EVALUATION OF NUTRITION EDUCATION IN PUBLIC NURSERY SCHOOLS IN KISUMU MUNICIPALITY, KENYA

By

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ABSTRACT

Knowledge about nutrition and health is gained throughout childhood, yet little is known about the nutrition knowledge of nursery school children in Kenya. Much of the research assessing nutrition practices in early childhood programs has focused on the adequacy of foods that are served and growth monitoring of children. Teachers have regular contact with the students; they potentially have a great influence on children's dietary practices. Literature on teachers' nutrition knowledge and dissemination of that knowledge in public nursery schools is scarce in Kenya. The objectives of this study are to: assess teacher knowledge and perceptions about nutrition; assess nutrition knowledge of nursery school children; and identify resources and strategies used to teach nutrition in nursery schools. The study adopted a cross sectional study design. The study population consisted of public nursery school teachers and children aged 3-5 year old from Kisumu municipality. From 109 public nursery schools, a total of 36 schools were selected using systematic sampling technique. From the 36 sampled schools, 146 teachers were selected using cluster sampling, and 365 children selected using stratified random sampling. Data was collected using questionnaires. The data was analyzed descriptively using Statistical Package for Social Sciences (SPSS) version 11.0. ANOVA was used for analysis. Results showed that 79% of the children were able to correctly name the foods, and about 62.7% correctly identified fruits. Few children (39.2%) were aware of the foods that should be eaten more frequently by them. The difference between mean scores of female and male children was not significant ($F=1.59$, $p> 0.05$). There were significant differences between the children's mean scores by their age ($F=96.46$, $p<0.05$). The mean score of children who were taught by teachers who had training in early childhood development was higher (mean=4.47) than those children who were taught by teachers with no training in early childhood development (mean=3.86). Most (65%) teachers were aware of the sources of proteins and carbohydrates. Only 22.6% of teachers were aware that goiter is caused by iodine deficiency while 46.6% were aware of foods rich in vitamin C and A. The difference between the teachers' mean scores of the trained teachers and untrained teachers was found to be significant ($F=33.66$, $p<0.05$). Majority (95%) of teachers strongly agreed or agreed that nutrition education is necessary for nursery school children. Only 49.3% of teachers reported availability of teaching and learning materials on nutrition in their schools. More than 90% of teachers reported use of poems and songs for teaching nutrition in schools. In conclusion, teachers' mean scores are higher for trained teachers than untrained teachers. The difference between teachers' mean scores and education level is not significant. The mean score of children who are taught by trained teachers is higher than those who are taught by teachers who are not trained. The difference between children's mean scores by their age is significant. Nutrition education resources are inadequate in public nursery schools. The government should keep on updating the teachers' knowledge by mounting training programs through workshops and seminars. The government should also develop and avail appropriate teaching and learning materials in the schools. As expressed by the teachers, nutrition education programmes for younger children should not only include children but their parents as well, since this can enhance the initiation of behavioural change.

CHAPTER ONE

INTRODUCTION

1.0 Background to the study

Kenya can be considered a relatively better developed country when compared with other sub-saharan African countries in terms of social services, and yet child malnutrition is still persistent and on the increase (UNICEF, 2009). As a result of rapid socioeconomic advancements in Kenya in the recent decades, the population has undergone significant lifestyle changes, including increased consumption of fats and oils, decreased intake of complex carbohydrates, eating out and skipping meals (Carloni, 2004). Unlike consumption of other food groups, fruit consumption remains low in Kenya, from infancy throughout adulthood (Oniang'o *et al.,* 2003). Urbanization or westernization has also brought about an increase in the number of fast-food outlets in Kenya during the last decade (Oniang'o *et al.,* 2003).

Several previous studies, have reported that obesity is prevalent in all age-groups, including children (WHO, 2003). In Kenya, child malnutrition also poses a challenge particularly in areas such as Kisumu (Carloni, 2004). The 2005-2006 Kenya Integrated Household Budget Survey (KIHBS) shows marginal increases since 2003 in stunting (33%), wasting (6.1%) and underweight children (20.2%),(UNICEF, 2009). National and nutritional survey carried out in 2003; indicate that the situation is particularly severe and worsening in Coast and Nyanza (Republic of Kenya, 2003). With the persistence of problems of malnutrition, it was noted that intervention efforts need to be intensified (Olenja, 2004). In Kisumu, nutrition communication activities form a major component of

the existing basic health services (Carloni, 2004). The Ministry of Education includes basic principles of nutrition in the nursery school curriculum (Ministry of Education, 2001). The curriculum of the nursery school children include nutrition concepts, which are mainstreamed in environment, social activities and other subject areas. The goal of nutrition education is to teach children to eat a well-balanced diet that contains a wide variety of foods, and that children learn to make wise food choices independently (Ministry of Education, 2001). Seven years after the Kenyan government produced early childhood development curriculum for 3- 6 year olds in 2001, there is need to evaluate programme to determine the extent to which the objectives have been achieved. To date, there seems to be no information on teachers' knowledge and perception about nutrition in Kenya.

Teachers have regular contact with pupils, so they potentially have a great influence on children's dietary behaviors (Lawatsch, 1990). Results from a study conducted by Crockett & Sims (1998) in New York, indicated that teachers' behaviors are not necessarily conducive to the development of healthy eating patterns by children. Additionally, teachers may unintentionally create harmful effects if they transfer negative attitudes to students. Thus, teachers have the opportunity to transmit both healthy or unhealthy attitudes and behaviors through both formal and informal interactions with students. Given the importance of teachers as part of the environmental influence on nutrition information and behavior of children, it is important to examine and understand teachers' nutrition knowledge and perceptions about nutrition.

1.1 Statement of the problem

Knowledge about health and nutrition is gained throughout childhood, yet little research has been done on assessment of nutrition knowledge of nursery school children in Kenya. Much of the research assessing nutrition practices in early childhood programs has focused on adequacy of foods that are served and growth monitoring of young children. Research on nutrition knowledge is particularly important; since the knowledge may influence diet and dietary behaviors. Most studies on nutrition knowledge of young children have been conducted outside Kenyan context. In Kenya, the curriculum of the nursery school includes nutrition concepts, which are mainstreamed in other subject areas. The teacher, being the person having regular contact with pupils, is required to facilitate nutrition education by dissemination of that information. Literature on teachers' nutrition knowledge and dissemination of that information is scarce in Kenya. This study provides information on children's understanding of nutrition, and nutrition education in public nursery schools in Kisumu, Kenya. The study focused on nutrition knowledge of nursery school children, as it is believed that children have much to learn about nutrition. Young children are future parents, therefore when they are provided with nutrition concepts at formative stage; they are most likely to respond to the dietary messages more than older children. They are also likely to develop lifetime healthy eating habits, which would influence their health during adulthood, even teach their future children the concepts they have learnt. Nursery school teachers can facilitate nutrition education and the development of healthy eating habits among children.

1.2 Justification of the study

Nutrition education which is not set securely within the context of pupils' experience will almost certainly be unsuccessful (Contento *et al.,* 2007). It will become compartmentalized and detached from the reality of lifestyle. At worst it may be discarded as irrelevant. Inaccurate knowledge among children facilitates uninformed choices to be made, which may promote unsound dietary practices that increase the risk to health (Carloni, 2004). In addition, poor child nutrition education can negatively influence their food knowledge, preferences, willingness to taste and their whole eating experience (Contento *et al.,*, 2007). Consequently, these different thoughts, perceptions and decision strategies may significantly impact on interventions aimed at changing food preferences and intake. In order, to improve nutrition education aimed at children, an understanding of children's nutrition knowledge as well as nutrition interests is crucial (Crokett & Sims, 1998). Much of the research on nutrition knowledge of young children has been conducted in other countries. Within Kenya, there seems to be no information on nutrition knowledge of young children. Nursery school teachers can facilitate nutrition education and the development of healthy eating habits by the dissemination of nutrition information through formal interactions and by serving as a role model through informal interactions. However, many schoolteachers may transmit incorrect information or model unhealthy dietary behaviors (Tedstone & Shetty, 2005). Given the importance of nursery school teachers in teaching young children nutrition, it is also important to examine and understand teachers' knowledge and perceptions about nutrition.

1.3 General objective

To investigate the extent to which nutrition education is implemented in Kisumu public nursery schools

1.4 Specific objectives

1. To assess teacher knowledge and perceptions about nutrition
2. To assess nutrition knowledge of nursery school children
3. To identify resources and strategies used to teach nutrition in public nursery schools

1.5 Research questions

The following research question was addressed by this study.

1. To what extent is nutrition education implemented in Kisumu public nursery schools?

1.6 Research hypotheses

a) There is no difference in nutrition knowledge scores of children taught by teachers who are trained in early childhood development and children who are taught by teachers with no training in early childhood development.

b) There is no difference in the nutrition knowledge scores between male and female children.

c) There is no difference between the children's knowledge scores by their age

1.7 Significance of the study

This study was expected to provide information, which may be utilized by the Ministry of Health, Ministry of Education and other organizations that run nursery schools. The respective ministries may use the findings to revise or redesign policies related to nutrition and health of nursery school children. The findings may provide some useful insights to guide the government in designing nutrition education programs for nursery school children. Non-governmental organizations and agencies responsible for planning and implementing health and nutrition programmes in the country could also use the findings. The study, also forms a base on which other researchers can develop their studies on provision of nutrition education to pupils in schools.

1.8 Scope and limitation of the study

The study was carried in Kisumu municipality in public nursery schools only. It only involved the nursery school teachers, and their pupils aged 3-5 years because this is the age limit for nursery school children in Kenyan education system. The scope of the study did not include all those involved in the provision of education to nursery school children. In this regard, there are chances that the study left out some information that could have been gathered had all those involved in the provision of education to the children been included in the study; that is including the parents of the nursery school children.

1.9 Assumptions of the study

The nursery school teachers truthfully, and to the best of their ability responded to the questionnaire on nutrition education in the public nursery schools in Kisumu municipality. It was also assumed that nursery school children chosen for study understood the questions asked and accurately answered them.

CHAPTER TWO

LITERATURE REVIEW

2.1 Importance of nutrition education

Many studies have shown that eating habits are established early in the life cycle and tend to carry through to adulthood (Tedstone & Shetty, 2005). As a result, the food that children eat now will undoubtedly influence their state of health in later life. Making informed food choices is an integral part of a child's normal growth and development (Scarr & Howes, 2004). The link between diet and chronic disease has long been recognized and, as a result, nutrition education is necessary and important part of health (Schoon & Parsons, 2002).

While Energy Protein Malnutrition (EPM) is the most widespread disorder, leading to high rates of morbidity and mortality (UNICEF, 2009). Continued inadequate consumption of protective foods leads to retarded growth and development. In addition, the huge range of foods available in Kenya makes it very difficult for people to make informed food choices (Oniang'o et al., 2003). Five out of every 120 children in Kenya suffer from Type 2 diabetes. The increase in the disease prevalence among children has been attributed to obesity and lack of physical exercises (WHO, 2003). The 2005-2006 Kenya Integrated Household Budget Survey (KIHBS) shows marginal increases since 2003 in stunting (33%), wasting (6.1%0) and underweight children (20.2%),(UNICEF, 2009). National and nutritional survey carried out in 2003; indicate that the situation is particularly severe and worsening in Coast and Nyanza (Republic of Kenya, 2003). These alarming figures clearly

demonstrate that reducing the prevalence of these conditions in children is an important public health priority. Food selection and consumption based on nutrition awareness in homes and schools will promote nutrition well- being and avoid nutrition deficiency conditions (Oniang'o *et al.,* 2003). Nursery schools are favorite sites for nutrition education. If sound nutrition education programs are included in the curriculum, children have opportunities to expand their knowledge and learn to select healthy foods at schools, homes and restaurants (Shaya & Wang, 2008).

2.2 Nutrition education in the nursery school children curriculum

Educational objectives and contents related to food and nutrition exist as part of national curricula for nursery school children in Kenya (Ministry of Education, 2001). Role-play, practical work, demonstration, songs, games, poetry, and story- telling strategies are included in the subject areas, in which nutrition features in addition to environmental activities, social activities, prescience activities, creative activities, and outdoor and indoor activities (Ministry of Education, 2001). Nutrition education will not be effective if it is approached in isolation from health education (Levine, 2002).

The nutrition concepts and content in the curriculum include fruit and vegetable identification, sources of foods, classification of foods, and discussion of tastes, smell and color of food (Ministry of Education, 2001). In United States, program that receive federal or state funds are often required to identify a curriculum model that they are implementing (Nuhlicel *et al.,* 2002). Kids for life curriculum and Coordinated Approach to Child Health (CATCH) curriculum are examples of curriculum used by nursery school teachers in

United States. Kids for life curriculum offers cross-curricular comprehensive health guides designed for use by nursery school teachers seeking to integrate health education into their daily activities and annual teaching plans. CATCH curriculum builds an alliance of parents, teachers, child nutrition personnel, school staff, and community partners to teach children and their families how to be healthy for a lifetime.

2.3 Nutrition education in the nursery school teachers' curriculum

In order that teaching nutrition may be effective in schools; nursery school teacher training colleges include courses in nutrition (Ministry of Education, 2001). Nutrition is an integral part of nursery school teachers' education curriculum in Kenya. The curriculum identifies the knowledge, skills, and concepts important for nursery school teachers to acquire in each content area (Portman, 2006). Pre-school teachers' syllabus, developed in 2000, covers child development, nutrition, preschool activity areas, ECD methodologies, and appropriate materials development (Ministry of Education, 2001).

The Ministry of Education recommends that nursery school teachers undergo formal nutrition training in colleges to improve their nutrition knowledge and skills. The teachers are required undergo training on healthy environment; health services; physical education; nutrition services; and topics such as food nutrient sources; functions of food and nutrient; nutritional deficiency diseases such as marasmus, rickets, coronary heart diseases kwashiorkor, night blindness; nutritional status of children, preventive measures; nutrition for young children, pregnant mothers, lactating mothers, young adults, adolescents, and elderly people (Portman, 2006). Student nursery school teachers preparing to teach children in Kenyan nursery schools are required to teach young children health and

nutrition (Avalos, 2002). The goal of training teachers on nutrition is for the teachers to teach nutrition and encourage the pupils to eat healthy foods.

2.4 Research on teachers' knowledge of nutrition

A survey carried out by Roszkowcki & Kollajitis (2004) in Poland, indicated that nursery school teachers had poor knowledge of the benefits of dietary fiber, the harmful effects of excess fat and cholesterol in the diet. There were significant differences in knowledge levels according to age, sex and level of education. Nutritional knowledge was investigated among nursery school teachers in the Taiwan area. The teachers who participated in the research answered 59% of the total knowledge questions correctly, with a tendency to score higher on general knowledge (Hu *et al.*, 2007).

The nutrition knowledge of nursery school teachers in Texas was examined by Demory-Luce & McPherson (2003). The survey data were collected by means of mail. The questionnaire was completed by 125 teachers. A mean knowledge score of 70% was found. It was determined that knowledge scores were significantly related to the level of education but not to other demographic variables (age, year of graduation, length of practice). In the research carried out by Temple (2002) in Alberta, Canada, the average correct response of 84 nursery school teachers was determined to be 63.1%. The subjects that were best known by the teachers were the nutrient associated with the prevention of coronary heart diseases, common nutrient deficiency in alcoholics (thiamine) and a nutrient which was not an antioxidant (zinc). The least known subjects were the nutrient believed to help protect against thrombosis (omega-3 fatty acids), the association between excess

protein intake and calcium loss, and the type of dietary fiber that helps lower the blood cholesterol level (soluble).

In Kos *et al.*,(2004) research in South Africa, that involved 450 nursery school teachers of 35.8% who have secondary school degree, of teachers of 50.3% and of 65.9% who have university degree have been found well knowledgeable about nutrition. In the research carried out by Kupper & Steiner (2002) in Zambia, it was found that the point of average nutritional knowledge of the teachers who have primary school degree is 26.1, of teachers who have high school and university degree is 36.3. In the research carried out on 200 nursery school teachers in Canada, it has been found that 65% of teachers have moderate, 18.5% of teachers have well, and 16.5% of teachers have inadequate nutritional knowledge level (Malik, 2000).

In another study carried out in Nigeria, it was found that teachers who had studied nutrition in colleges, and attended continuing nutrition education programs scored significantly higher in nutrition than those who had not studied nutrition in colleges (Lasswell *et al.*, 2005). Corley *et al's* (2001) questionnaire included statements for which the teachers in Southwestern Ontaria in Canada were asked to respond true or false for each response. This meant that teachers have 50% chance of guessing the correct answer, which could account for higher overall score. Despite high scores obtained, teachers indicated low level of certainty with responses. In another study carried out by Bedgrood & Tuck (2003) in New Zealand, it was found that nursery school teachers' knowledge scores were lower. Despite this, 86% of the teachers regularly dispensed nutrition information, and 73%

believed themselves to be well prepared to provide nutrition advice. The study used self-report questionnaires among the nursery school teachers. The questionnaires addressed general knowledge about nutrition.

More than three quarters in Juzwiak's (2004) study of nursery school teachers in Brazil, incorrectly held belief that certain foods such as pineapple, have special value in weight loss diets as they claim to burn body fat. These beliefs, held by teachers contribute to enormous body of misinformation that exists in the weight loss industry, as well as to the confusion of pupils regarding the most appropriate means to decrease body fat. The role of protein appears to be a source of confusion for teachers. This is evidenced by the incorrect belief, held by slightly under half of Juzwiak's (2004) study of teachers, that protein is the main fuel for muscles. In India, Seshadri & Golpadas (2001) reported that more than one third of nursery school teachers believed protein to be the primary source for muscle. A range of teachers believed that vitamins and minerals provided energy.

2.5 Children's knowledge and understanding of nutrition

Several studies have already been conducted in other countries to assess the knowledge the children have regarding nutrition. Research conducted in 2000 in 14 child care centers in South California, involving 187 three to five year old children, revealed that greatest knowledge gains were seen in food identification questions (Gorelick & Clark, 2000). Significant gains were also seen in the ability to distinguish between foods that are good for them and those that should not be eaten frequently. The study also found that older children scored significantly higher on fruit identification and on food choices that were

"good for them." Pre-operational children believed that the ingested food went into the stomach and did not change in the body.

In the Michela and Contento (2001) study of classification of foods into groups, in one hundred fifteen 4-11 year olds in New York, children in preoperational stage of cognitive development (4-6 year olds) divided foods into groups based on two characteristics: sweets versus non-sweet foods and liquids versus solids. The children could mention foods that were healthy, but they could not explain why. The study also revealed that the children believed that the ingested food went into the stomach and did not change in the body.

Similarly, Hertzler & DeBord (2002) tested four-nutrition education lessons with children between 2-6 years of age in California. The study found that 3-5-year-olds can learn the names of objects and begin to classify by size, color, shape, and other attributes, 4-6-year-olds can group foods by the nutrients they contain (fat, vitamin A, iron, calcium). The study also found that very young children of 1–21/2 years old accept almost all kind of edible and inedible substances. The first rejection category to appear is distaste; disliked products are rejected. Secondly, rejections based on danger appear. This means that products are rejected because negative consequences of ingestion are expected. It is not until the age of 7 that children differentiate between disgust and inappropriateness. Between the ages of 2 and 7, children become more independent eaters and they have to learn which foods are edible and which foods are not (Gorelick & Clark, 2000).

Singleton *et al.*, (2002) evaluated the role of food and nutrition in the health perceptions in interviews of sixty 4-7 year olds in Nebraska. When children were asked, "What is the

right kind of foods?" they named specific vegetables and fruits. Children responded that "unhealthy foods" were foods high in sugar. Analysis of open-ended questions showed a positive program effect, but analysis of closed-ended questions indicated no program effect.

In regard to ability to report food habits, Hertzler & DeBord (2002) found that children between age 2 and 5 years could name foods served daily and count to one or two foods. Additionally, in Michigan, Murphy (2005) evaluated 62- nursery school children's understanding of the dietary guidelines in 12 focus-group interviews. Nursery school children understood the thrust of the dietary guidelines: increase the healthful foods you eat and decrease intake of less healthful foods. The children could classify or group foods that they should eat more or less of. They stated high fat or sweet foods when asked, "What foods are not good for you?" and responded that fruits, vegetables, and milk "are good for them". In response to, "Are there any foods you like but think you shouldn't eat?" responses were primarily high-sugar foods such as candy, ice cream, gum, and pop. Children believed there are good and bad foods.

2.6 Nursery school teachers' qualification and pupils' nutrition knowledge

A study carried out by Weiss & Kien, (2004) on the effectiveness of nutrition education programs in New York, showed that teacher training significantly improves instructors' nutrition knowledge. In another research by Shannon (2002) in New York, it was found that there was significant effect of in-service education on nursery school pupils' knowledge scores. Connell (2000) also found in Finland, that when nursery school children

attended centers with a higher proportion of trained nursery school teachers, they exhibited greater cognitive test scores in nutrition knowledge than those cared for by less-trained teachers.

In a study of child care quality in Massachusetts, Georgia and Virginia – three states with wide variation in child care regulations. Scarr and Howes (2004) found those children in programs with more sensitive nursery school teachers and more responsive care giving received higher nutrition knowledge scores. The study also found that nursery school teachers with a bachelor's degree (with or without specialized training at the college level) scored high in nutrition knowledge than teachers no training or only training at the vocational school level or lower. The number of years of experience was not a good indicator of the teachers' behavior.

In nursery school classrooms in Switzerland, higher nutrition knowledge scores were associated with the teacher having a BA degree or, to a lesser extent, at least some college (Dunn, 2003). But education alone did not explain quality: process quality was higher in classrooms where teachers had completed more education, and had a moderate amount of experience. Classrooms with higher levels of quality had teachers with higher levels of education, greater experience, and more positive attitudes and knowledge about nutrition. Preliminary results found that children in classrooms led by teachers with more education scored slightly higher on nutrition knowledge. In Ghana, Cartwright (2006) found that children in classrooms with nursery school teachers who had at least college degree had higher scores on the nutrition test than did children in classrooms with teachers having only high school backgrounds. In a study conducted by Bryceson *et al.,* (2005) in

Tanzania, nursery school teachers who taught about food and nutrition had taken more food and nutrition courses and had higher knowledge scores.

2.7 Teaching experience and pupils' nutrition knowledge

Teaching experience also continues to be a factor in determining children's nutrition knowledge scores (Howarth, 2001). Suzuki (2004) conducted research on nutrition teaching in nursery schools in Nepal. It was found that teaching experience is related to children learning gains in a truncated fashion; nursery school teachers with more than three years of experience are more effective than an inexperienced teacher. Otherwise, there is not a significant relationship between teachers' experience and nursery school children's nutrition knowledge. In another study carried out in Australia, it was found that there is no linear relationship between years of teaching experience and improved children's knowledge scores (Smith, 2003).

Greenwald *et al.,* (2006) found in their study in Malaysia, that teaching experience had a positive and significant effect on children's nutrition knowledge. In a research carried out by Hawkins and Dossey (2001) in England, although teaching experience appeared to be related to nursery school children nutrition knowledge scores, the relationship may not be linear; children whose teachers had fewer than 5 years of experience had lower levels of nutrition knowledge scores, but there were no differences in nutrition knowledge among children whose teachers had more than 5 years of experience.

Other researchers have disagreed with these findings. Hanushek (2007) wrote that 71% of the studies he reviewed did not find any results to support a relationship between teaching experience and nursery school children's nutrition knowledge. Howarth (2001), in his study of over 100 school districts in Texas, found that teacher experience was positively associated with children's nutrition knowledge scores at the district level. Likewise, Etheridge (2007) found that teacher experience had a positive effect on children's knowledge for inner-city pupils. In their study of nursery school children, Ramey and Ramey (2004) found that teacher experience was positively related to White and African American children's knowledge scores, but negatively related to Hispanic gain scores.

2.8 Nursery school teachers' perceptions and attitudes about nutrition education

Attitudes predispose an individual to action that has some degree of consistency and can be evaluated as either negative or positive (McMillen *et al.*, 2000). A study of 47 nursery school teachers in an inner city area of London, England, reported that the attitude of the teacher was one of the most vital factors in the success of nutrition education programs (Smith, 2003). The study found that many non- specialist nursery school teachers hold negative attitudes towards nutrition education and question its value. Research has shown that positive teacher attitudes towards nutrition contribute to the formation of positive pupil nutrition interests and knowledge (Relich, 2004). Other studies have shown that classroom strategies used to teach nutrition are influenced by teacher attitudes which, in turn, influence pupil attitudes and knowledge scores (Carpenter & Lubinski, 2000).

Suzuki (2004) examined the attitudinal disposition and beliefs of teachers in the Nepal, before and after fields based course using two open ended questions. After this course, half of the teachers indicated that they were not willing to teach nutrition. Suzuki also found that many teachers recognised that they were not equipped to teach nutrition after observing the complex nature of nutrition teaching. It is important that the attitudes of teachers is acknowledged in the development of appropriate nutrition education teacher education courses, as teachers' views about nutrition education may need to be challenged or complemented (Portman, 2006).

In a study carried out in Peru, nursery school teachers feel unprepared to teach nutrition, and report that they have insufficient educational materials to support learning in the classrooms (Ames, 2004). The study also noted that isolated and isolating conditions of work and the inadequate funds to support nutrition education reinforce teachers' negative attitude to the school. In another study carried out in Sri Lanka, it was found that 53.6% of teachers responded that they would not teach nutrition education themselves and the main reason was lack of nutrition knowledge, and that the courses should be taught by specialists (Vithanapathirana, 2000). In the Turks and Caicos Islands, teachers reserved their most negative comments for the burden of lesson planning imposed by the teaching of nutrition (Berry, 2008).

Other researchers have noted the positive effect of tertiary training on pre-service teachers' attitudes to nutrition education (Howarth, 2001). Some researchers have indicated that many of the effects of teacher education on knowledge, attitudes and beliefs are only

temporary (Zeichner & Tabachnick, 2001). In Vietnam, teachers strongly agreed that nutrition education is a necessity in the nursery schools (Hargreaves *et al.,* 2001). The main reason for necessity was for proper growth. Starting period was supported as beginning when the children are in nursery schools. The teachers indicated that suitable person to teach nutrition were parents, dieticians, and class teachers.

2.9 Resources and strategies as determinants of success of nutrition education

Nursery school teachers need to create awareness and foster interest in children by planning the environment and introducing new and stimulating objects, people, and experiences (DeVries & Kohlberg, 2000). Teaching strategies and mode of delivery may also affect the success of nutrition education program (Hendrick *et al.,* 1999). Several reports have supported the idea that a didactic (information only) approach is not as effective as practical learning (Ames, 2004). Hands on, experiential learning strategies have been successful at improving knowledge, positive attitudes, and healthy intentions among pupils (Isbell & Exelby, 2001). Peer support group interventions using a life skills approach have also shown success in improving children's eating attitudes and behaviors (McVeigh, 2003).

Abraham (2000) chose to implement a program that used cooperative and interactive learning with a pupil centered approach in England. This intervention program improved pupils' attitudes towards eating and pupils' perceptions with no negative side effects. Improvements in eating attitudes were still present at the 12 month follow up. According to Martin (1994) teaching strategies should be based on the teachers' rationale for example

when the teacher has decided on what to teach, then one needs to know a variety of ways that could be taught any particular skill or concept.

School gardens also provide pupils with hands-on experience throughout growing, harvesting, and preparing common and uncommon foods. Children are more likely to taste vegetables that they grow themselves versus vegetables presented to them (Hendrick *et al.*, 1999). In addition, gardens provide a wonderful opportunity for foodservice staff, parents, and community members to become involved with the project. Doak (2006) demonstrated that school cafeteria is a teaching aid, because it makes a substantial contribution to learning capacity of children. A study by Wardle *et al.*,(2005) revealed that when nutrition education is an integral part of the school meal programs there is a definite influence on the nutrition knowledge of children participating in it.

The teaching methods advocated in the Kenyan national guidelines for early childhood development for teaching nursery school children nutrition include practical work, field work and group discussion (Ministry of Education, 2001). Other strategies recommended for the teachers are use of songs, role play, poems, story telling, games, food related pictures, textbooks and realia. As indicated in the national guidelines for nursery school teachers, the children are supposed to visit farms, kitchen or food industries to learn about nutrition, how foods are processed; and cooking and preparation of foods (Ministry of Education, 2001). Children are also required to engage in practical work such as germinating of food grains; drawing and naming of foods; learning songs about foods; tasting variety of foods.

In Britain, the nursery schools tend to base the teaching of nutrition on different models of healthy eating such as food pyramid and the traffic lights system. These are designed principally to show how different foods can be grouped (food standards agency, 2004). Turner & Ingle (2004) found that in one of nursery schools in South Africa, the children are allowed to prepare and serve fruit to each other daily. The teacher works with them and discusses the activity with the children.

2.10 Role of parents in children's learning of nutrition

Parents have a special role to play in any program designed to improve nutrition of children (Desforges, 2003). Parental involvement as children get older also has significant benefits for children's nutrition knowledge (Brassett-Grundy, 2002).The home and school must reinforce each other, so that what is taught in school is extended to the home (Jalongo & Isenberg, 2004). School reaches a large proportion of children than any other organized service. Hence, large numbers of families can be reached through children who attend the schools (Ramey and Ramey (2004). Since health is a prime factor responsible for national development, education of the parents on principles of nutrition is important (Jones, 2008).

In a Canadian study by (Oldershaw, 2002), it was reported that although parents may believe their role is critical in helping children to learn nutrition, they do not have much knowledge about nutrition. Hence effective methods should be used to impart effectively knowledge about nutrition. Vital partnership between the home and school, the parent and teacher is required if children are to find optimum opportunities for proper education and

health food practices. Desforges (2003) study in New Zealand, found that parental involvement is associated with healthy adjustment as well as pupils' nutrition knowledge gains. In a study by Dubois *et al.,* (2004) in England, it was found that family support and the quality of the parent-child relationship predicted higher knowledge scores among children. In United States, Schoon and Parsons (2002) demonstrated that parental interest in nutrition has a more significant impact on nutrition knowledge of children than parents' educational achievement.

Ramey and Ramey (2004) offered a variety of ways for parents to be effectively involved in their child's nutrition education, including: 1. involving them in most of feeding activities in schools. 2. conducting regular meetings with them to create good relationship between the parents and teachers and also to impart nutrition education to parents 3. develop favorable attitudes in mothers towards desirable food practices. In the nursery schools, classes should be conducted for parents on topics on health and nutrition and on other aspects pertaining to children. The meals provided to children should be shown and their nutritional importance explained to the parents.

2.11 Role of teachers in guiding children's learning

The vital role of teachers and other adults is to support children's development in terms of both their actual development and potential (Desforges, 2003). The principle of learning is that children can do things first in a supportive context and then later independently and in a variety of context.

Teachers need to know about the children's families, language, and culture in order to help children learn nutrition (Siraj-Blatchford, 2003). Parents benefit because they learn more

about what goes on in school and can encourage learning at home (Oldershaw, 2002). Most importantly, children benefit by improved communication because contact between homes and school helps children learn and succeed (Jones, 2008). According to Holly and Mayer (1999), teachers are most effective when they are 'hands on' working along side colleagues to support children's learning. To be successful in children's center, teachers need to have specialist knowledge of young children's learning and development from birth (Ramey & Ramey, 2004). They also need to have the skills to lead colleagues and work closely with other early year's staff in observing, planning, and supporting children's learning (Oldershaw, 2002). It is crucial that the teacher has an understanding of the roles and responsibilities of the other professionals and is able to establish effective, professional relationships with colleagues from a range of backgrounds (Siraj-Blarchford, 2003).

2.12 Theoretical framework

This study used Piaget Jean's theory of cognitive development to assess the knowledge the children have regarding nutrition. Piaget developed a cognitive development model with four successive stages: sensory motor period (0–2 years), pre-operational stage (2–7 years), concrete operational stage (7–11 years) and the formal operational stage (11–15 years). Along these stages, children's thinking changes from concrete to abstract, they develop the ability to replace overt actions by mental representations, egocentrism and centration diminishes, children develop more eye for detail, their information processing capacities increase, and their problem solving becomes more and more advanced. Children cannot undertake certain tasks until they are psychologically mature enough to do so. During preoperational developmental stage (2-7years), the child learns to use language and to

represent objects by images and words. The child has difficulty taking the viewpoint of others. The child can classify objects by a single feature, but their understanding is limited to concrete principles.

Other studies have also utilized Piaget's theory in order to assess children's knowledge of nutrition (Hertzler and DeBord, 2002; Michela and Contento 2001). These studies suggest that children in the pre-operational stage of cognition (5-6 year olds) can generally divide foods into groups based on two characteristics: sweets versus non-sweet foods and liquids versus solids (Michela and Contento (2001). Also, Hertzler and DeBord (2002) and Michela and Contento (2001) noted that children are able to recognize sweet and non-sweet foods. Most sweet foods that children like tend to fall under the category of ``junk'' foods. For example candies, cakes, chocolates, and biscuits are children's favorites.

The above authors have successfully used Piaget's theory to analyze children's nutrition knowledge. Nursery school children's age limit in Kisumu is 3-5 years which augers well with the age the above authors have studied. By understanding Piaget's theory of cognitive development, this study further seeks to explore the knowledge the nursery school children in Kisumu have concerning nutrition, based on their ability to represent objects by image and words, and classify objects by single feature. Preoperational stage (2-7 years), the second of four stages of cognition development in the Piaget's theory, was identified in this study to provide a depiction developmental level of nursery school children in Kisumu. To assess their knowledge, each pupil was presented with cards, each card containing pictures of foods. Each pupil was asked to identify and name the foods in the

card. They were than asked to identify the fruit and vegetable to determine their knowledge on differentiation of fruit and vegetables. Hertzler and DeBord (2002) and Michela & Contento (2001) noted that children are able to recognize sweet and non-sweet foods. Most sweet foods that children like tend to fall under the category of ''junk'' foods. For example candies, cakes, biscuits, chocolates are children's favorites. Therefore, this study used this knowledge to test children in Kisumu nursery schools.

2.13 Gaps in the literature review

Several issues seem to emerge as research gaps in this review. Recognition of early nutrition education has increased in the recent years, as supported by a large body of research or studies on school based nutrition education. In Kenya, nutrition education is incorporated in the nursery school and teacher education curriculum. A critical component in the Kenyan nursery school curriculum is that for teachers to use a wide variety of strategies to teach nutrition. Data on the strategies and nutrition education resources available within nursery schools in Kenya, particularly in Kisumu municipality appears lacking. There seems to be no studies that have been done on the nutrition knowledge of nursery school children in Kenya.

Most of the research or studies on nutrition knowledge of children have been done in other countries such as United States. The guidelines for early childhood development in Kenya, recommend the teachers to teach young children nutrition. The objective of teaching nutrition is to enable children to learn to keep good health habits and maintain good health through eating a balanced diet. Studies on teachers' nutrition knowledge and perceptions

about nutrition education in Kenya are scarce. The reviewed studies on nutrition knowledge of children and teachers have been conducted outside the Kenyan context. Based on the gaps in the reviewed literature, this study seeks to add knowledge based on the Kenyan public nursery schools.

CHAPTER THREE

METHODOLOGY

3.1 Area of study

According to Kisumu District Development Plan (2002-2008), Kisumu municipality is in Winam division, which holds the provincial and district headquarters. The town urban coverage is 141km^2. The mean annual rainfall in the area is 1,280mm, with mean annual temperature of 20-30^{o}C. The main attraction is the availability of business opportunities, colleges and restaurants. Activities and/or centers such as museums, hotels, beaches, and fishing activities. Kisumu is third largest city in Kenya with a population of approximately 392,616 people. Rapid urbanization trends in Kisumu, particularly in the last decade coupled with low investment and basic service expansion has resulted into enormous pressure on the urban environment. With annual growth rate estimated at 2.8%, Kisumu records one of the highest urban population densities in the country. The result has been an increase in the urban poverty, rapid expansion of informal settlements and marked increase in disease infection rates largely associated with limited access to health facilities. Almost 80% of Kisumu's land area is rural in nature. Many mothers engage in economic activities to earn a livelihood for their families. However, they have difficulty combining work and childcare responsibilities. As recorded by Kabiru *et al.,* (2003) families tend to use nursery schools as day care centers for their children. The nursery school cycle lasts three years and has three grades: baby, middle and pre-unit. The official entry age to these institutions is three years old, and children are expected to leave this cycle before they are six years old. Enrolment in nursery schools has increased from 13, 499 in 2000 to 25, 398 in 2006.

3.2 Study design

This research was a descriptive study in which cross sectional survey design was used. In cross sectional survey, data is usually collected only once involving the administration of a questionnaire or interview schedule to a group of respondents who have been randomly selected. This type of research attempts to describe such things as knowledge, attitudes and characteristics.

3.3 Study population

The study was carried out in Kisumu municipality, Western Kenya. The study population consisted of public nursery school teachers and children from Kisumu municipality. There are approximately 109 public nursery schools in the area. The total number of nursery school children aged 3 to 5 years old in the schools is approximately 4150, while the nursery school teachers are 326. The area is divided into nine school zones, namely: Otonglo, Southern, Central, Nyahera, Rweya, Ojolla, Kajulu, Manyatta, and Ragumo. Table 3.3 shows the number of schools in each zone. Central zone has 21, Manyatta 14, Rangumo 13, and Southern has 12 schools.

Table 3.3. Sample selection and distribution based on Kisumu municipal report of 2006

Zone	Number of schools in the zone	% age	Total sample selected in the zone
Central	21	20	7
Ojolla	7	6	2
Manyatta	14	13	5
Rweya	7	6	2
Kajulu	9	8	3
Ragumo	13	12	4
Otonglo	15	14	5
Nyahera	11	10	4
Southern	12	11	4
TOTAL	**109**	**100**	**36**

3.4 Study sample

The sampling frame for the survey consisted of Kisumu municipality. The area has approximately 109 public nursery schools (Table 3.3). Thirty-six public nursery schools were selected by means of stratification, giving a total of 39% of the study population. All the teachers in the 36 public nursery schools agreed to participate in the study. Therefore, the total number of teachers surveyed was 146.

The pupil sample consisted of 365 nursery school children in the 36 selected nursery schools. The sample size of the children was determined using the following formula suggested by Yamane (1967).

$$n= N/1+N\,(e)^2$$

Where n=sample size; N=population size; e=level of precision desired or margin of error (in this case e=0.05).

Inserting the required information into the formula gives: -

$$n= \frac{4,150}{1+ 4,\,150\,(0.05)^2} = 365 \text{ nursery school children}$$

3.5 Sampling technique

The study adopted multi stage sampling methods. A list of all public nursery schools was obtained from Kisumu Municipal Education. The schools were then stratified by zone. Sampling was done by means of Probability Proportional to Size (PPS). This was done by obtaining a list of schools from each zone and then selecting a systematic sample from a random start. The total number of public nursery schools (N=109) in Kisumu municipality

was divided by the number of schools required for study (n=36) to obtain the sampling interval size, which was 3. A random number from 1-3 was selected, which was two. To select the sample, second school in the list was started with, and then every third school in the list was selected for study. A total of 36 nursery schools were selected using systematic sampling. Table 3.3 shows the total sample of schools selected in each zone.

The second stage involved selecting teachers to be included in the study. A total of 146 nursery school teachers were selected for study using cluster sampling. All the teachers in each sampled nursery school were selected for study because they were few to make a sample out of them, thus the 146 teachers being selected.

Stratified random sampling was used to select the children for study. Each participating school was asked to provide a list of all nursery school children in their school. The children from the list were then stratified by gender (male and female). The children were then stratified by three age groups (3 year olds, 4 year olds, and 5 year olds). Within each sub-group, children were selected by simple random method. A proportionate number of children were selected from each sub stratum. Using the proportionate stratified sample, a total of 173 children selected were males and 192 females. Out of the male children; 47 were 3 year olds, 58 were 4 year olds, and 68 were 5 year olds. Out of the total female children; 52 were 3 year olds, 64 were 4 year olds, and 76 were 5 year old children.

3.6 Research instruments

Data was collected using questionnaires. One questionnaire was for the teachers and the other for the nursery school children. The design of the questionnaires was adapted from those developed by Bonnie *et al.,* (2001) and Zinn *et al.,* (2004). Bonnie *et al., (*2001) and Zinn *et al.,*(2004) report that the tool has acceptable reliability and validity test.

A two-part questionnaire was administered to all the participating nursery school teachers (Appendix A). The first section of the questionnaire presented demographic questions including years of teaching experience, professional qualification, level of education, a rating of their own nutrition knowledge, sources of nutrition information, and whether or not they taught nutrition to their pupils. Four statements were used to assess the perceptions of the teachers towards teaching nutrition. The responses were recorded on a five point scale ranging from 5=Strongly agree, 4=Agree, 3=Undecided, 2= Disagree, 1= Strongly Disagree.

Part two of the questionnaire comprised of nine nutrition knowledge questions. Each teacher's nutrition knowledge score were coded as 1 for a correct response and 0 for an incorrect response. The nutrition knowledge levels were scored as follows: 7- 9 points, very good; 5-6 points, good; 4 points and below, poor. Each correct answer was assigned 1 point and the nutrition knowledge level of children was assessed out of 9 total points. Zinn *et al.,* (2004) points out that multiple-choice test are most widely used for measuring knowledge and comprehension. In addition, a broad sample of achievement could be measured, incorrect alternatives could provide diagnostic information, and scoring would

be easy, objective and reliable. Teachers were also asked to rank a list of factors that would inhibit effective teaching of nutrition in nursery schools. The questionnaire also contained items to investigate teachers' sources of nutrition education.

Another questionnaire was administered to all nursery school children who participated in this study (Appendix B). The questionnaire included demographic information on gender and age of the children. It comprised of 8 nutrition knowledge questions. Each correct answer was assigned 1 point and the nutrition knowledge level of children was assessed out of 8 total points. Each correctly named food was assigned 0.2 point, to give a total of 1 point for correctly naming all foods asked in question 1 (Appendix B). One point was assigned for correctly mentioning healthy food as their preferred choice; another 1 point was assigned for correctly identifying healthy foods that should be eaten more often. The pupils were also assigned 1 point for mentioning food that should not be eaten more often by them. Pupils also received 1 point for mentioning reason why they liked eating particular food. Responses were categorized into three nutrition knowledge levels: low ($\leq$3 of 8 questions correct); moderate (4-5 of 8 questions correct); and high ($\geq$ 6 of 8 questions correct).

The children's understanding of nutrition was evaluated through testing their knowledge. They were presented with cards, each card containing pictures of foods. Each pupil was asked to name the foods in the card. They were then asked to identify the fruit and vegetables. They were also asked to indicate the foods that should be eaten frequently by them.

3.7 Measurements and data collection

Two research assistants were recruited to assist in data collection. The research assistants were required to have a mean grade of C plain and above in KCSE. The process of data collection started immediately after training of the research assistants. Training consisted: (i) instrument administration, (ii) interview techniques (iii) and procedures and skills.

Attitude of teachers was measured by using Likert scaling based on the five-point scale ranging from strongly disagree, agree, undecided, disagree, to strongly disagree. Teachers were presented with statements about nutrition education, and then asked to indicate their agreement or disagreement with the statement. Disagreement to the statement indicated negative attitude while agreement indicated positive attitude towards nutrition education

Teaching experience- teachers were asked how many years they have been teaching in nursery schools. Response categories were 1) below 2 years; (2) 3- 6; (3) 7-10; (4) 11- 14 years; (5) 15 and over

Perception- Teachers' perception was measured by Likert scale. The responses to questions about nutrition education were coded from five (Strongly agree) to one (Strongly disagree).

Teacher training- Teachers' training was characterized by either trained or not trained in early childhood development.

Level of education- Level of education was defined by the highest educational attainment.

3.8 Pre-testing of instruments

The survey instruments were field tested with teachers and children attending two public nursery schools in a different study area. Individuals and schools, which participated in the pre-tests, were excluded from the final sample. The pre-test results were discussed with the research supervisors who provided valuable critiques about the research instruments' format, content, expression and importance of test items, which led to deletion, addition, and revision of test items. During the design of the survey and the author checked for consistency in the interpretation of questions and to eliminate ambiguous items. After review of the instruments all suggested revisions were made before being administered.

3.9 Ethical considerations

Research permit was obtained from Maseno University (Appendix C). An informed consent was also obtained from nursery school head teachers and teachers after the study objectives and methodologies had been read to them. A letter was sent to the children's parents informing them of the study and to ask their consent (Appendix D). Children whose parents had returned the signed consent forms were considered for inclusion in the study.

3.10 Methods of data analysis

The teachers and children's characteristics were analyzed using descriptive statistics. Descriptive statistics were used to display data in frequencies, percentages and mean. The data was analyzed by means of the Statistical Package of Social Sciences (SPSS) version 11.0. Nutrition knowledge test score (the number of correct responses) was computed for each respondent. ANOVA was used to test differences between children's mean scores by

their age and gender. ANOVA was also used to test significant differences in the teachers' nutrition knowledge score. The categories tested included years of teaching experience, level of education, and training in early childhood development. The level of statistical significance used for all tests was set at $p \leq 0.05$.

CHAPTER FOUR

RESULTS

4.1 Demographic characteristics of the sampled nursery school children and teachers

The data in Table 4.1 shows the demographic characteristics of the 365 sampled children. The age of the children was captured in three categories: 3 being the lowest and 5 the highest. About 58 (34%) males were 4 year olds, 47 (27.2%) were 3 year olds, while 68 (39.5%) males were 5 year olds. Sixty four were 4 year old females while 76 (39.6%) were 5 year olds. A total of 173 (47.4%) sampled children were males and 192 (52.6%) were females. The mean age of the children was 4.2 years.

Table 4.1. Demographic characteristics of the sampled children (N=365)

Age	Male		Female	
(years)	n	%	n	%
3	47	27.2	52	27.1
4	58	33.5	64	33.3
5	68	39.3	76	39.6
Total	**173**	**47.4**	**192**	**52.6**

Demographic information about the 146 sampled nursery school teachers is presented in Table 4.2. Only one teacher reported that the highest level of education completed was primary education. A total of 107 (73.3%) teachers had attained college education while 23(15.7%) had completed secondary education. Also, 59(40.4%) teachers had highest teaching experience of 3-6 years followed by teachers with 7-10 years of teaching

experience 40(27.4%), and 21(14.4%) teachers had 11-14 years of teaching experience while 9(6.2%) had 15 and over years of teaching experience. Most 94(64.4%) teachers had undertaken training in early childhood development (ECD) while 52(35.6%) teachers had no training.

Table 4.2 Demographic information about the nursery school teachers (N=146)

Demographic characteristics	n	%
Early childhood development training background		
Trained	94	64.4
Untrained	52	35.6
Years of teaching experience		
≤2	17	11.6
3-6	59	40.4
7-10	40	27.4
11-14	21	14.4
15 and over	9	6.2
Education level		
Primary complete	1	0.7
Secondary incomplete	15	10.3
Secondary complete	23	15.7
College	107	73.3

4.2 Nutrition knowledge of teachers

Nutrition knowledge of teachers was analyzed according to the responses to 9 multiple-choice test questions. Each correct answer was assigned 1 point and the nutrition knowledge of teachers was assessed out of 9 total points. Table 4.3 shows the distribution of teachers obtaining correct answer for each nutrition question. Most 100(68.5%) teachers correctly identified food that is balanced.

Table 4.3. Distribution of teachers obtaining the correct answer for each statement (N=146)

Statement	n	%
Naming food rich in vitamin A and C	68	46.6
Identifying a balanced diet	100	68.5
Identifying food rich in iron	74	50.7
Identifying foods recommended for a child suffering from rickets	47	32.1
Source of carbohydrates	96	65.7
Cause of coronary heart diseases	90	61.6
Identifying condition caused by iodine deficiency	33	22.6
Source of protein	95	65
Function of cereals and grains in the diet	83	56.8

A total of 95(65%) teachers were aware of the sources of proteins, while 96(65.7%) correctly mentioned the sources of carbohydrates. However, almost a half 72(49.3%) did not know the foods rich in iron. Only 68(46.6%) teachers correctly identified the food rich in vitamin A and C. Regarding cereals and grains, 83(56.8%) teachers correctly indicated

the main function of cereal and grains, which is to provide energy in the body. Teachers scored low in knowledge about diet and disease. The only well known relationships seemed to be between eating too much fat (such as fatty meat) and coronary heart diseases, although approximately 56(38%) teachers were unaware of the link. Ninety teachers correctly indicated that eating too much fat may increase the risk of coronary heart diseases. Knowledge about condition caused by iodine deficiency had the poorest score, with only 33(22.6%) teachers correctly indicating that goiter is caused by iodine deficiency. When the teachers were asked to identify foods recommended for a child suffering from rickets, less than half 47 (32.1%) of teachers chose the correct answer (cod liver oil and milk).

The differences between mean nutrition knowledge scores of the teachers by their education level and early childhood development training are presented in Table 4.4. The mean nutrition knowledge score of teachers who had training in early childhood development was 5.40 (60%), while mean score of the untrained teachers was 3.69(41%). The difference between the mean scores of the trained teachers and those of untrained teachers was found to be significant ($F=33.66$, $p<0.05$). No significant difference was found in terms of education level ($F=1.99$, $p>0.05$). The total mean score of the 146 teachers was 4.79 (53.2%).

Table 4.4. Analysis of Variance between teachers' means scores by their education level and training in early childhood development

Variables	n	Mean score	SD	Std. Error	df	F	Sig.
Teacher training							
untrained	52	3.69	1.87	.26	145	33.66	0.000
trained	94	5.40	1.61	.17			
Education level							
Primary	1	2					
Secondary incomplete	15	3.93	1.67	.43	145	1.99	0.118
Secondary complete	23	4.87	2.01	.42			
College	107	4.93	1.87	.18			
TOTAL	146	4.79	1.89	0.16			

ANOVA was also used to test differences between the teachers' mean scores by their training and years of teaching experience. Table 4.5 shows the differences in the knowledge scores. The mean score of trained teachers with less than two years of experience was higher 6.29 (69.8%) than those with 7-10 years of experience 5.87 (65.2%), while those with 11-14 years had the lowest mean score of 4.38 (48.7%). ANOVA showed these differences to be significant (F=2.97,p=0.024). The mean score of untrained teachers with 7- 10 years experience was higher 4.40(48.9%) than those with below two years experience 4.0 (44.4%). The difference in the mean scores of the untrained teachers by their experience was not significant (F= 2.41, p= 0.062).

Table 4.5 Analysis of Variance between teachers' means scores by their years experience and training in early childhood development

Years of experience	Untrained teachers					Trained teachers				
	n	mean score	df	F	Sig.	n	mean score	df	F	Sig.
Below 2	10	4.00				7	6.29			
3-6	18	3.78				41	5.37			
7-10	10	4.40				30	5.87			
11-14	8	2.63	51	2.41	0.062	13	4.38	93	2.97	0.024
15 or more	6	2.00				3	4.67			
TOTAL	52	3.69				94	5.40			

4.3 Teaching of nutrition

The majority of teachers (85.2%) reported teaching lessons about nutrition to their pupils in the 2007-2008 school year (Figure 4.3). Only 14.8% of the teachers reported not teaching lessons about nutrition to their pupils.

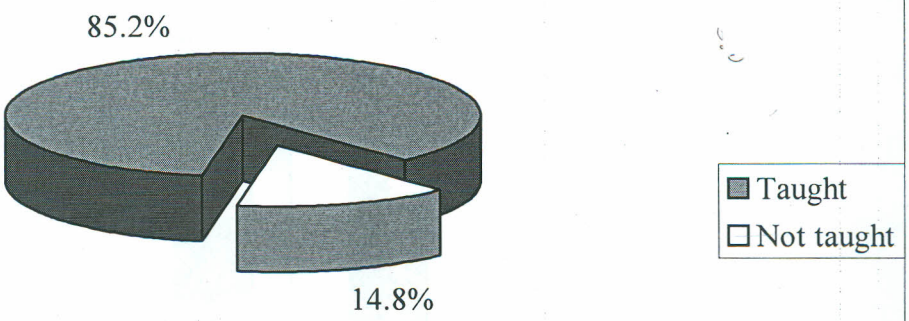

Figure 4.3. Distribution of teachers who have taught or not taught lessons in nutrition

4.4. Knowledge rating

The teachers were asked to rate their own nutrition knowledge. Figure 4.4 presents the teachers' rating of their own nutrition knowledge. The majority of teachers who taught nutrition lessons to their pupils rated their knowledge either average or good, with only few ratings at the extremes of excellent and poor. This contrasted with teachers that did not offer nutrition lessons to their pupils, who had lower ratings in the ''good" and ''average'' categories, and more in the poor category. Less than half 66(45.4%) of all teachers rated their knowledge as average while 59(40.2%) rated their knowledge as good.

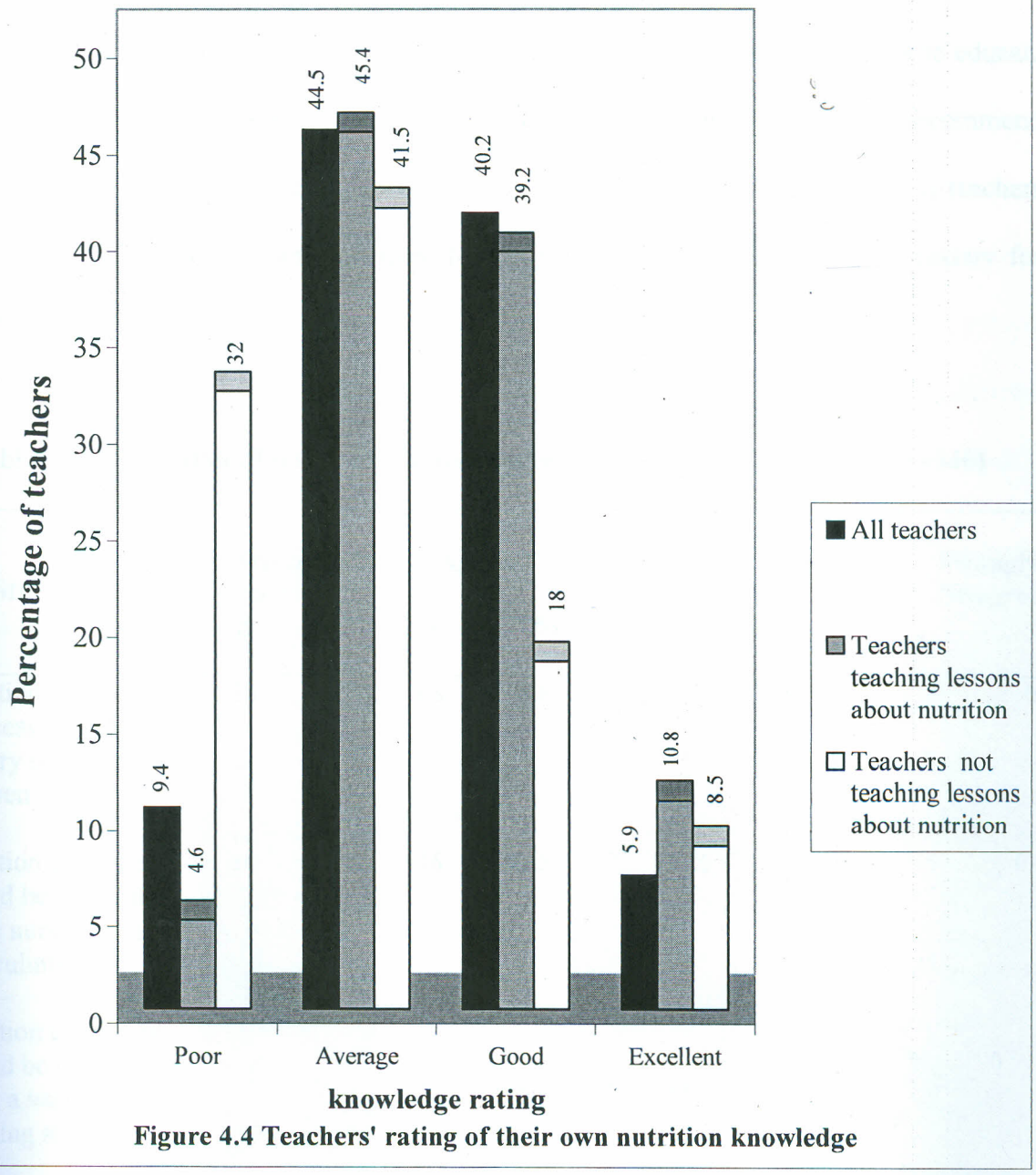

Figure 4.4 Teachers' rating of their own nutrition knowledge

Thirty two percent of teachers who did not teach nutrition rated their knowledge as poor. About 7(5%) teachers teaching lessons in nutrition rated their knowledge as poor. Almost 13(9%) teachers not teaching lessons in nutrition rated their knowledge as excellent.

4.5. Teachers' perceptions about nutrition education

About 139(95%) teachers responded that they would recommend other teachers to educate children on nutrition while few 7(4.8%) responded that they would not recommend teaching of nutrition in nursery schools. As shown in Table 4.6, 143 (98.3%) teachers either strongly agree (51.4%) or agree (46.6%) that nutrition education is necessary for nursery school children.

Table 4.6. Perception of teachers towards delivery of nutrition education (N=146)

Statements	Responses									
	Strongly agree		Agree		Undecided		Disagree		Strongly Disagree	
	n	%	n	%	n.	%	n.	%	n.	%
Nutrition education is necessary for nursery school children	75	51.7	68	46.6	3	2	0	0	0	0
Nutrition education should be integrated in the nursery school curriculum	80	54.8	46	31.5	17	11.6	2	1.4	1	0.7
Nutrition education should be taught using a variety of teaching strategies	52	35.6	56	38.4	34	23.3	4	2.7	0	0
Teachers need to consult a variety of information to make competent decisions	65	44.5	51	34.9	20	13.7	6	4.1	4	2.7

A total of 126(86.3%) teachers strongly agree or agree that nutrition education should be integrated into the nursery school curriculum. About 115(79%) teachers either agree or strongly agree that nutrition education should be taught using variety of teaching strategies. About 66 (45%) of teachers strongly agreed that they need to consult a variety of information to make competent decisions while 51(34.9%) agreed with the statement. Teachers were asked how they perceive their role regarding pupils' nutrition. The most common response was "teach nutrition" 68(48.9%) as shown in Table 4.7. Other responses included encouraging healthy eating of balanced diet 20(14.4%) and improving nutritional status of children 43 (30.3%). Three percent of teachers thought that their role in student nutrition was to teach parents nutrition.

Table 4.7 Teachers' perceived roles in nutrition education

Response	n	%
Teach nutrition	68	48.9%
encourage healthy eating of balanced diet	20	14.4%
To improve nutritional status of children	43	30.3%
Provide information or resources	6	7.7%
Teach parents nutrition	5	3.6%
Provide healthy foods	3	2.2%

4.6 Pupils' nutrition knowledge

The responses of the children to the 8 nutrition knowledge questions were evaluated by the method of scoring them. The overall nutrition knowledge score was the number of correct

answers and ranged from 0-8 points. Table 4.8 shows the distribution of children responding correctly to each knowledge question by age.

Table 4.8. Distribution of children obtaining correct answer for each statement by age (N=365)

Statement	3 years		4 years		5 years		All	
	n	%	n	%	n	%	n	%
Naming all foods	51	51.5	102	83.6	136	94.4	289	79.1
Identify fruit	24	24.2	83	68.0	122	84.7	229	62.7
Identify vegetable	40	40.4	81	66.4	136	94.4	257	70.4
Selecting all foods that should be eaten more frequently	21	21.2	54	44.3	68	47.2	143	39.2
Selecting all foods that should not be eaten more frequently	36	36.3	58	47.5	69	47.9	163	44.7
Reasons for eating `allowed foods' more frequently than restricted ones	6	6	29	23.8	56	38.8	91	24.9
Selecting healthy food as preferred choice	22	22.2	40	32.8	49	34.0	111	30.4
Reasons for selecting the preferred food	8	8.0	34	20.7	46	31.2	88	21.3

More than half 51(51.5%) of 3-year-olds, and 136 (94.4%) 5-year olds were able to correctly name all the foods. Approximately 102(84%) 4- year olds also responded correctly to the question. The results show that 4 and 5-year-old children correctly identified a fruit more than the 3-year-olds. About 122(85%) 5-year-olds and 83(68%) 4-year olds correctly identified a fruit. However, only 24(24.2%) three year olds identified a fruit.

When the children were asked to indicate the foods that they should eat more often, few 143(39.2%) children correctly identified oranges, bread and cabbages as foods that they should eat more often. Majority (60.8%) of the children mentioned French fries, sodas and cakes as foods that should be eaten frequently by them. Less than half 68(47.2%) 5-year olds and 54(44.3%) 4-year olds correctly identified the foods that should be eaten frequently.

When the children were asked to indicate the foods that should not be eaten frequently by them, less than half 69(47.9%) 5 year olds and 58(47.5%) 4 year olds chose the correct answers (sodas, ice-cream and sweets). The children were also asked to mention the food they prefer eating. Only 49(34%) 5-year olds and 40(32.8%) 4-year olds mentioned healthy foods (such as fruits and vegetables) as their preferred choice. About 22 (22%) of 3-year olds also selected healthy foods as their choice. The majority 254 (69.6%) of children selected foods that are high in fats, oils and sugar such as cakes, biscuits, french fries, and candies. However, few 88(21.3%) children were mentioned the reasons why they liked

eating such foods. Knowledge about reasons why allowed foods should be eaten more frequently than the restricted ones had the poorest score, with only 29(23.8%) of 4-year olds and 6 (6%) 3-year olds mentioning correct answers such as to grow, for energy, and for good health.

4.7. Differences between children's mean scores by their age and gender

Differences between mean scores of children by age and gender were tested using ANOVA. The differences are presented in Table 4.9. Mean score for female children was 4.04 (50.5%) while for male children was 4.33 (54.1%).

Table 4.9. Differences between children's mean scores by their age and gender (N=365)

Variables	n	mean	SD	Std. Error	df	F	Sig.
Age(years)							
3	99	2.46	0.99	0.10			
4	122	4.56	1.74	0.16		96.46	0.000
5	145	5.13	1.59	0.10	364		
Gender							
male	173	4.08	1.83	0.14		1.595	0.207
female	192	4.33	1.89	0.14			
Total	365	4.21	1.86				

The differences between the mean scores of male and female children was not significant (F=1.595, p=0.207). Differences between children's mean scores by their age was found to be significant (F=96.46, p= 0.000). The mean score of 3-year old children was 2.46

(27.3%), while that of 5-year old was 5.13 (64.1%). The total mean score of the 365 sampled children was 4.21 (53%).

Results of the differences between children's mean scores by their teachers' training and education level are presented in Table 4.10. The mean score of children whom their teachers had training in early childhood development (ECD) was higher 4.47(55.8%) than for those whose teachers had no training in ECD 3.86(48.3%). ANOVA showed these differences to be significant (F=9.49, p=0.002). When teachers' education level is considered, mean score of children whom their teachers had college education was higher 5.65 than for those whose teachers had completed secondary education 3.34, while those whom their teachers had incomplete secondary education was 3.44. ANOVA showed these differences to be not significant (F=1.44, p=0.222).

Table 4.10 Teachers' qualification and nutrition knowledge of pupils

Variables	n	mean	SD	Std. Error	df	F	Sig.
Teacher training							
untrained	152	3.86	1.75	.14	364	9.49	0.002
trained	213	4.47	1.90	.13			
Teacher education level							
Primary	4	1.75	.96	.48			
Secondary incomplete	92	3.44	1.61	.16	364	1.44	0.222
Secondary complete	132	3.34	1.58	.14			
College	137	5.65	1.30	.11			

4.8. Sources of nutrition information

Table 4.11 shows the sources of nutrition information reported by the teachers. About 54.3% of trained teachers and 32.7% of untrained teachers identified workshops and seminars as their main source of nutrition information.

Table 4.11. Distribution of the sources of nutrition information by teachers (N=146)

Source	Trained teachers		Untrained teachers		Total	
	n	%	n	%	n	%
Workshops and seminars	51	54.3	17	32.7	68	46.6
Textbooks	69	73.4	22	42.3	91	62.3
Newspapers	47	50.0	15	28.8	62	42.4
Informal training at hospitals	21	22.3	34	65.4	55	37.7
Family and friends	28	29.8	38	73.1	66	45.2
Electronic media such as television, radio	41	43.6	33	63.5	74	50.7
Others	5	5.3	7	13.5	12	8.2

A total of 68 (53.3%) teachers indicated textbooks as their main source of information followed by electronic media, which accounted for 74 (50.7%). Less than half 68(46.6%) of the teachers mentioned workshops and seminars as their main source of nutrition information. Friends and family members were used as sources of information by 66 (45.2%) teachers. More untrained teachers obtained information from informal training in the hospitals than trained teachers. About 34 (65%) untrained teachers obtained information from informal training in the hospitals while only 21(22.3%) trained teachers

obtained information from the hospitals. A total of 55 (37.7%) teachers undertook informal training at hospitals. Twelve (8.2%) teachers mentioned other sources of information such as church meetings, pharmacy and health shops.

4.9. Nutrition education resources available in schools

Teachers were asked to mention the resources available for teaching nutrition in their nursery schools. Table 4.12 shows distribution of teachers who reported availability of various resources within their schools.

Table 4.12. Distribution of the availability of resources by teachers (N=146)

Resource	Availability	
	n	%
Teaching and learning materials on nutrition	72	49.3
School cafeteria	23	15.8
Support from parents	120	82.2

Less than half 72 (49.3%) teachers reported availability of teaching and learning materials such as textbooks, posters, cut out pictures of foods from magazines. Only 23 (15.8%) teachers indicated availability of school cafeteria as a resource for teaching nutrition in their schools. The majority 120 (82.2%) of teachers reported support from parents. Out of the 120 (82.2%) teachers who reported availability of support from parents, 20% of them reported that parents do motivate their children by tutoring them with lessons at home and encouraging their children to do their best to achieve their goals (Table 4.13).

About 13 (11%) teachers reported that parents do participate in events in schools. Ten percent of teachers reported that parents offer financial support, which is important for purchase of teaching materials. About 4% of teachers reported that parents provide support by being role model for children.

Table 4.13 Role of parents in teaching of nursery school children (N=120)

Parent's role	n	%
Participating in discussions about experiences the children	14	11.6
Involved in decision making	10	8.3
Motivating children	24	20
Availing learning materials	3	2.5
Financial support	12	10
Organizing and participating in events in schools	13	10.8
Being role model for children	5	4.2
Granting permission for children to participate	13	10.8
Maintaining communication between home and school	26	21.7

4.10 Instructional materials used in nursery schools

Teachers were asked to indicate the instructional materials used to teach nutrition in their schools. The teachers reported use of a number of different materials, primarily visual aids such as posters, realia, replicas, books, art project and murals, charts, pictures. As illustrated in Table 4.14, 74(50.6%) teachers indicated use of textbooks such as mathematics and environmental activities, play and creative activities, management and

language activities, some common childhood diseases and health records, material and child health, and food safety protection.

Table 4.14 Distribution of the instructional materials used to teach nutrition in schools (N=146)

Instructional material	n	%
Teachers' curriculum guides	72	49.3
Textbooks	74	50.6
Visual aids	139	95.2
Audio cassettes	4	2.7
Other electronic such as computer, DVDs	0	0

Almost all 139(95.2%) teachers reported use of visual aids such as realia, posters, cut out pictures from magazines, charts, and replicas in their schools. Seventy two teachers reported use of teachers' curriculum guides in their schools. Only 4(2.7%) teachers indicated use of audiocassettes to teach nutrition. Also, none of the teachers indicated use of electronics such as computers and DVDs in their schools.

4.11. Strategies used in nursery schools

Teachers were asked to mention the strategies used to teach nutrition in their schools. The data in Table 4.15 show distribution of strategies used to teach nutrition in nursery schools. A total of 142 (97.3%) teachers reported use of songs, while 139 (95.2%) teachers reported

use of poems. About 126 (86%) teachers indicated used of role-play while 103 (71%) teachers reported use story-telling. in their school.

Table 4.15. Distribution of the strategies used to teach nutrition in nursery schools (N=146)

Strategy	n	%
Songs	142	97.3
Poems	139	95.2
Role plays	126	86.3
Group discussion	75	51.4
Field trips	87	53.4
Story telling	103	71
Practical work for the children	69	47.2
Demonstration by teachers	64	43.8

However, less than half 64(43.8%) of teachers reported use of demonstration by teachers, and 69 (47.2 %) teachers reported use of practical work for children in their schools. The results indicate that the teachers used a variety of strategies to teach children nutrition.

4.12. Teachers' suggestions on the improvement of nutrition education

The teachers were asked to give suggestions on what should be done to improve nutrition education in nursery schools.

Table 4.16. Teachers' suggestions on the improvement of nutrition education (N=146)

Statements	Strongly agree		Agree		Undecided		Disagree		Strongly Disagree	
	n	%	n.	%	n	%	n.	%	n	%
Parents should be involved in supporting nutrition lessons in nursery schools	48	32.9	72	49.3	21	14.4	3	2.1	2	1.4
Parents should be invited to attend nutrition classes/seminars in school	59	40.4	72	49.3	12	8.2	2	1.4	1	0.7
In-service training/ workshops on nutrition should be provided to nursery school teachers	69	47.3	67	45.9	10	6.8	0	0	0	0
Schools should provide adequate nutrition teaching resources	88	60.3	56	38.4	2	1.4	0	0	0	0
School authorities should allocate funding to facilitate teaching of nutrition	47	32.2	96	65.8	3	2.1	0	0	0	0

A total of 120 (22.2%) teachers either strongly agreed or agreed that parents should be involved in supporting nutrition lessons in nursery schools (Table 4.16).

To the teachers, in-service training on nutrition is very important because 69(47.3%) teachers strongly agreed that in-service training should be provided to nursery school teachers while 67(45.9%) agreed with the statement.

About 88(60%) teachers strongly agreed that schools should provide adequate teaching resources on nutrition while 56(38.4%) agree with the statement. According to the teachers, school authorities should allocate funds to facilitate the teaching of nutrition in nursery schools. More than half 96(65.8%) teachers agree that funds should be allocated to schools while 47(32.2%) strongly agreed with the statement.

CHAPTER FIVE

DISCUSSION

Studies on teachers' knowledge and perceptions about nutrition are scarce in Kenya. The reviewed studies on nutrition knowledge of nursery school teachers and children have been conducted outside the Kenyan context. To fill the gap in the literature concerning the nutrition knowledge of nursery school teachers and children, teachers' perceptions of nutrition, and nutrition education resources, the following discussion based on the study findings was done to add knowledge based on Kenyan public nursery schools.

5.1 Teachers' nutrition knowledge

The results on the assessment of nutrition knowledge of teachers indicated that the teachers performed moderately well in the knowledge test. This is shown in the response to the knowledge questions where the total mean score of the sampled teachers was 4.79 (53.2%). The implication is that the sampled teachers do possess knowledge regarding nutrition. More over, the fact that 68.5% of teachers were able to identify a balanced diet, a key concept in nutrition, is commendable. The results also indicated that the teachers are aware of the sources of proteins and carbohydrates. A Canadian study also showed that nursery school teachers are aware of sources of proteins and carbohydrates (Malik, 2000). However, the teachers in this study did not show a better knowledge of foods rich in vitamin A and C, suggesting that the teachers need a better understanding or more information about sources of vitamins.

The results of this study also indicated that the teachers have greater knowledge about association of excess fat intake and the risk of coronary heart disease. Similarly, other studies have also determined that the items about the association between excess fat intake and coronary heart diseases were among the most known topics by nursery school teachers (Temple, 2002; Al-Numeir, 2004). However, the outcome of the findings of this study indicated that the teachers were not aware of the condition caused by iodine deficiency, and the foods recommended for a child suffering from rickets. This is in line with the findings of Shoaf (1996), where the nursery school teachers in Ohio had poor knowledge about links between iodine and goiter. Similarly, Juzwiak (2004) found that only 40% of teachers in Brazil agreed with the statement that eating iodine rich foods prevents goiter. The current findings indicate that more effort is needed to raise awareness on the importance of eating iodine rich foods, vitamin D rich foods, goiter and rickets.

Also, results in this study indicated that there is no significant difference between the mean scores of the teachers by their education level; although the teachers with college education scored slightly higher than the teachers who have completed secondary education. The findings indicate that level of education did not affect nutrition knowledge of the teachers. As noted by Zeichner & Tabachnick (2001), many of the effects of teacher education on knowledge, attitudes and beliefs are only temporary.

5.2. Teachers' perceptions

The outcome of the findings on the perceptions of teachers about nutrition education revealed that the teachers have positive perceptions towards nutrition education. This is shown in their response to questionnaire items where a majority of the teachers strongly agreed or agreed that nutrition education should be integrated in the nursery school curriculum; and that they would encourage other teachers to teach young children nutrition. The teachers generally agree that nutrition education is necessary for the nursery school children. The outcome of the findings might be because the teachers perceive their role in nutrition education primarily as that of classroom instructors who teach nutrition concepts. However, they also believe their role involves encouraging healthy eating habits and improving nutritional status of children.

The result of this study is similar to a previous finding that almost all teachers agree that nutrition education is necessary in nursery schools (Hargreaves *et al.,* 2001). However, the teachers in this study believe that more still need to be done to improve the teaching of nutrition in nursery schools. This is clearly shown in their response to questionnaire items where majority of the teachers strongly agreed or agreed with the following statements: in-service training should be provided to nursery school teachers; schools should provide adequate teaching and learning resources; and school authorities should allocate funding to facilitate teaching of nutrition. The findings of the current study support the findings of several prior studies. Wardle *et al.,* (2005) documented several "essential elements" to school based nutrition education. These included integrating nutrition into other subject

areas in the curriculum, providing teacher in-service training, and making available teaching and learning resources, as appropriate for different grade levels (Wardle *et al.*, 2005).

Results of this study also indicated that teachers unanimously believe that parents should be involved in supporting nutrition lessons in schools; this fact is verified in other research (Ramey & Ramey, 2004). Another study showed parental involvement has become an integral part of the majority of school-based health education programmes (Oldershaw, 2002).Cognitive scores for nursery school children and first grade pupils were significantly higher in schools with parental involvement (Desforges,2003). A follow-up indicated that a better quality diet was sustained into pre- and early adolescence when parents received nutritional information.

5.3 Child nutrition knowledge

The results of this study indicate that even three-year old children possess some knowledge about nutrition. Although their knowledge was not as much as that of the five-year olds, the mean score of the three-year olds was 2.46 (27.3%). However, the five year olds provided twice as many nutrition related responses as the younger children. The good knowledge noted among the children may be partly accounted by the use of variety of teaching strategies by their teachers. Analysis of teachers' questionnaire indicated that majority of the teachers were using a variety of teaching strategies such as songs, poems,

role plays, practical work, and the textbooks. Use of a variety of teaching strategies has been described as a key aspect of effective nutrition education (Ames, 2004).

The outcome of the finding on children's understanding of nutrition indicated that the children consider high sugar and fat foods such as cakes and French fries as foods that should be eaten more frequently by them. The finding suggests a need for the children to be encouraged and taught at an early age to have more fruits and vegetables to promote their intake. Gorelick & Clark (2000) found that 4-5 year olds could correctly distinguish between foods that were good for them and those that should not be eaten frequently, a finding that is in contrast with this study. As in the study of Singleton *et al.,* (2002), 4-7 year olds named vegetables and fruits as the right kinds of foods. The children responded that unhealthy foods were foods high in sugar.

It is believed that young children are not reliable sources of information on their own eating preferences (Doak et *al.,* 2006). However, this study revealed that young children can express their preferences in relation to food. The findings showed that young children could mention the food they liked, but majority could not tell the reason why they liked the food. This finding is in line with the study by Cooke (2005), where 3-5 year olds could indicate which foods they preferred but could not tell why they liked the food.

Results of this study indicated that four and five year olds knew and could identify fruit and vegetable. This finding is similar to the study by Gorelick & Clark (2000) in which children scored significantly higher on fruit identification. Hart (2002) found that as children mature, they are able to identify more fruits and vegetables, a finding that is in

line with this study. However, in this study, vegetables and fruits came out as least favorite food of the children; the finding suggests a need to tackle the barrier in order to promote children's consumption of vegetables and fruits. Michela & Contento (2001) noted that most foods that children like tend to fall under the category of junk foods such as candies, cakes, chocolates and biscuits.

Although it is generally believed that females' nutritional knowledge is significantly higher than for males because they tend to involve themselves more with their mothers in cooking (Nuhlicel *et al.,* 2002), this current study did not find this. There is no significant difference between the mean scores of female and male children; although females scored slightly higher than males. The differences in mean scores may be minimal due to the young age of the children.

As expected from Piaget's cognitive theory, five year old children in this study, provided more correct responses to the knowledge questions than the younger children. While the older children seem to have more extensive knowledge about nutrition, it is not known whether this difference is due to their more mature cognitive development or to their exposure to more nutrition information over a longer period of time. Previous research have also found that older children are more knowledgeable in nutrition more than the younger ones (Mckinley *et al.,* 2005).

5.4 Role of teacher training

It was hypothesized that children taught by trained teachers would not have significantly greater nutrition knowledge than children who are taught by untrained teachers. Based on

the results of this ANOVA analysis, this hypothesis was rejected. Since this study found that there was significant differences between children's mean scores by their teachers' training, it would imply that more effort should be focused on teacher training to improve the children's learning. Previous research has also found that when nursery school children attended centers with a higher proportion of trained teachers, they exhibited greater cognitive test scores in nutrition knowledge than those cared for by less trained teachers (Connell, 2000). In-service training has been shown to improve health education implementation, and to help teachers feel more confident about health education (Moon et *al.*, 2004).

In addition, findings from this study indicated that trained teachers in early childhood development have greater nutritional knowledge than untrained teachers. The higher knowledge among trained teachers may be attributed to the fact that most trained teachers do attend workshops and seminars where their knowledge on nutrition is widened, deepened, as well as updated. In addition, more trained teachers than untrained teachers read textbooks and newspapers to get more nutrition information. This is clearly shown in their response to questionnaire, where about 54% of trained teachers and 32.7% of untrained teachers identified workshops and seminars as their main source of nutrition information. Also, more trained identified textbooks and newspapers as their main sources of nutrition information.

5.5 Resources and strategies used to teach nutrition

The outcome of the findings on nutrition education resources available in nursery schools indicated that additional nutrition education resources should be made available to teachers to support nutrition education. This is shown in their response to questionnaire where less than half of the teachers reported availability of teaching and learning materials on nutrition in their schools. Ministry of Education (2001) through Kenya Institute of Education developed teacher curriculum guides to be followed by nursery school teachers in teaching children nutrition, yet it is surprising that less than half of teachers reported use of teachers' curriculum guides in their schools. Further investigations of the reasons for this low level of use may be of assistance to Ministry of Education in improving the effectiveness of nutrition education dissemination.

The teachers in this study obtained their nutritional knowledge mainly from their seminars and television, but also from books and friends. A previous study among nursery school teachers also showed that friends had an important role regarding acquisition of nutritional knowledge in teachers (Corley, 2001).

Findings in the current study indicate that teachers generally agree that schools should provide adequate nutrition teaching resources to improve nutrition education. This is of benefit because the availability of resources, including curricula, textbooks, equipment, and facilities, affects the ability of teachers to implement health education (Hargreaves *et*

al., 2001). A national study in United States found that teachers in schools with fewer resources and lower institutional support for nutrition education and teachers with no training were less likely than other teachers to integrate nutrition education into other subjects (Celebuski & Farris, 2000).

Lack of textbooks in schools or inaccessibility to the available textbooks, lack of motivation to use textbooks and lack of funds to purchase the needed textbooks have been observed to limit learning in many schools in Kisumu (Kabiru *et al.,*2003). The reported level of use of textbooks in schools by 50.6% of teachers in the current study is fairly commendable. The results of this study indicate that the level of use of instructional technology resources in Kisumu is still very low compared to the practices in schools in United States, France, Germany and the rest of the world. According to Celebuski & Farris (2000), nursery school teachers use computers on a daily basis. A study by Levine (2002) found coordinating classroom nutrition education with cafeteria activities critical to successful nutrition education program implementation, yet only 15.8% of teachers in the current study reported availability of school cafeteria to reinforce classroom instruction.

The results of this study indicate that teachers use a variety of resources to teach nutrition. Teachers reported using a number of different strategies and activities in nutrition education primarily songs, games, stories, role playing, and group discussion. This is commendable because it has been noted that in order to capture and sustain interest of children in nutrition a variety of teaching methods need to be used (Brevr, 1998).

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The teachers' mean scores are higher for trained teachers than for untrained teachers. The differences between the teachers' mean scores by their education level is not significant. The trained teachers' mean score is higher for teachers with below two years experience than for those in other groups (3-6, 11-14, 7-10, 15 or more years). The teachers believe that nutrition education is necessity for nursery school children and that nutrition should be integrated in the nursery school curriculum.

Nursery school teachers and children need to learn more about nutrition. The mean score of five year-old children is higher than for four and three year-old children. The difference between the mean score of male and female children is not significant. The mean score of children whose teachers are trained in ECD is higher than for those children whose teachers have no training in ECD.

A variety of teaching strategies is used in nursery schools. Nutrition education resources such as teaching and learning materials, school cafeteria are inadequate in the nursery schools. Involvement and participation of parents in the education program is great.

6.2. Recommendations

In the basis, of the results of this study, the following recommendations are made:

1. To increase nutrition knowledge of the teachers particularly in areas such as relationship between diet and health, and sources of vitamin A and C, additional training programs for teachers should be established. The government and all concerned organizations should keep on updating the teachers' nutrition knowledge by mounting training programs through workshops and seminars. School administrators should also encourage the teachers to seek more knowledge on nutrition so as to improve their nutrition knowledge.

2. Data indicate that children's least favorite foods are fruits and vegetables. Parents and teachers need to work together to teach the importance of eating fruits and vegetables, to promote their preferences for fruits and vegetables. Curriculum programs which help children to understand the foods that should be eaten more frequently should be developed.

3. The Ministry of Education and Kenya Institute of Education should develop and avail appropriate nutrition education resources in the nursery schools. Availing of educational materials would promote learning of nutrition and help teachers up date their nutrition knowledge. It is also helpful to encourage teachers to use the available teaching and learning materials to teach young children nutrition Teachers should seek more knowledge on nutrition from textbooks, workshops and seminars to improve their nutrition knowledge.

4. As expressed by teachers, nutrition awareness activities for parents to support nutrition education in nursery schools should be established. The parents need to be involved in activities such as school feeding for children. In the nursery schools, classes or educational programs should be conducted for parents by nutrition experts on topics such as health, nutrition, and various other aspects pertaining to children.

Recommendation for future studies

1. The study began with the nursery school pupils and teachers in public nursery schools, it would be important to examine the nutrition education in private nursery schools or primary schools to establish whether there are similarities or differences and the factors that may influence the teaching of nutrition in the schools.

2. The study concentrated on teachers and children in public nursery schools. A study that interviews different individuals in the schools including teachers, head teachers, pupils and parents is recommended. Understanding their role and influence on the children's nutrition education will help with the design for future programs in terms of content.

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