensils.

1/2 cup of chopped (raw tomatoes)

1/2 cup of cooked vegetables (spinach or *doodo*)

1 cup of raw leafy vegetables (lettuce or Spanish chard)

FRUITS:

Fruits have nutritional value just like the other foods.

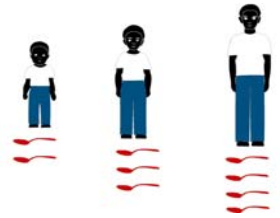
Ask participants to name fruits that are appropriate for young children.

Give your children a variety of fruits.

Most fruits do not need a lot of preparation. It should be easy for you to include fruits in your children's diet.

Avoid letting children pick fruit by themselves. This practice exposes them to food-borne illnesses.
Pick fruit for your children, wash it and prepare it appropriately.

Fruit is more appropriate for children when it is soft. Choose fruits that are ripe enough.



Ask participants to indicate the recommended amount of fruits for young children.
Children need the same amounts of fruits as needed for vegetables.

The rule of thumb is to give children a spoonful of fruits for each year of age.

Children need 2 servings of fruit daily.

Show participants recommended servings of various vegetables.

Ask volunteers to estimate recommended amounts using household utensils.

These are the amounts that count as a serving of fruit:

1/2 cup fresh fruit (mangoes)

1/2 cup cooked fruit (pineapple)

1/4 cup Dried fruit (dried berries)

3/4 cup of fruit juice (passion fruit juice)

Ask participants to name fruits that can be juiced. Allow time for participants to share personal experiences.

Ask participants to describe types of juices that are appropriate for young children.

Fruit juice is appropriate for children when it is prepared with clean, safe water.

Always use boiled or bottled water when making fruit juice at home.

Using unboiled water can make your children sick.

If you do not have access to clean water, you are better off buying the bottled fruit juices for your young children.

Give examples.

Let participants share experiences on how they use different fruits.

Notes to the educator:

1. As you prepare the recipes, stress the importance of:
   - Ensuring that children get enough fruits and vegetables
   - Adding more vegetables to the traditional banana/bean stew as a way of increasing the amounts of vegetables.
2. Encourage the participants to serve fruits to children at meals and for snacks.

Closing remarks:

1. Ask the participants how they feel about the recipes you prepared.
2. Reiterate the importance of serving a variety of fruits and vegetables to children.
3. Challenge the participants keep track the types of fruits and vegetables they serve their children.

*****

Lesson VII: **Planning and scheduling meals for children**

Lesson Overview

Objectives:

1. Emphasize the benefits of providing children foods from all the food groups
2. Coach the mothers on how to prepare meals that incorporate foods from all the food groups
3. Enhance the mothers' food apportioning skills and emphasize the need to increase the amounts of food served to their children
4. Instruct the mothers on how to increase the number of meals/snacks they provide to their children

Learner objectives:
The participants will be able to:

1. Understand that growing children have different nutritional needs from adults
2. Prepare meals that incorporate foods from all the three food groups
3. Serve their children appropriate amounts of foods from each food group
4. Plan and provide snacks to their children
5. Devise ways to prepare the available foods and ensure that children are fed at least 4 times a day

Suggested recipes:
Stew of foods from all food groups
Fruit snacks for children
Vegetable side dishes

Preparing for the lesson

Review the entire lesson
Make sure there are supplies for 35 participants
Gather the food items

Doing the lesson

1. Greet the participants (2 min)
2. Present the lesson using the flip chart. (20 min)
3. **Activity:** Ask the participants to forms groups. Each group take a turn to pick food items until they have all the foods they need or until food is finished. Then each group prepares a dish that incorporates at least 5 foods (45 min).
4. Allow time for the participants to taste the food and ask questions. (20 min)
5. Summarize the key points in the lesson. (5 min)
6. Closing remarks. Ask participants for comments about the course. (8 min)

Presentation

Briefly review what was covered in all the previous lessons.

Ask if anyone tried making the stew and let the participants share their experiences.
Give a prize to the person who incorporated the most food items.

How easy is it for you to choose foods for your children?

Can you find foods from all the food groups with ease?

Which food group are you having problems with incorporating in your children's meals?

The previous lessons have looked at different food groups. All food groups are important.

(Emphasize) Always include food from all the three food groups.

We all can select food from these food groups if we try. Here are tips on how to choose foods for children.

Tip #1: *Know what your children need*

Start by visualizing the food you would like to see on your child's plate.

Think of the foods that you would like your children to eat.

(*Emphasize)*Your children's health depends on what you put on this plate.
What you put on this plate will determine how your children grow.

Always, make the effort to provide your children with a large **number of food types.**
Pay attention to the **amounts** of each food your children eat.
And feed your children more **frequently.**

Tip #2: *Strive to provide a variety of food types*

Think of all the foods that are available to you.

You may not like to prepare the foods that are available to you.

(*Emphasize)* Always, keep in mind that your children need a **variety of foods** to grow well.

Select the foods that your children need the most.

Always use the food groups as a guide when preparing food for your children.

Ask the participants to recite the 3 food groups and give examples of foods in each food group.

Recite the amounts and servings needed for each food group

Ask for volunteers to measure out the recommended amounts.

Tip #3: *Provide your children food from all the 3 food groups*

Body-building foods

Energy-yielding foods

Protective foods

Use this plate as the guide when preparing food for your children.

Make sure that your children get foods from all the food groups.

Giving your child food from only one food group is like giving your child a partly empty plate.

Tip #4: *Mix foods to increase the number of food types you prepare for children*

Mixing foods can help you to provide a variety of foods in a single meal.

Mixing foods also increases the amount of food available for a meal.

Mix foods from different food groups to improve the nutritional value of your children's meals.

Ask participants to suggest mixed dishes that are appropriate for children.

Remember children need food from each food group to grow well.

Show participants dishes of mixed foods and let them taste.

Tip #5: *Provide snacks in between meals*

If you provide your children 3 meals or less, you might not be able to provide enough food to your children. Your children will never get the amount of food they need for the day.

It is best to give children snacks in between meals.

Remember that children have small stomachs, and need to eat frequently.

Young children need to eat at least 5 meals a day.

Be creative and make snacks for your child. *(Give examples of foods that are easy to fix as snacks)*

Give your children a variety of snacks in-between meals to ensure that your children get enough energy and nutrients.

Ask participants to suggest foods that can be provided to children as snacks.

Notes for the educator:

1. While you cook, let the participants measure foods.
2. When food is ready, **ask each mother to prepare a plate for a three-year old child**.
3. Encourage the participants to discuss their beliefs about feeding children in relation to what was covered by the course.

Closing remarks:

Reiterate the importance of:

1. Preparing a variety of foods i.e. increase nutritional density, increase the amounts of food available to the entire family.
2. Mixing foods as an easy way to preparing a variety of foods
3. Making sure each child gets enough food from each food group i.e. the importance of keeping track what each child eats.
4. Providing snacks in between meals
5. Thank the participants for their involvement and encourage them to participate in future activities.
6.

*****

APPENDIX D

INTERVENTION INFORMED CONSENT FORM

Informed Consent Script to be read to participants:

Hello Ms/Mrs _____
My name is Margaret Kabahenda. I am a student from the University of Georgia and I am conducting a study on what children eat.

Your information Ms./Mrs. _____ will help me in putting together an education program that can teach other mothers how to feed their children. So, I would like to ask you a couple of question about how you feed your child.

First, however, I would like to inform you Ms/Mrs. _____ that you are not required to take part in this study. And if you decide to participate, you can stop at any time you want to and you will not be penalized. If you are willing to participate, I would be asking you a few questions and this interview will take about 30-45 minutes of your time. Any information you provide me will not be released to anybody else without your consent.

Would you like to participate in this study, Ms./Mrs _____?
(If yes) Thank you Ms./Mrs_____ for accepting to participate in the study.
(continue with interview)

Interview protocol:

1. ***Introduce self and greet family members***

Hello Ms/Mrs _____ My name is _____ (*Describe* self).

2. ***Inform subject of purpose of visit and seek their consent to participate:***

I am conducting a study on how we can use different foods in our region to feed young children.

Ms/Mrs _____ do you have any children that are under 5 years of age? **YES /NO**

*If **YES**, ask for the age of the children.*
Ages of children in household: _____ _____ _____ _____ _____ _____ _____

*If **NO**, inform participant that you are looking for mothers of children under 5 years of age and terminate interview.*

3. ***Read attached* Informed Consent Form*:***

We need you to help us Ms./Mrs. _____. We are trying to put together a program that can help young mothers in feeding their children. So, I would like to ask you some questions about how you feed your children.

First, however, I would like to inform you Ms/Mrs. _____ that you are not required to take part in this study. And if you decide to participate, you can stop at any time you want to and you will not be penalized.
If you are willing to participate, I would be asking you a few questions. This interview may take about 30-45 minutes of your time. Any information you provide me Ms/Mrs _____ will not be released to anybody else without your permission.

Would you like to participate in this survey Ms./Mrs _____?
(If yes) Thank you Ms./Mrs_____ for accepting to do this interview.

***Subject **must sign** the Informed Consent Form before you proceed.

4. ***Inform participant of what will be covered in interview***

Ms/Mrs _____ I will start by asking you what your child ate in the past 24 hours. Then I will ask you a few questions about the foods your children eat.

5. PART A: **24-hour Recall Food Intake** *(Use Table below to record information)*
If mother has many young children, ask for the dietary intake of the child who was home the previous day. If all children were home the previous day, ask for information about the child of the median age (i.e. 3-4 years)

- When was the last time you fed this child Ms/Mrs _____
- Can you describe the food that your child ate?
- Please estimate the amount of the food that you gave this child
    - *(Use household utentils to estimate amounts)*
- Did she/he eat all his/her food? If **not**, about how much food did she/he eat?
- What did your child eat before this meal/snack?

***Repeat these questions going backwards till all 24 hours are accounted for?*

Time	**Food/drink served**	**Preparation Method**	**Amount**

* This is a 24-hour food intake recall of children 2-5 years of age as reported by the mother.

Was this a typical day for you Ms/Mrs _____? _____YES _____ NO

If **NO**, describe how you would feed your child on a typical day?

_____

_____

PART B: Food knowledge, beliefs, and feeding behavior questionnaire

Part 1: **Feeding Behavior**

1. How many meals do you prepare in a typical day Ms/Mrs _____?

   (4) 4 or more (3) 3 (2) 2 (1) 1

2. Name the foods that you cook everyday?

   _____ _____ _____ _____ _____ _____ _____

3. Do you provide snacks in between meals?

   (2) Yes (1) No

4. How many snacks do you provide?

   (3) 3 or more (2) 2 (1) 1

5. Do you prepare special meals for young children?

   (2) Yes (1) No

   (a) If **YES**, How many times in a day do you prepare food for children only?

   (4) 5 or more (3) 3-4 (2) 1-2 (1) 0

   When: _____

   _____

   _____

   (b) If **NO**, Why not: _____

   _____

   _____

Part 2: **Food knowledge, beliefs, and food selection habits**
(Will employ the Food-picture sorting technique)

Ms/Mrs _____ I have here a number of food pictures. I would like for you to sort out the foods that are familiar to you.

Of the foods you have sorted out:

1. Select the foods that your family eats?

2. How often do you cook this food item *(for each food selected)*
(***Usee attached Food frequency questionnaire)***

3. Which of these foods would yield the most energy to growing children?

Food #: ___ ___ ___ ___ ___ ___ ____

___ ___ ___ ___ ___ ____ ___ ____ ___

4. Which of these foods will protect children from getting sick easily?

Food #: ___ ___ ___ ___ ___ ___ ___

___ ____ ___ ___ ____ ____ ___

5. Which of these foods are high in protein and would help children to grow well?

Food #: ___ ___ ___ ___ ___ ___ ____ ___

(a) Which of these foods are inappropriate for children 2-5 years?

Food #:	Reason for not being appropriate
_____	_____
_____	_____
_____	_____

(Continued overleaf)

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Which of these foods are the most appropriate for children 2-5 years old?

Food #:	Reason for being **most appropriate:**
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Participant's age: _____

Education level: _____

Occupation: _____

Total # of children in household (**optional**) _____

****

PICTURE OF SAMPLE FOOD CARDS

APPENDIX E

Data Coding Scheme

Part A: 24-hour food intake recall

Score = Number of times a food item was provided based on items listed under "Food/drink served".

PART B: Food knowledge, beliefs, and feeding behavior

Section 1: Feeding behavior
Data coded as specified on the questionnaire.

Section 2: Food knowledge, beliefs and food selection habits

Q1 - Not included in analyses

Q2 Food Frequency Questionnaire:

a. Frequency in food selection (to assess changes in the number of times foods are provided)

30 = Daily
20 = 4-6 times a week
8 = 1-3 times a week
1 = 1 - 3 times a month
0 = < 1 per month, occasionally, yearly, or never.

b. Number of food items consumed in a month (to assess changes in food variety). This data set was generated from the data set used in (a) above using the *Recode* function of SPSS.

1 = food item was provided
0 = food item not provided

Q3 Scores of 0 - 5 were given based on the number of foods identified that belong to the Energy-yielding food group (bananas, tubers, starch vegetables, grains plus fats and sweets). Maximum possible score is 5

Q4 Scores of 0 - 5 were given based on the number of foods identified that belong to the Protective food group (fruits and vegetables). Maximum possible score is 5.

Q5 Scores of 0 - 5 were given based on the number of foods identified that belong to the Body-building food group (legumes, nuts, meats and milk). Maximum possible score is 5.

Q6a Foods inappropriate for children 2-5 years old:

3 - All foods are appropriate **or** gives inappropriate method of preparation
2 - Foods hard to chew i.e. yams or cassava
1 - Don't know or names appropriate foods i.e. wrong response

Q6b Foods appropriate for children 2-5 years old:

3 - All foods are appropriate
2 - Foods hard to chew i.e. yams or cassava
1 - Don't know or no response

APPENDIX F

Figure 4.1: Estimated Regression Lines for Correlations that were Statistically Significant