

## Evaluation of Nutrition Knowledge and Perception of Good Food among Nursery School Pupils in Kisumu Municipality-Kenya

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**Abstract:** Child nutrition is one key factor that determines the outcome of human development and even influences the later quality of one's life. Knowledge about nutrition and health is gained throughout childhood, yet there is limited research on 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 to children. The objectives of this study were to assess nutrition knowledge of preschoolers and assess their perception of what they would consider good food; and to evaluate their teacher knowledge and how this is influencing teaching of nutrition education. The study adopted a cross sectional study design consisting of 365 preschoolers from 36 nursery schools in Kisumu Municipality-Kenya and 146 ECD teachers. Stratified Cluster sampling was used in selecting all the participants. Study results showed that the overall mean nutrition knowledge score of the children was 51.7%. Few children (39.2%) were aware of the foods that should be eaten more frequently by them. There were significant differences between the children's mean scores by their age ( $F = 96.46, p = 0.000$ ). Children who were taught by teachers with previous training in Early Childhood Development scored higher than those children who were taught by teachers without the training. Mean nutrition knowledge score of the teachers was 53.3%. 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 study recommends training of nutrition education and closer collaboration between teachers and parents in teaching young children good nutrition. The government and relevant education institutions should also reinforce nutrition education in nursery school according to the education policy and to facilitate teaching materials for the same.

**Key words:** ECD teacher education, perception, preschoolers nutrition knowledge

### INTRODUCTION

Maternal and child nutrition is one key factor that determines the outcome of human development and significantly influences quality of life in later years. Mother's nutritional intake during pregnancy influences the outcome of the new born and the first few months of the child's life. The child's nutrient intake continues to be impacted by the weaning method used by the caretakers and ultimate food items the child is being introduced to. Nutrition knowledge and basic health practices are thus progressively gained throughout childhood. A child learns at an early age that a right to food is a basic human right and makes efforts in selecting what to eat. As social being, a child learns what is eaten and what should be avoided from their parents, siblings, peers and teachers alike depending on the life stage. This is a significant stage of learning because immediately the child leaves home to go to preschool, the scope of the word food widens and this is the focus of this study.

Outside the home, the child will learn new ideas such as what is tasty and pleasant in the mouth and what is difficult to chew or swallow. At this point the child is then faced with a difficult task of choosing from the long list of food items from different food vendors. Apart from what adults may instruct, the natural taste bud drive of the toddler also will guide a child on what foods to eat. With time, children quickly learn that some food items are exceptionally sweet to eat yet are not approved by parents for everyday eating. The child is then left to wonder for reasons why they are not allowed to feed on such foods as often as they may wish. This is the time when a child comes to be aware that some foods are good while others are not good to be eaten all the time. From available literature, it is apparent that there is limited documentation on the nutrition knowledge of nursery school children in Kenya despite the fact that nutrition is in the approved curriculum. Much of the research assessing nutrition practices in early childhood programs focus on the adequacy of foods that are served to children in school

and what the parents feed their children on. The development and reinforcement of healthy diets and healthy eating behaviors that prevent or reduce incidence of malnutrition is common during the formative years (Carloni, 2004). Promotion of healthy eating behavior has become an important public health initiative as the number of children who are underweight continues to increase (Oniang'o *et al.*, 2003). Most parents are familiar with the odious task of controlling what their children eat when they start going to those nursery schools without strict child feeding programs. This study there examines nutrition knowledge of preschoolers to increase our understanding of how we can influence healthy eating habits among children, particularly when they leave the confines of their homes and get to the wider market place influenced by peers and media houses.

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). According to UNICEF (2009), 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%), activities all of which are associated with ineffective feeding program for children.

Schools have become critical part of the social environment that shape children's eating habits. With the persistence of problem of malnutrition, it was noted that intervention efforts need to be intensified (Olenja, 2004). Until now, most approaches have focused on changing adult feeding behavior and diet. Much of the research assessing nutrition practices in early childhood programs has focused on adequacy of foods that are served to children. Children are future parents, when they are provided with adequate nutrition concepts at formative stages; they are likely to respond effectively to the dietary messages (Contento *et al.*, 2007). They are also likely to develop lifetime healthy eating habits, which would influence their health during adulthood.

In recent years, policy makers have recognized the important role schools play in the effort to reduce malnutrition and to maintain a reasonable standard of hygiene in schools. The Ministry of Education in Kenya includes basic principles of nutrition in the nursery school curriculum (Ministry of Education, 2001). The goal of nutrition education is to teach young children to eat a well-balanced diet that contains a wide variety of foods. Seven years after the Kenyan government produced early

Table 1: Demographic characteristics of the sampled children (N = 365)

Age (years)	Boys		Girls	
	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

childhood development curriculum for 3-6 year olds in 2001, there has not been effective evaluation programs to determine the extent to which the objectives have been achieved. Indeed improved nutrition education aimed at children, and an understanding of children's nutrition knowledge as well as nutrition interests is crucial (Crockett and Sims, 1998). Given the importance of teachers as part of the environmental influence on nutrition information and behavior of children, it is important to also examine and understand teachers' nutritional knowledge and their perceptions regarding nutrition education they are purported to teach. The major objectives of this study are therefore to assess nutrition knowledge of nursery school children, analyze their teachers' knowledge and perceptions the children have about good food, and to identify and analyze resources and strategies used to teach nutrition in public nursery schools.

## MATERIALS AND METHODS

**Study population and design:** This study was carried out between May 2008 and August 2008. Children and teachers from public nursery schools in Kisumu, Kenya participated in this study. A cross-sectional survey was carried out in Kisumu municipality in Western Kenya. The study population consisted of public nursery school teachers and children from 36 nursery schools in Kisumu municipality zones. The 36 schools were selected by means of stratification, giving a total of 39% of the study population. In total there were 146 teachers. All the teachers in the selected schools agreed to participate in the study. The selection of the children was done by clustering them by class. A total of 365 children were selected using systematic randomizing method from the year 3, 4 and 5 classes in the schools; the age category normally used in preschools in Kenya for class placement. The sampling method yielded a group of 173 boys and 192 girls. The distribution of the sample is presented in Table 1.

**Instrumentation:** Data was collected using questionnaires and by observing children pick and select food samples from a food chart. Two questionnaire schedules were used. 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).

The instrument documented by the two authors had acceptable reliability and validity test and thus deemed fit for the current study.

A two-part questionnaire tool was administered to all the participating nursery school teachers. The first section of the questionnaire contained demographic question items such as 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 teach nutrition to the 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 for correct (1 point) or incorrect (0 points) 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 subsequent answer was assigned 1 point. The nutrition knowledge level of children was assessed out of 9 total points. Teachers were also asked to rank a list of factors that positively or negatively influence effective teaching of nutrition in nursery schools. The questionnaire also contained items to investigate teachers' sources of nutrition information and education background.

Another questionnaire was administered to all nursery school children who participated in this study. The questionnaire included demographic information on gender and age of the children. It comprised of 8 food perception questions. Each correct answer was assigned 1 point and the nutrition perception level of children was thus assessed out of 8 total possible points. Each correctly named food was assigned 0.2 point out of 5 possible responses, to give a total of 1 point for correctly naming all foods asked in question 1. 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 children. Pupils also received 1 point for correctly mentioning reason why they liked eating particular food. The nutrition knowledge levels were scored as follows: 0-3 points as inadequate; 4-5 points as moderate; 6-8 points as adequate.

The children's understanding of nutrition was also evaluated through testing their knowledge. They were presented with cards, each card containing pictures of different 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 children and those that should not be eaten as often such as sweets and ice cream. All the scores were entered in tabular form for analysis.

**Pre-testing of instruments:** The survey instruments were field tested with teachers and children attending two public nursery schools in a different area. Such individuals and schools that participated in the pre-tests were excluded from the final sampling stage. The pre-test results were examined for valuable information and format, content, expression and importance of test items reevaluated. During the designing of the survey the authors checked for consistency in the interpretation of questions and ambiguous items were deleted. After review of the instruments all suggested revisions were made before the tools were administered.

**Ethical considerations:** Research permit was obtained from relevant institutions. An informed consent was also obtained from the nursery school head-teachers and other class teachers. A letter was sent to the children's parents and guardians informing them of the study and to ask their consent. Children whose parents returned the signed consent forms were considered for inclusion in the study.

**Data analysis:** The teachers and children's characteristics were analyzed using descriptive statistics. Nutritional 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  $p \leq 0.05$ .

## RESULTS

**Demographic characteristics of the sampled nursery school children:** The data in Table 1 shows the demographic characteristics of the 365 sampled children.

The figures indicate that in all the age categories, there were more boys than girls enrolled in nursery schools within the municipality. This was consistent with the Kenyan schools pupil registration which shows more girls than boys going to nursery and primary schools.

Demographic information about the 146 sampled nursery school teachers is presented in Table 2. At least 73% of the selected nursery school teachers had some nursery school teacher training certificate with 64% obtaining early childhood development certification. A total of 48% had more than 7 years of experience making this sampled population to be fairly well placed in handling preschooler's education. It was noted that only 17(11.6%) of the teachers had less than two years experience although most of them had just come from Early Childhood Development training colleges.

**Pupils' knowledge of nutrition:** When the children were asked to indicate the foods that they should eat more

Table 2: Distribution of the nursery school teachers by demographic characteristic (N = 146)

Characteristics of the teachers	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

often, few children (39.2%) could correctly identify oranges, bread and cabbages as foods that they should eat more often (Table 3). Majority (60.8%) of the children mentioned French fries (deep fried potatoes), sodas and cakes as foods that should be eaten frequently by them. Almost all the children who identified these foods said that they either smell good or taste nice. 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. Based on general observations, these are food items parents and teachers normally use in rewarding good behavior among children.

More than half of 3-year-olds (51.5%), and 136 (94.4%) 5-year olds were able to correctly name all the foods on the food chart. Only 102 (84%) 4-year olds also responded correctly to the same question. The results show that 4 and 5-year-old children correctly identified fruits. Most of the 3 year old children were not able to identify fruits on a chart. About 122 (85%) 5-year-olds and 83 (68%) 4-year olds correctly identified fruits probably due to their developmental stage. However, it was not clear how only 24 (24.2%) three year olds could consistently identify a fruit among other foods on the chart. This is an aspect worth reviewing to identify the determinants of their sensitivity taste buds.

When the children were asked to indicate the foods that should not be eaten frequently by them, less than half 69(47.9%) of the 5 year olds and 58(47.5%) of 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%) of the 5-year olds and 40(32.8%) of the 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 preferred choice of foods. 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 as foods of their choice. Interestingly, only 88(21.3%) children gave reasons why they liked eating such foods. Reasons for preferences of food selection had the poorest score, with only 29 (23.8%) of 4-year olds and 6(6%) 3-year olds mentioning correct answers. The options for eating certain good foods included answers such as to grow, for energy, and for good health. From this section, it was concluded that almost all the preschoolers do not know the reasons for eating certain foods. Foods are selected based on taste and what guardians give at home or peers occasionally bring in their lunch boxes. Other children talked about beautiful, good or attractive colors as determinant for choice of good foods for eating despite the fact that these were not part of the expected responses.

**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. Mean score for girls was 4.08 (50.5%) while for male children was 4.33 (54.1%). 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 ( $F = 96.46$ ,  $p = 0.000$ ). This was consistent with expectations because older children tend to be more informed and exposed than

Table 3: Distribution of the nursery school pupils by age and their correct scores in Nutrition knowledge evaluation (N = 365)

Statements of evaluation	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
Identifying fruits	24	24.2	83	68.0	122	84.7	229	62.7
Identifying 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 the 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

Table 4: Differences between children's mean scores in nutritional knowledge by age and gender (N = 365)

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

Table 5: Analysis of variance of the influence of teachers' qualification on nutrition knowledge of the nursery school pupils

Variables	n	Mean score	SD	SE	df	F	Sig.
Teacher training							
Untrained	152	3.86	1.75	0.14	364	9.49	0.002
Trained	213	4.47	1.90	0.13			
Teacher education level							
Primary	4	1.75	0.96	0.48	364	70.11	0.000
Secondary incomplete	92	3.44	1.61	0.16			
Secondary complete	132	3.34	1.58	0.14			
College	137	5.65	1.30	0.11			

Table 6: Perception of teachers towards delivery of nutrition education in Nursery schools (N = 146)

Statements	Strongly agree		Responses 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

their younger counterparts in almost all areas of knowledge acquisition during growth and development. 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, education level and experience are presented in Table 5. The mean score of children whose 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' educational level is considered, mean score of children with college graduate teachers was higher (5.65) than for those whose teachers had only completed secondary education (3.34). Those whom their teachers had incomplete secondary education with mean of 3.44 and completed secondary education with mean of 3.44 were not different. ANOVA showed these differences to be not significant ( $F = 1.44$ ,  $p = 0.222$ ). This also did not come as a surprise because teacher education normally is key to how and what knowledge is imparted to the learner regardless of the level of learning.

**Teachers' knowledge of nutrition and their Influence on Pupils:**

When asked which food is rich in vitamin A and C, about 54% of the teachers gave incorrect responses. Further still almost half (49.3%) of teachers did not know the foods rich in iron. Knowledge about condition caused by iodine deficiency had the poorest score among the teachers. Only 33(22.6%) teachers correctly knew that goiter is caused by iodine deficiency. When the teachers were asked to identify foods and food supplements recommended for a child suffering from rickets, less than half 47(32.1%) of teachers chose the correct answer (cod liver oil and milk) as listed on the chart. In this survey, the majority of teachers who taught nutrition lessons rated their own nutrition knowledge either average or good, with only few ratings at the extremes of excellent and poor. Table 6 illustrates teachers' perception on teaching of nutrition education in nursery schools.

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 also agree or strongly agree that nutrition education should be taught using variety of teaching strategies to capture the attention of the nursery school pupils. Three percent of

Table 7: Instructional materials for nutrition education in the nursery 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

teachers thought that their role in student nutrition was to teach parents nutrition and not the children. Further analysis indicated that 4% of the nursery school teachers feel that it is parents who should be taught nutrition in order to pass the same knowledge to the children at home.

**Nutrition education instructional resources in the nursery schools:** Teaching and instructional materials are key to effective delivery of information particularly to the young learners in nursery schools. Availability and usage of the same were also evaluated. Teachers were requested to list all the resources available for teaching nutrition in their nursery schools. Table 7 shows the distribution of various resources within their schools. At least 95% of the teachers reported availability of visual aids for teaching nutrition and another 4% reporting use of multimedia such as audio aids for poems, rhymes and stories. The visuals included books, charts, posters, cut-out pictures from magazines, replicas, murals, and realia. None of the schools had access to computer for DVDs or other electronic visual aids. Only 23(15.8%) teachers indicated availability of school cafeteria as a resource for teaching nutrition in their schools.

## DISCUSSION

**Child nutrition knowledge:** As mentioned in introduction above, even a child knows that access to food is a basic right and that everybody needs food. From this study it is confirmed that even a three-year old child possesses some discretion about food selection and few go further and have limited nutritional knowledge about the foods they eat. Although the children's knowledge is not well defined, they have an idea of what good food is and can make a choice faced with several options to select from. Children also increasingly add to their nutrition knowledge as they grow older which is consistent with the theory of child development and knowledge acquisition (Adams, 1990; Byrnes, 2001).

The finding on nursery school children's understanding of nutrition indicate that children consider sugar and fatty foods such as cakes and French fries as foods that should be eaten more frequently by them. This characteristic lasts fairly long as a human being grows. The basic value about food which is obtained from home will definitely be carried out of the home into the wider surrounding and the information will be used to influence significant others. A sound nutrition knowledge imparted at home and reinforced at all levels of schooling is likely to go a long way in life. Therefore, it is wise for the children to be encouraged and taught at an early age to

have more fruits and vegetables than empty sugars and fat-filled foods to promote the healthy eating at tender ages of life. Gorelick and 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. Similarly, in Singleton *et al.* (2002), 4-7 year olds named vegetables and fruits as the right kinds of foods. The children in both the studies knew that unhealthy foods were foods high in sugar.

Data for this current study was collected in 2008 period during which there was a lot of outcry from parents in most major towns in Kenya about the influence of mushrooming of small food kiosks near public schools. The intention of the kiosks was to sell non-certified food items from home industries to unsuspecting school pupils. Such food vending exposed many children to unhealthy food habits. From a different observation in Kisumu town where this study was done, it was noted that uncertified food vendors were targeting children by selling them alcohol laced dried colored fruits to unsuspecting young children. To induce children to love going to school, few parents wrongly gave their children few coins when leaving home to go buy something to eat such as bananas, oranges, sweets or ice creams during mid-morning breaks. Such common activities in Kenya influence young children's ability to select healthy foods. This could have influenced the outcome of this study relative to that of Gorelick and Clark (2000) and Singleton *et al.* (2002). Of course background of the children and the levels of CDE training of teachers could have played a significant role in the outcome of children's nutrition knowledge as is the case in this Kisumu project.

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 or do not like certain foods. 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.

The results of this study also indicate that four and five year olds knew and could identify fruits and vegetables even though these were not necessarily their food of choice. This finding is consistent to the study by Gorelick and Clark (2000) in which children scored significantly higher on fruit identification. Hart (2002) found that as children mature, they are better able to identify 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 as a base for good nutrition in human health. Michela and 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.

This study did not find any significance between boys and girls. Although it is generally believed that females' nutrition knowledge is significantly higher than for males because girls tend to involve themselves more with their mothers than males in cooking as observed also by Nuhlicel *et al.* (2002), this current study did not find this relationship. There is no significant difference between the mean scores of female and male children. Even though, 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) according to Piaget cognitive theory of development.

**Impact of teachers' nutrition knowledge:** It is the Kenyan Ministry of Education policy that nutrition education is given to all school going children in preprimary education (Ministry of Education, 2001). According to this policy there are lesson guides to enable teachers in preprimary schools to effectively handle the topics well with the young learners. In this survey the majority of teachers (85.2%) report teaching nutrition to their pupils in nursery schools. It is not clear what kind of information is passed on to the pupils because the teachers did not display competency in handling nutrition lessons. The assessment of nutrition knowledge of teachers indicated that they performed only moderately well in the knowledge test with a mean score 4.79(53%). The implication is that the sampled teachers possess minimal knowledge in nutrition. The results indicate that they are only well aware of the sources of proteins and carbohydrates, limited information not adequate to teach basic nutrition to first time learners such as the preschoolers. A similar Canadian study also showed that nursery school teachers tend to be aware of sources of proteins and carbohydrates better than other nutrients (Malik, 2000). It is worth noting that most people would only cite protein and carbohydrates as the known food value in Kenya. The teachers in this study did not show a basic knowledge of foods rich in vitamin A and C, suggesting that the teachers need a better training about sources of critical vitamins and minerals for healthy living. However, the teachers were knowledgeable of the dangers associated with excess fat intake and the risk of coronary heart diseases. Temple (1999) and

Al-Numeir (2004) reported that coronary heart diseases were among the most known topics by nursery school teachers. Nevertheless, the teachers were not aware of the condition caused by iodine deficiency, and the foods recommended for a child suffering from rickets. This means that they are not be able to identify should such problems exist among the children they are handling in class. This is consistent with the findings of Shoaf (1996), where the nursery school teachers in Ohio had poor knowledge about links between iodine and goiter and Juzwiak (2004) in Brazil. Such findings indicate that more effort is needed to raise awareness on the importance of eating iodine rich foods, and vitamin D rich foods.

**Impact of teachers' perception:** Although the teachers in this study showed a dismal performance in nutrition education, they have positive attitudes towards the subject. Almost all the teachers support the idea of teaching nutrition to preschoolers. They agreed that nutrition education should be integrated in the nursery school curriculum. They also appreciate the role of encouraging healthy eating habits and improving nutritional status of children for better performance in school consistent with what Hargreaves *et al.* (2001) recorded. They thus suggested that parents should be involved in supporting nutrition lessons in schools. Several studies support involvement of parents, guardians and teachers alike in nurturing healthy eating (Ramey and Ramey, 2004; Oldershaw, 2002; Desforges, 2003). There was significant difference between mean scores of preschoolers whose teachers were ECD trained and those without. Even though such an outcome is not necessarily unique, but it is a pointer that ECD teacher training is crucial for nutrition knowledge of children in preprimary schools.

## CONCLUSION AND RECOMMENDATION

It is apparent that preschoolers in the sample selected from Kisumu municipality are not adequately knowledgeable in nutrition education. Relative to the current curriculum expectations about basic nutrition education, the children would not select healthy foods unless closely guided by their parents and teachers. This defeats the efforts of introducing nutrition education in nursery schools where children are expected to be knowledgeable about good food; and be able to make wise decision when to avoid junk food how to pick fruits and vegetables from a given selection. To improve on this shortfall, training programs for nursery school teachers should be enforced. In-service (on-job training) of the teachers who are on board should be made an available option. Parents and teachers need to work together to teach the importance of healthy eating. Provision of appropriate teaching aids should be facilitated by the relevant government and even private institution to improve teaching nutrition to preschoolers.

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